



# **PERFORATING CATALOG**

ISSUE 1 – September 2023

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## About GEODynamics

GEODynamics is the global technology and manufacturing leader in perforating, downhole completion, intervention, and wireline-conveyed solutions. GEODynamics creates and delivers downhole solutions that enable unsurpassed well economics, performance, and lifespan.

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## Revisions

| ISSUE | DATE              | NOTES   |
|-------|-------------------|---|
| 1     | September 9, 2022 | Issue 1, release for 2022. Shaped charge performance data has been updated for all gun systems. Shaped charge data tables are grouped by application: good hole, super big hole, deep penetrating, etc., and then grouped by gun size and brand. New catalog topics added for conventional subs, conventional centralizing gun connectors, lifting equipment, and support plates. Minor edits, corrections, and format updates throughout. Removed FracIQ PRO gun systems (GWA31 and GWA33).  |
| 2     | December 21, 2022 | Added crossover to pumpdown sub details to STRATX GIC31 and GIC33 gun system topics. Moved Direct Connection topics to pages 44-46, which follow STRATX gun system topics. Updated parts list details for STRATX Direct Connection (top gun connector) rebuild kits (page 45). Added Diamondback setting tool crossover details to EPIC Module Ignitor topic (page 46). Removed wireline release tool.  |
| 1     | September 1, 2023 | 2023 release, issue 1: <ul style="list-style-type: none"> <li>• Charge performance data updates throughout the catalog for 3-1/8" FracIQ (removed LD charges) and EC2-33A1921-E (perforating conditions).</li> <li>• Updated Detonators, Detonating Cord, and Accessories topic (removed inactive part numbers; added new items).</li> <li>• Added the following conventional long gun systems: 4-5/8" 5 spf HP, 4-3/4" 12 spf XDP, and 4-3/4" 16 spf SBH.</li> <li>• Removed slickwall carriers.</li> <li>• Reduced maximum tensile specification for 3-1/8" conventional (GA and GLB) gun systems (from 245,200 lbf to 202,300 lbf, calculated hardware breaking point). This change made on all relevant gun system pages and the Mechanical Performance Data pages.</li> <li>• Added GIC31-SO02 and GIC31-SO03 gun details (STRATX SandIQ).</li> <li>• Added several new part numbers to Centralizing Gun Connectors.</li> <li>• Added new catalog pages for the 4.50" Centralizing Break-Apart Tandem Sub.</li> <li>• Added new Super Good Hole (SGH) charge, EC2-40S4551, performance data to 7" 12 SPF catalog topic.</li> </ul> |
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# Mechanical Performance

## Data Summary

| Carrier O.D. / System Type | SPF / Phasing (tested) | Maximum Pressure (psi) [MPa] | Maximum Tensile* (lbf)[kN] | Charge Size/Type         | Charge Part Number | Perforating Condition  | API Maximum Gun Swell (in)[mm] |
|----------------------------|------------------------|------------------------------|----------------------------|--------------------------|--------------------|------------------------|--------------------------------|
| 1-9/16" GA Series, RTG     | 4 spf / 0°             | 20,000 [138]                 | 88,100 [392]               | 3.2g, HMX, Razor® XDP    | EC1-15A0322        | In Fluid or Dry        | 1.69 [42.93]                   |
|                            | 6 spf / 60°            |                              |                            |                          |                    | Fluid                  |                                |
|                            | 6 spf / 0°             |                              |                            |                          |                    | Dry                    |                                |
| 1-3/4" GA Series, RTG      | 6 spf / 0°             | 20,000 [138]                 | 88,100 [392]               | 5.1g, HMX, Razor XDP     | EC1-17A0522        | Fluid                  | 1.91 [48.51]                   |
| 2" GA Series, RTG          | 6 spf / 60°            | 20,000 [138]                 | 153,100 [681]              | 6.8g, HMX, Razor XDP     | EC1-20A0722        | Fluid                  | 2.14 [54.36]                   |
|                            | 6 spf / 60°            |                              |                            | 6.5g, HMX, Razor XLS XDP | EC1-20B0722        | In Fluid or Dry (6.5g) | 2.22 [56.39]                   |
|                            | 6 spf / 60°            |                              |                            | 6.8g, HMX, Connex®       | EC1-20A0722-RC     | Fluid                  | 2.18 [55.37]                   |
|                            | 6 spf / 60°            |                              |                            | 6.5g, HMX, Connex® XLS   | EC1-20B0722-RC     | In Fluid or Dry (6.5g) | 2.29 [58.16]                   |
|                            | 6 spf / 60°            |                              |                            | 11.0g, HMX, Razor XDP    | EC2-23A1122        | Fluid                  | 2.56 [65.02]                   |
| 2-3/8" GA Series, RTG      | 6 spf / 60°            | 20,000 [138]                 | 153,100 [681]              | 11.0g, HMX, Connex       | EC2-23A1122-RC     |                        |                                |
|                            | 6 spf / 60°            |                              |                            | 10.5g, HMX, Connex XLS   | EC2-23A1122-RC-LS  | ‡ Fluid or Dry (10.5g) | 2.62 [66.55]                   |
| 2-1/2" GA Series, RTG      | 6 spf / 60°            | 20,000 [138]                 | 137,500 [612]              | 11.5g, HMX, Razor XDP    | EC2-25A1122        | Fluid                  | 2.66 [67.56]                   |
|                            | 6 spf / 60°            |                              |                            | 11.5g, HMX, Connex       | EC2-25A1122-RC     |                        |                                |
| 2-3/4" GLB27 Series        | 6 spf / 60°            | 25,000 [172]                 | 176,600 [785]              | 15.0g, HMX, Razor XDP    | EC2-27A1522        | Fluid                  | 2.90 [73.66]                   |
|                            |                        |                              |                            |                          |                    | Dry                    | 3.02 [76.71]                   |
| 2-3/4" GA Series           | 6 spf / 60°            | 25,000 [172]                 | 176,600 [785]              | 15.0g, HMX, Razor XDP    | EC2-27A1522        | Fluid                  | 2.90 [73.66]                   |
|                            | 6 spf / 60°            |                              |                            |                          |                    | Dry                    | 3.02 [76.71]                   |
|                            | 6 spf / 60°            |                              |                            |                          |                    | Fluid                  | 2.91 [73.91]                   |
| 2-7/8" GA Series, Standard | 6 spf / 60°            | 20,000 [138]                 | 213,700 [950]              | 15.0g, HMX, Razor XDP    | EC2-27A1522        | Fluid or Dry           | 3.13 [79.50]                   |
|                            | 6 spf / 60°            |                              |                            | 15.0g, HMX, Connex       | EC2-27A1522-RC     |                        |                                |
|                            | 6 spf / 60°            |                              |                            | 18.0g, HMX, Connex       | EC2-28A1822-RC     | Fluid                  | 3.07 [77.98]                   |
|                            | 6 spf / 60°            |                              |                            | 18.0g, HMX, Razor XDP    | EC2-28A1822        |                        |                                |
| 2-7/8" GA Series, HP       | 6 spf / 60°            | 25,000 [172]                 |                            | 15.0g, HMX, Razor XDP    | EC2-27A1522        | Fluid or Dry           | 3.13 [79.50]                   |
|                            | 6 spf / 60°            |                              |                            | 15.0g, HMX, Connex       | EC2-27A1522-RC     |                        |                                |
| 3-1/8" GIC31, STRATX®      | 6 spf / 60°            | 20,000 [138]                 | 140,000 [622]              | Various Charge Options   | See Catalog Pages  | Fluid (22.7g)          | 3.46 [87.88]                   |
|                            | 6 spf / 60°            |                              |                            |                          |                    | ‡ Dry (19.0g)          | 3.60 [91.44]                   |
| 3-1/8" GIC31-HF STRATX®    | 6 shot HELLFire®       | 16,000 [110]                 |                            | 7.0g, RDX, HELLFire®     | EC2-31K Series     | Fluid                  | 3.46 [87.88]                   |
| 3-1/8" GHF31 Series        | 6 shot HELLFire        | 16,000 [110]                 | TBD                        | 7.0g, RDX, HELLFire      | EC2-31K Series     | Fluid                  | 3.46 [87.88]                   |

\*Hardware calculated breaking point

‡ For 2-3/8" in dry gas, maximum shot density is 5 spf and limited to low-swell (LS) charges only. Refer to catalog pages for more details.

FLUID: Qualified for shooting in FLUID only with perforating systems qualified by GEODynamics.

IN FLUID or DRY: Qualified for shooting in FLUID or DRY GAS with perforating systems qualified by GEODynamics.

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# Mechanical Performance

## Data Summary

| Carrier O.D. / System Type | SPF / Phasing<br><i>(tested)</i> | Maximum Pressure<br><i>(psi) [MPa]</i> | Maximum Tensile*<br><i>(lbf)[kN]</i> | Charge Size/Type       | Charge Part Number | Perforating Condition | API Maximum Gun Swell<br><i>(in)[mm]</i> |
|----------------------------|----------------------------------|--|--------------------------------------|------------------------|--------------------|-----------------------|--|
| 3-1/8" GA Series           | 6 spf / 60°                      | 22,500 [155]                           | 202,300 [900]                        | 22.7g, HMX, Razor® XDP | EC2-33A2322        | Fluid                 | 3.41 [86.61]                             |
|                            | 22.7g, HMX, Connex®              |  |                                      | EC2-33A2322-RC         | Fluid              | 3.41 [86.61]          |  |
|                            | 19.0g, HMX, Razor XDP            |  |                                      | EC2-33A1922            | Fluid              | 3.46 [87.88]          |  |
|                            | ‡ Fluid or Dry                   |  |                                      |                        | 3.60 [91.44]       |                       |  |
| 3-1/8" GLB31 Series        | 6 spf / 60°                      | 22,500 [155]                           | 202,300 [900]                        | Various Charge Options | See Catalog Pages  | Fluid (22.7g)         | 3.46 [87.88]                             |
|                            | 6 spf / 60°                      |  |                                      |                        |                    | ‡ Dry (19.0g)         | 3.60 [91.44]                             |
| 3-1/8" GT31, SandIQ® PRO   | 60° Phase/45° Charge Tilt        | 22,500 [155]                           | 202,300 [900]                        | 22.7g, RDX, SandIQ®    | EC2-33A2371-SF     | Fluid                 | 3.46 [87.88]                             |
| 3-3/8" GIC33-HF, STRATX    | 6 shot HELLFire                  | 15,000 [103]                           | 175,000 [778]                        | 7.0g, RDX, HELLFire®   | EC2-33K Series     | Fluid                 | 3.48 [88.39]                             |
| 3-3/8" GHF33, HELLFire     | 6 shot HELLFire                  | 15,000 [103]                           | 331,900 [1476]                       | 7.0g, RDX, HELLFire    | EC2-33K Series     | Fluid                 | 3.48 [88.39]                             |
| 3-3/8" GA Series           | 6 spf / 60°                      | 22,700 [156]                           | 331,900 [1476]                       | 25.0g, HMX, Razor XDP  | EC2-33B2522        | Fluid                 | 3.56 [90.42]                             |
|                            | 22.7g, HMX, Razor XDP            |  |                                      | EC2-33A2322            | Fluid or Dry       | 3.62 [91.95]          |  |
|                            | 25.0g, HMX, Connex               |  |                                      | EC2-33B2522-RC         | Fluid              | 3.56 [90.42]          |  |
|                            | 22.7g, HMX, Connex               |  |                                      | EC2-33A2322-RC         | Fluid or Dry       | 3.63 [92.20]          |  |
| 3-3/8" GA Series, SBH      | 12 spf / 150°-30°                | 20,000 [138]                           | 331,900 [1476]                       | 12.0g, RDX, Basix SBH  | EC2-31B1231        | Fluid                 | 3.46 [87.88]                             |
| 3-3/8" GLB33 Series        | 6 spf / 60°                      | 22,700 [156]                           | 331,900 [1476]                       | Various Charge Options | See Catalog Pages  | Fluid (25.0g)         | 3.56 [90.42]                             |
|                            | 6 spf / 60°                      |  |                                      |                        |                    | Dry (22.7g)           | 3.63 [92.20]                             |
| 4" HF Series               | 6 shot HELLFire®                 | 15,000 [103]                           | 318,000 [1414]                       | 12.0g, RDX, HELLFire   | EC2-40K1271        | Fluid                 | 4.60 [116.84]                            |
| 4" GA Series               | 4 spf / 60°                      | 19,700 [135]                           | 434,400 [1932]                       | 39.0g, HMX, Razor XDP  | EC2-40A3922        | Fluid                 | 4.16 [105.66]                            |
|                            | 4 spf / 60°                      |  |                                      | 39.0g, HMX, Connex     | EC2-40A3922-RC     |                       |  |
| 4-1/2" GA Series           | 5 spf / 60°                      | 17,700 [122]                           | 517,800 [2303]                       | 39.0g, HMX, Razor XDP  | EC2-40A3922        | Fluid                 | 4.67 [118.62]                            |
|                            | 5 spf / 60°                      |  |                                      | 39.0g, HMX, Connex     | EC2-40A3922-RC     |                       |  |
|                            | 12 spf / 135°-45°                | 17,200 [118]                           |                                      | 22.7g, HMX, Razor XDP  | EC2-33A2322        |                       | 4.64 [117.86]                            |
|                            | 12 spf / 135°-45°                |  |                                      | 22.7g, HMX, Connex     | EC2-33A2322-RC     |                       | 4.69 [119.13]                            |

\*Hardware calculated breaking point

‡ For 3-1/8" 19g in dry gas, maximum shot density is 5 spf or limited to one- (1) and two- (2) shot short guns only.

FLUID: Qualified for shooting in FLUID only with perforating systems qualified by GEODynamics.

IN FLUID or DRY: Qualified for shooting in FLUID or DRY GAS with perforating systems qualified by GEODynamics.

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# Mechanical Performance

## Data Summary

| Carrier O.D. /<br>System Type        | SPF / Phasing<br><i>(tested)</i> | Maximum<br>Pressure<br><i>(psi) [MPa]</i> | Maximum<br>Tensile*<br><i>(lbf)[kN]</i> | Charge Size/Type        | Charge Part Number | Perforating<br>Condition | API Maximum<br>Gun Swell<br><i>(in)[mm]</i> |  |
|--------------------------------------|----------------------------------|---|---|-------------------------|--------------------|--------------------------|---|--|
| 4-5/8" GA Series, Standard           | 5 spf / 60°                      | 18,900 [130]                              | 454,600 [2022]                          | 39.0g, HMX, Razor® XDP  | EC2-40A3922        | Fluid                    | 4.816 [122.33]                              |  |
| 4-5/8" GA Series, HP                 |                                  | 25,000 [172] @ 250°F                      |   |                         |                    |                          |   |  |
| 4-5/8" GA Series, Standard           | 12 spf / 135°-45°                | 18,900 [130]                              | 454,600 [2022]                          | 22.7g, HMX, Razor XDP   | EC2-33A2322        | Fluid                    | 4.69 [119.13]                               |  |
| 4-5/8" GA Series, HP                 | 16 spf / 140°-20°                |   |   | 26.0g, RDX, Razor SBH   | EC2-46A2631        | Fluid                    | 4.81 [122.17]                               |  |
|                                      | 16 spf / 140°-20°                | 20,000 [138] @ 235°F                      | 465,300 [2069]                          |                         |                    |                          |   |  |
| 4-3/4" GA Series                     | 12 spf / 135°-45°                | 25,000 [172] @ 260°F                      | 454,600 [2022]                          | 22.7g, HMX, Razor XDP   | EC2-33Z2322-RC     | Fluid                    | 4.867 [123.62]                              |  |
|                                      | 16 spf / 140°-20°                | 23,000 [158] @ 260°F                      |   | 26.0g, RDX, Razor SBH   | EC2-46A2631        | Fluid                    | 4.828 [122.63]                              |  |
| 4-3/4" GA Series, HPHF               | 24 spf / 90°-45°                 | 30,000 [207]                              | 688,000 [3060]                          | 18.0g, HMX, Razor SBH   | EC2-48K1832        | Fluid                    | 4.81 [122.17]                               |  |
| 5-1/8" GA Series                     | 12 spf / 135°-45°                | 17,200 [118]                              | 461,800 [2054]                          | 19.0g, RDX, Razor DP/GH | See Catalog Pages  | Fluid                    | 5.34 [135.64]                               |  |
|                                      | 16 spf / 140°-20°                |   |   | 32.0g, RDX, Razor SBH   | EC2-51A3231        | Fluid                    | 5.33 [135.38]                               |  |
|                                      | 22 spf / 140°-20°                | 15,400 [106]                              |   | 19.0g, RDX, Razor DP/GH | See Catalog Pages  |                          | 5.34 [135.64]                               |  |
| 6-3/4" GA Series, HPHF               | 22 spf / 90°-45°                 | 30,000 [207]                              | 1,229,000 [5466]                        | 52.0g, Razor SBH        | EC2-68K5232        | Fluid                    | 6.83 [178.48]                               |  |
| 7" GA Series                         | 12 spf / 135°-45°                | 13,500 [93]                               | 770,700 [3428]                          | 39.0g, RDX, Razor DP/GH | EC2-40A3922        | Fluid                    | 7.28 [184.91]                               |  |
|                                      |                                  |   |   | 52.0g, RDX, Razor SBH   | EC2-70C5231        |                          | 7.15 [181.61]                               |  |
| 7" GA Series, Standard               | 15 spf / 140°-20°                | 13,500 [93]                               |   | 52.0g, RDX, Razor SBH   | EC2-70C5231        | Fluid                    | 7.23 [183.64]                               |  |
| 7" GA Series, HP                     |                                  | 14,600 [100]                              |   |                         |                    |                          |   |  |
| 7" GA Series, 360°<br>Channel Finder | 18 spf / 90°<br>Rotated Cluster  | 11,500 [79]                               |   | 39.0g, RDX, Razor SBH   | EC2-70K3931        | Fluid                    | 7.22 [183.39]                               |  |
|                                      |                                  |   |   | 52.0g, RDX, Razor SBH   | EC2-70K5232        |                          |   |  |
| 7" Eclipse                           | 20 spf / 90°-45°                 | 11,500 [79]                               |   | 39.0g, RDX, Razor SBH   | EC2-70K3931        | Fluid                    | 7.22 [183.39]                               |  |
|                                      |                                  |   |   | 52.0g, RDX, Razor SBH   | EC2-70K5232        |                          |   |  |

\*Hardware calculated breaking point

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# General Data on Explosives

## Temperature vs. Exposure Time Chart

### Explosives Supplied by GEODynamics

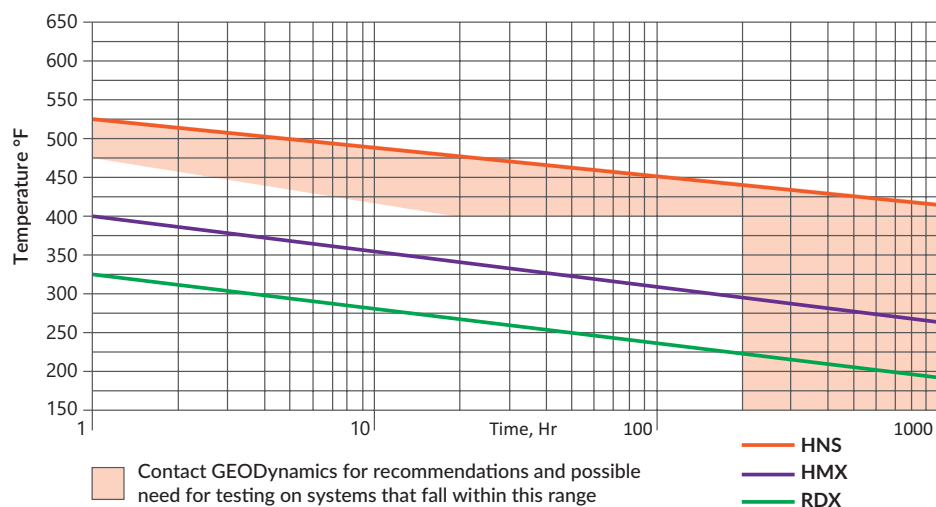
GEODynamics manufactures and supplies an extensive line of high quality, high performance explosive products for use in oil and gas well completions. These products include:

- Shaped charges
- Primer cords (Primacord™)
- Detonators
- Cutters and severing tools
- Setting tools

When loading perforating guns, the explosive materials used in primer cord and shaped charges should be matched. For example, when using HMX shaped charges, HMX primer cord should be used.

### Temperature vs. Exposure Time for Common Explosive Materials

The following chart illustrates the maximum temperature and exposure time above which explosive material will exhibit significant degradation and performance will suffer. Effects should be considered irreversible and exposure time is therefore cumulative in case multiple exposure periods occur.



### Common Explosive Materials Used in Charges and Primer Cords

#### RDX (Cyclotrimethylene Trinitramine)

Economical material with good performance. RDX is usually pink in color. Maximum application temperature\* is 325°F for one hour or less. Density is 1.82 g/cc. Melting point is 399°F. Detonation velocity is approximately 28,709 ft/sec.

#### HMX (Cyclotetramethylene Trinitramine)

Used when an explosive with a higher temperature rating and higher performance than RDX is required. HMX is usually white in color. Maximum application temperature\* is 400°F for one hour or less. Density is 1.9 g/cc. Melting point is 536°F. Detonation velocity is approximately 29,857 ft/sec.

#### HNS (Hexanitrosilbene)

Used for applications in which the material will be subjected to high temperatures. HNS is substantially more expensive than RDX or HMX, and performance is less than that of RDX or HMX. HNS is usually pale yellow in color. Maximum application temperature\* is 520°F for one hour or less. Density is 1.75 g/cc. Melting point is 600°F. Detonation velocity is approximately 22,967 ft/sec.

\*See chart for maximum application temperature ranges

# Shaped Charges

## Good Hole

- Connex® delivers clean, open tunnels independent of rock type. Every tunnel receives its own cleaning action, independent of other perforations, resulting in a much greater percentage of clean tunnels and ideal flow path between undamaged reservoir and the wellbore. Connex charges use reactive metals to create a secondary reaction to clear out the compaction zone in a perforating zone. Patented charge liner material deposited along the tunnel reacts exothermically when introduced to heat and pressure. This reaction creates significant pressure within and around the tunnel, breaking up and expelling the crushed zone compacted debris back into the well bore. In sufficiently competent rock, fractures are also formed at the tunnel tip.
- Basix™ delivers impressive quality at an equally impressive price point. High-performing and budget-conscious Basix takes conventional shaped charge technology and kicks it up a notch. Basix charges are available for good hole, big hole, super big hole, and deep-penetration perforating applications.



## CONVENTIONAL/UNCONVENTIONAL GOOD HOLE, 2" - 3-1/8" GUN SYSTEMS

| Carrier O.D. | Shaped Charge   | Part Number    | Perforating Condition | Explosive  | Shot Density / Phasing                   | ^Casing O.D. | Performance in Concrete |               | Performance in Stressed Berea |               |
|--------------|-----------------|----------------|-----------------------|------------|--|--------------|-------------------------|---------------|-------------------------------|---------------|
|              |                 |                |                       |            |  | Application  | EHD (in)[cm]            | TTP (in)[cm]  | EHD^ (in)[cm]                 | TTP (in)[cm]  |
| 2" 6.8g      | 2007 Basix GH   | EC1-20A0742    | In Fluid or Dry       | 6.8g, HMX  | 4 spf / 0°                               | 3-1/2" L-80  | 0.36 [0.91]             | 20.52 [52.12] |                               |               |
| 2-7/8" 15g   | 2715 Connex XEH | EC2-27A1541-RC | In Fluid or Dry       | 15.0g, RDX | 6 spf / 60°                              | 4-1/2"       |                         |               | 0.30 [0.76]                   | 12.30 [31.24] |
|              |                 | EC2-27A1542-RC |                       | 15.0g, HMX |  |              |                         |               | 0.35 [0.89]                   | 11.60 [29.46] |
| 3-1/8" 19g   | 3319 Connex XEH | EC2-33A1941-RC | ‡ Fluid or Dry        | 19.0g, RDX | 5 spf / 60° (Dry)<br>6 spf / 60° (Fluid) | 4-1/2" L-80  |                         |               | 0.41 [1.04]                   | 14.20 [36.07] |
|              |                 | EC2-33A1942-RC |                       | 19.0g, HMX |  |              |                         |               | 0.42 [1.07]                   | 14.37 [36.50] |
|              | 3319 Basix GH   | EC2-33A1941    |                       | 19.0g, RDX |  |              | 0.60 [1.52]             | 28.55 [72.52] |                               |               |
|              |                 | EC2-33A1942    |                       | 19.0g, HMX |  |              |                         |               |                               |               |
| 3-1/8" 23g   | 3323 Connex XEH | EC2-33A2341-RC | Fluid                 | 22.7g, RDX | 6 spf / 60°                              | 4-1/2"       |                         |               | 0.43 [1.09]                   | 15.60 [39.62] |
|              |                 | EC2-33A2342-RC |                       | 22.7g, HMX |  |              |                         |               | 0.43 [1.09]                   | 15.89 [40.36] |
|              | 3323 Basix GH   | EC2-33A2341-E  |                       | 22.7g, RDX |  | 5-1/2" L-80  | 0.48 [1.22]             | 31.40 [79.76] |                               |               |
|              |                 | EC2-33A2342-E  |                       | 22.7g, HMX |  | 4-1/2"       |                         |               |                               |               |

‡ For 3-1/8" 19g in dry gas, maximum shot density is 5 spf or limited to one- (1) and two- (2) shot short guns only.

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

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### CONVENTIONAL/UNCONVENTIONAL GOOD HOLE, 3-3/8" - 7" GUN SYSTEMS

| Carrier O.D. | Shaped Charge   | Part Number    | Perforating Condition | Explosive    | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |               | Performance in Stressed Berea |               |
|--------------|-----------------|----------------|-----------------------|--------------|------------------------|--------------|-------------------------|---------------|-------------------------------|---------------|
|              |                 |                |                       |              |                        | Application  | EHD (in)[cm]            | TTP (in)[cm]  | EHD^ (in)[cm]                 | TTP (in)[cm]  |
| 3-3/8" 19g   | 3319 Connex XEH | EC2-33A1941-RC | In Fluid or Dry       | 19.0g, RDX   | 6 spf / 60°            | 4-1/2" L-80  |                         |               | 0.41 [1.04]                   | 14.20 [36.07] |
|              |                 | EC2-33A1942-RC |                       | 19.0g, HMX   |                        |              |                         |               | 0.42 [1.07]                   | 14.37 [36.50] |
| 3-3/8" 23g   | 3323 Connex XEH | EC2-33A2341-RC | In Fluid or Dry       | 22.7g, RDX   |                        |              |                         |               | 0.43 [1.09]                   | 15.60 [39.62] |
|              |                 | EC2-33A2342-RC |                       | 22.7g, HMX   |                        |              |                         |               | 0.43 [1.09]                   | 15.89 [40.36] |
|              | 3323 Basix GH   | EC2-33A2341    |                       | 22.7g, RDX   |                        |              | 0.52 [1.32]             | 33.58 [85.29] |                               |               |
|              |                 | EC2-33A2342    |                       | 22.7g, HMX   |                        |              |                         |               |                               |               |
| 3-3/8" 25g   | 3325 Connex XEH | EC2-33B2541-RC | Fluid                 | 25.0g, RDX   |                        |              |                         |               | 0.40 [1.02]                   | 14.92 [37.90] |
|              |                 | EC2-33B2542-RC |                       | 25.0g, HMX   |                        |              |                         |               | 0.50 [1.27]                   | 16.50 [41.91] |
|              | 3325 Basix GH   | EC2-33B2541    |                       | 25.0g, RDX   |                        |              | 0.57 [1.45]             | 25.91 [65.81] |                               |               |
| 4-1/2" 23g   | 3323 Connex XEH | EC2-33A2341-RC | Fluid                 | 22.7g, RDX   | 6 spf / 60°            | 7.0"         |                         |               | 0.34 [0.86]                   | 14.72 [37.39] |
|              |                 | EC2-33A2342-RC |                       | 22.7g, HMX   |                        |              |                         |               | 0.43 [1.09]                   | 15.89 [40.36] |
| 5-1/8" 19g   | 3319 Razor GH   | EC2-33A1941-G  | Fluid                 | † 19.0g, RDX | 22 spf / 140°-20°      | 7-5/8"       |                         |               | 0.37 [0.94]                   | 25.20 [64.01] |
|              |                 | EC2-33A1942-G  |                       | † 19.0g, HMX |                        |              |                         |               |                               |               |
|              | 3319 Basix GH   | EC2-33A1941-EG |                       | † 19.0g, RDX |                        |              |                         |               |                               |               |
|              |                 | EC2-33A1942-EG |                       | † 19.0g, HMX |                        |              |                         |               |                               |               |
| 7" 39g       | 4039 Basix GH   | EC2-40A3941    | Fluid                 | 39.0g, RDX   | 12 spf / 135°-45°      | 9-5/8"       | 0.80 [2.03]             | 15.42 [39.17] |                               |               |

† 33A charge case must be grooved. For 5-1/8" 22 spf, max. explosive load is 19g.



Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

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# Shaped Charges

## Big Hole and Super Big Hole



- Basix™ delivers impressive quality at an equally impressive price point. High-performing and budget-conscious Basix takes conventional shaped charge technology and kicks it up a notch. Basix charges are available for good hole, big hole, super big hole, and deep-penetration perforating applications.
- Razor® delivers industry-leading shaped charge performance, achieved by combining cutting-edge designs, state-of-the-art production processes, and rigorous quality control. When the amount of area open to flow is critical, Razor SBH leads the way with the industry's largest entry hole and flow area performance.

## CONVENTIONAL/UNCONVENTIONAL BIG HOLE, 3-1/8" - 4-1/2" GUN SYSTEMS

| Carrier O.D. | Shaped Charge | Part Number | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |              | Performance in Stressed Berea |              |
|--------------|---------------|-------------|-----------------------|------------|------------------------|--------------|-------------------------|--------------|-------------------------------|--------------|
|              |               |             |                       |            |                        | Application  | EHD (in)[cm]            | TTP (in)[cm] | EHD^ (in)[cm]                 | TTP (in)[cm] |
| 3-1/8" 23g   | 3323 Basix BH | EC2-33A2331 | Fluid                 | 22.7g, RDX | 6 spf / 60°            | 4-1/2" L-80  | 0.78 [1.98]             | 7.60 [19.30] |                               |              |
|              |               | EC2-33A2332 |                       | 22.7g, HMX |                        |              | 0.79 [2.01]             | 7.80 [19.81] |                               |              |
| 3-3/8" 23g   | 3323 Basix BH | EC2-33A2331 | Fluid                 | 22.7g, RDX | 6 spf / 60°            | 5-1/2" L-80  | 0.70 [1.78]             | 5.79 [14.71] | 0.69 [1.75]                   | 4.05 [10.29] |
|              |               | EC2-33A2332 |                       | 22.7g, HMX |                        |              |                         |              |                               |              |
| 4-1/2" 23g   | 3323 Basix BH | EC2-33A2331 | Fluid                 | 22.7g, RDX | 12 spf/135°-45°        | 7.0" L-80    | 0.81 [2.06]             | 5.28 [13.41] | 0.78 [1.98]                   | 5.00 [12.70] |
|              |               | EC2-33A2332 |                       | 22.7g, HMX |                        |              |                         |              | 0.80 [2.03]                   | 5.30 [13.46] |
| 4-1/2" 39g   | 4039 Basix BH | EC2-40A3931 | Fluid                 | 39.0g, RDX | 5 spf / 60°            | 7.0" L-80    | 0.86 [2.18]             | 6.13 [15.57] |                               |              |
|              |               | EC2-40A3932 |                       | 39.0g, HMX |                        |              |                         |              |                               |              |

## CONVENTIONAL/UNCONVENTIONAL SUPER BIG HOLE, 3-1/8" - 4-5/8" GUN SYSTEMS

| Carrier O.D. | Shaped Charge        | Part Number              | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |              | Performance in Stressed Berea |              |
|--------------|----------------------|--------------------------|-----------------------|------------|------------------------|--------------|-------------------------|--------------|-------------------------------|--------------|
|              |                      |                          |                       |            |                        | Application  | EHD (in)[cm]            | TTP (in)[cm] | EHD^ (in)[cm]                 | TTP (in)[cm] |
| 3-1/8" 12g   | 3112 Basix SBH       | EC2-31B1231              | Fluid                 | 12.0g, RDX | 12 spf/150°            | 5.0" L-80    | 0.70 [1.78]             | 5.60 [14.22] | 0.65 [1.65]                   | 4.60 [11.68] |
|              |                      | EC2-31B1232              |                       | 12.0g, HMX | 12 spf/135°-45°        |              |                         |              |                               |              |
| 3-3/8" 12g   | 3112 Basix SBH       | EC2-31B1231              | Fluid                 | 12.0g, RDX | 12 spf/150°            | 5-1/2" L-80  | 0.71 [1.80]             | 5.88 [14.94] | 0.66 [1.68]                   | 4.70 [11.94] |
|              |                      | EC2-31B1232              |                       | 12.0g, HMX |                        |              |                         |              |                               |              |
| 4-1/2" 26g   | 4526 Basix SBH TL    | EC2-45B2631              | Fluid                 | 26.0g, RDX | 12 spf/135°-45°        | 7.0" L-80    | 0.87 [2.21]             | 5.67 [14.40] |                               |              |
|              |                      | EC2-45B2632              |                       | 26.0g, HMX | 16 spf/ 140°-20°       |              | 0.93 [2.36]             | 5.77 [14.66] |                               |              |
| 4-5/8" 26g   | 4626 Razor SBH TL LD | <sup>1</sup> EC2-46A2631 | Fluid                 | 26.0g, RDX | 16 spf/ 140°-20°       | 7.0" L-80    | 0.90 [2.29]             | 5.50 [13.97] |                               |              |
|              |                      | <sup>1</sup> EC2-46A2632 |                       | 26.0g, HMX |                        |              |                         |              |                               |              |
|              |                      | <sup>1</sup> EC2-46A2631 |                       | 26.0g, RDX |                        | 7-3/4" C-110 | 0.96 [2.44]             | 5.40 [13.72] |                               |              |
|              | 4526 Basix SBH TL    | EC2-45B2631              |                       | 26.0g, RDX |                        | 7.0" L-80    | 0.94 [2.39]             | 6.27 [15.93] |                               |              |
|              |                      | EC2-45B2632              |                       | 26.0g, HMX |                        |              |                         |              |                               |              |
|              | 4626 Basix SBH TL    | <sup>1</sup> EC2-46B2631 |                       | 26.0g, RDX |                        |              | 0.94 [2.39]             | 6.27 [15.93] |                               |              |
|              |                      | <sup>1</sup> EC2-46B2632 |                       | 26.0g, HMX |                        |              |                         |              |                               |              |
|              |                      |                          |                       |            |                        |              |                         |              |                               |              |

Maximum shot density in 4-1/2" carrier is 12 spf. Charge cases 45B, 46A, 46B with 26g load are compatible with 4-1/2" carrier and 4046A load tube.

<sup>1</sup> Charge cases 45A & 46A are zinc; charge cases 45B & 46B are steel. <sup>1</sup> Blank charge case P/N: EP-1085-100-D (4-1/2" BH LD, zinc).

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

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# Shaped Charges

## Super Big Hole

Razor® delivers industry-leading shaped charge performance, achieved by combining cutting-edge designs, state-of-the-art production processes, and rigorous quality control.

- When it is critical that your perforation tunnel escapes near-wellbore damage and contacts the formation, Razor XDP's best-in-class penetration pushes your perforations to new depths.
- When the amount of area open to flow is critical, Razor SBH leads the way with the industry's largest entry hole and flow area performance.



## CONVENTIONAL/UNCONVENTIONAL SUPER BIG HOLE, 4-3/4" - 7" GUN SYSTEMS

| Carrier O.D. | Shaped Charge        | Part Number              | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D.      | Performance in Concrete |              | Performance in Stressed Berea |              |
|--------------|----------------------|--------------------------|-----------------------|------------|------------------------|-------------------|-------------------------|--------------|-------------------------------|--------------|
|              |                      |                          |                       |            |                        | Application       | EHD (in)[cm]            | TTP (in)[cm] | EHD^ (in)[cm]                 | TTP (in)[cm] |
| 4-3/4" 18g   | 4818 Razor SBH       | EC2-48K1831              | Fluid                 | 18.0g, RDX | 24 spf / 90°-45°       | 7.0" L-80         |                         |              |                               |              |
|              |                      | EC2-48K1832              |                       | 18.0g, HMX |                        | † 7-3/4" Q-125    | 0.73 [1.85]             | 4.81 [12.22] |                               |              |
| 5-1/8" 32g   | 5132 Razor SBH TL LD | <sup>2</sup> EC2-51A3231 | Fluid                 | 32.0g, RDX | 16 spf / 140°-20°      | 7-5/8" L-80       | 0.63 [1.60]             | 3.70 [9.40]  |                               |              |
|              |                      | <sup>2</sup> EC2-51A3232 |                       | 32.0g, HMX |                        |                   | 1.07 [2.72]             | 6.60 [16.76] |                               |              |
|              | 5132 Razor SBH LD    | <sup>2</sup> EC2-51B3231 |                       | 32.0g, RDX | 12 spf / 135°-45°      |                   | 1.05 [2.67]             | 7.08 [17.98] |                               |              |
|              |                      |                          |                       | 32.0g, RDX | 16 spf / 140°-20°      |                   | 1.05 [2.67]             | 6.88 [17.48] |                               |              |
| 6-3/4" 52g   | 6852 Razor SBH       | EC2-68K5231              | Fluid                 | 52.0g, RDX | 22 spf / 90°-45°       | 9-5/8" L-80       |                         |              |                               |              |
|              |                      | EC2-68K5232              |                       | 52.0g, HMX |                        | ‡ 9-7/8" Q-125    | 1.08 [2.74]             | 5.62 [14.27] |                               |              |
| 7" 39g       | 7039 Razor SBH TL LD | EC2-70C3931              | Fluid                 | 39.0g, RDX | 15 spf / 140°-20°      | 9-5/8" L-80       | 0.97 [2.46]             | 5.35 [13.59] |                               |              |
|              |                      | EC2-70C3932              |                       | 39.0g, HMX |                        |                   | 1.24 [3.15]             | 7.08 [17.98] |                               |              |
|              | 7039K Razor SBH      | EC2-70K3931              |                       | 39.0g, RDX | 20 spf / 90°-45°       | 9-5/8" L-80       | 1.04 [2.64]             | 6.31 [16.03] | 1.10 [2.79]                   | 4.40 [11.18] |
|              |                      | EC2-70K3932              |                       | 39.0g, HMX |                        |                   |                         |              | 1.18 [3.00]                   | 4.60 [11.68] |
| 7" 52g       | 7052 Razor SBH TL LD | EC2-70C5231              | Fluid                 | 52.0g, RDX | 15 spf / 140°-20°      | 9-5/8" L-80       | 1.39 [3.53]             | 6.50 [16.51] |                               |              |
|              |                      | EC2-70C5232              |                       | 52.0g, HMX |                        | ^^10-1/8" SM-125S | 1.12 [2.84]             | 6.60 [16.76] |                               |              |
|              | 7052K Razor SBH**    | EC2-70K5231              |                       | 52.0g, RDX | 20 spf / 90°-45°       | 9-5/8" L-80       |                         |              |                               |              |
|              |                      | EC2-70K5232              |                       | 52.0g, HMX |                        |                   | 1.41 [3.58]             | 5.67 [14.40] |                               |              |
|              |                      |                          |                       |            |                        |                   | 1.42 [3.61]             | 7.06 [17.93] |                               |              |

† Heavy weight 7-3/4" 45.51#, Q-125 casing was used in lieu of 7" 31.70# L-80. <sup>2</sup> Charge case 51A is zinc; charge case 51B is steel.

‡ Heavy weight 9-7/8" 61.80#, Q-125 casing was used in lieu of 9-5/8" 46.18# L-80. ^^ Heavy weight 10-1/8" 79.75# SM-125S grade casing used in lieu of 9-5/8" 47# L-80.

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# Shaped Charges

## Deep Penetrating/Extreme Deep Penetrating

Connex® delivers clean, open tunnels independent of rock type. Every tunnel receives its own cleaning action, independent of other perforations, resulting in a much greater percentage of clean tunnels and ideal flow path between undamaged reservoir and the wellbore.

Connex charges use reactive metals to create a secondary reaction to clear out the compaction zone in a perforating zone. Patented charge liner material deposited along the tunnel reacts exothermically when introduced to heat and pressure. This reaction creates significant pressure within and around the tunnel, breaking up and expelling the crushed zone compacted debris back into the well bore. In sufficiently competent rock, fractures are also formed at the tunnel tip.



## CONVENTIONAL/UNCONVENTIONAL DP/XDP, 1-9/16" - 1-3/4" GUN SYSTEMS

| Carrier<br>O.D. | Shaped Charge     | Part Number    | Perforating<br>Condition | Explosive | Shot Density /<br>Phasing | ^Casing O.D. | Performance in Concrete |               | Performance in Stressed Berea |              |
|-----------------|-------------------|----------------|--------------------------|-----------|---------------------------|--------------|-------------------------|---------------|-------------------------------|--------------|
|                 |                   |                |                          |           |                           | Application  | EHD (in)[cm]            | TTP (in)[cm]  | EHD^ (in)[cm]                 | TTP (in)[cm] |
| 1-9/16"<br>3.2g | 1503 Connex SDP   | EC1-15A0321-RC | Fluid                    | 3.2g, RDX | 6 spf / 60°               | 2-7/8" L-80  |                         |               | 0.17 [0.43]                   | 4.90 [12.45] |
|                 |                   | EC1-15A0322-RC |                          | 3.2g, HMX |                           |              |                         |               | 0.17 [0.43]                   | 6.80 [17.27] |
|                 | 1503 Razor XDP    | EC1-15A0321    | Fluid                    | 3.2g, RDX | 6 spf / 60°               |              | 0.17 [0.43]             | 12.13 [30.81] | 0.13 [0.33]                   | 5.30 [13.46] |
|                 |                   | EC1-15A0322    | In Fluid or Dry          | 3.2g, HMX | 4 spf / 0°                |              | 0.19 [0.48]             | 13.09 [33.25] |                               |              |
|                 |                   |                |                          |           |                           |              | 0.19 [0.48]             | 13.09 [33.25] | 0.13 [0.33]                   | 5.23 [13.28] |
|                 |                   | EC1-15A0323    | Fluid                    | 3.2g, HNS | 6 spf / 60°               |              |                         |               | 0.11 [0.28]                   | 5.00 [12.70] |
| 1-9/16"<br>2.9g | 1503 Razor XDP LS | EC1-15A0321-L  | Dry                      | 2.9g, RDX | 6 spf / 0°                | 4-1/2" L-80  |                         |               |                               |              |
|                 |                   | EC1-15A0322-L  |                          | 2.9g, HMX |                           |              | 0.19 [0.48]             | 12.80 [32.51] | 0.18 [0.46]                   | 6.50 [16.51] |
| 1-3/4"<br>5.1g  | 1705 Connex SDP   | EC1-17A0521-RC | Fluid                    | 5.1g, RDX | 6 spf / 60°               |              |                         |               | 0.21 [0.53]                   | 7.40 [18.80] |
|                 |                   | EC1-17A0522-RC |                          | 5.1g, HMX |                           |              |                         |               | 0.21 [0.53]                   | 8.70 [22.10] |
|                 | 1705 Razor XDP    | EC1-17A0521    |                          | 5.1g, RDX | 6 spf / 0°                |              |                         |               |                               |              |
|                 |                   | EC1-17A0522    |                          | 5.1g, HMX |                           |              | 0.26 [0.66]             | 21.63 [54.94] | 0.20 [0.51]                   | 7.70 [19.56] |
|                 |                   | EC1-17A0523    |                          | 5.1g, HNS |                           |              |                         | 0.19 [0.48]   | 6.20 [15.75]                  |              |
|                 | 1705E Basix XDP   | EC1-17A0521-E  |                          | 5.1g, RDX | 6 spf / 60°               |              |                         |               |                               |              |
| EC1-17A0522-E   |                   | 5.1g, HMX      |                          |           |                           |              |                         |               |                               |              |

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

FLUID: Qualified for shooting in FLUID only with perforating systems qualified by GEODynamics.

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# Shaped Charges

## Deep Penetrating/Extreme Deep Penetrating

- Razor® delivers industry-leading shaped charge performance, achieved by combining cutting-edge designs, state-of-the-art production processes, and rigorous quality control. When it is critical that your perforation tunnel escapes near-wellbore damage and contacts the formation, Razor XDP's best-in-class penetration pushes your perforations to new depths. When the amount of area open to flow is critical, Razor SBH leads the way with the industry's largest entry hole and flow area performance.
- Basix™ delivers impressive quality at an equally impressive price point. High-performing and budget-conscious Basix takes conventional shaped charge technology and kicks it up a notch. Basix charges are available for good hole, big hole, super big hole, and deep-penetration perforating applications.

## CONVENTIONAL/UNCONVENTIONAL DP/XDP, 2" - 2-3/8" GUN SYSTEMS

| Carrier<br>O.D. | Shaped Charge       | Part Number       | Perforating<br>Condition | Explosive  | Shot Density /<br>Phasing | ^Casing O.D. | Performance in Concrete |               | Performance in Stressed Berea |               |
|-----------------|---------------------|-------------------|--------------------------|------------|---------------------------|--------------|-------------------------|---------------|-------------------------------|---------------|
|                 |                     |                   |                          |            |                           | Application  | EHD (in)[cm]            | TTP (in)[cm]  | EHD^ (in)[cm]                 | TTP (in)[cm]  |
| 2"<br>6.8g      | 2007 Connex SDP     | EC2-20A0721-RC    | Fluid                    | 6.8g, RDX  | 6 spf / 60°               | 2-7/8"       |                         |               | 0.22 [0.56]                   | 8.94 [22.71]  |
|                 |                     | EC2-20A0722-RC    |                          | 6.8g, HMX  |                           |              |                         |               | 0.22 [0.56]                   | 9.37 [23.80]  |
|                 |                     | EC2-20A0723-RC    |                          | 6.8g, HNS  |                           |              |                         |               | 0.20 [0.51]                   | 7.30 [18.54]  |
|                 | 2007 Razor XDP      | EC1-20A0721       | Fluid                    | 6.8g, RDX  | 6 spf / 60°               | 3-1/2" L-80  | 0.25 [0.64]             | 21.83 [55.45] | 0.22 [0.56]                   | 9.55 [24.26]  |
|                 |                     | EC1-20A0722       |                          | 6.8g, HMX  |                           | 2-7/8" L-80  | 0.25 [0.64]             | 22.30 [56.64] |                               |               |
|                 |                     | EC1-20A0722       |                          | 6.8g, HMX  |                           | 3-1/2" L-80  | 0.24 [0.61]             | 24.40 [61.98] |                               |               |
|                 | 2007E Basix XDP     | EC1-20A0721-E     | Fluid                    | 6.8g, RDX  | 6 spf / 60°               | 3-1/2" L-80  | 0.25 [0.64]             | 16.42 [41.71] |                               |               |
|                 |                     | EC1-20A0722-E     |                          | 6.8g, HMX  |                           |              | 0.25 [0.64]             | 20.70 [52.58] | 0.24 [0.61]                   | 8.40 [21.34]  |
| 2"<br>6.5g      | 2007 Connex SDP XLS | EC2-20B0721-RC    | In Fluid or Dry          | 6.5g, RDX  | 6 spf / 60°               | 2-7/8" L-80  |                         |               | 0.23 [0.58]                   | 8.70 [22.10]  |
|                 |                     | EC2-20B0722-RC    |                          | 6.5g, HMX  |                           |              |                         |               | 0.21 [0.53]                   | 9.80 [24.89]  |
|                 | 2007 Razor XLS XDP  | EC1-20B0721       |                          | 6.5g, RDX  |                           |              |                         |               |                               |               |
|                 |                     | EC1-20B0722       |                          | 6.5g, HMX  |                           |              | 0.25 [0.64]             | 22.30 [56.64] | 0.19 [0.48]                   | 10.80 [27.43] |
| 2-3/8"<br>11g   | 2311 Connex SDP     | EC2-23A1121-RC    | Fluid                    | 11.0g, RDX | 6 spf /60°                | 3-1/2" L-80  |                         |               | 0.25 [0.64]                   | 11.40 [28.96] |
|                 |                     | EC2-23A1122-RC    |                          | 11.0g, HMX |                           |              |                         |               | 0.31 [0.79]                   | 11.35 [28.83] |
|                 |                     | EC2-23A1123-RC    |                          | 11.0g, HNS |                           |              |                         |               | 0.23 [0.58]                   | 8.70 [22.10]  |
|                 | 2311 Razor XDP      | EC2-23A1121       |                          | 11.0g, RDX |                           |              |                         |               | 0.25 [0.64]                   | 12.70 [32.26] |
|                 |                     | EC2-23A1122       |                          | 11.0g, HMX |                           |              | 0.31 [0.79]             | 30.11 [76.48] | 0.24 [0.61]                   | 11.40 [28.96] |
|                 |                     | EC2-23A1123       |                          | 11.0g, HNS |                           |              | 0.25 [0.64]             | 22.70 [57.68] | 0.23 [0.58]                   | 9.20 [23.37]  |
|                 | 2311 Basix XDP      | EC2-23A1121-E     |                          | 11.0g, RDX |                           |              |                         |               | 0.30 [0.76]                   | 9.00 [22.86]  |
|                 |                     | EC2-23A1122-E     |                          | 11.0g, HMX |                           |              |                         |               |                               |               |
|                 |                     |                   |                          |            |                           |              |                         |               |                               |               |
|                 |                     |                   |                          |            |                           |              |                         |               |                               |               |
| 2-3/8"<br>11g   | 2311 Razor XDP LS   | EC2-23A1121-LS    | Dry                      | 11.0g, RDX | ‡ 5 spf / 0°              | 3-1/2" L-80  |                         |               |                               |               |
|                 |                     | EC2-23A1122-LS    |                          | 11.0g, HMX |                           |              | 0.31 [0.79]             | 30.11 [76.48] |                               |               |
|                 |                     | EC2-23A1121-LS    | Fluid                    | 11.0g, RDX | 6 spf / 0°                |              |                         |               |                               |               |
|                 |                     | EC2-23A1122-LS    |                          | 11.0g, HMX |                           |              | 0.31 [0.79]             | 30.11 [76.48] |                               |               |
| 2-3/8"<br>10.5g | 2311 Connex SDP XLS | EC2-23A1121-RC-LS | Dry                      | 10.5g, RDX | ‡ 5 spf / 60°             | 3-1/2"       |                         |               | 0.25 [0.64]                   | 11.40 [28.96] |
|                 |                     | EC2-23A1122-RC-LS |                          | 10.5g, HMX |                           |              |                         |               | 0.31 [0.79]                   | 11.35 [28.83] |
|                 |                     | EC2-23A1121-RC-LS | Fluid                    | 10.5g, RDX | 6 spf / 60°               |              |                         |               | 0.25 [0.64]                   | 11.40 [28.96] |
|                 |                     | EC2-23A1122-RC-LS |                          | 10.5g, HMX |                           |              |                         |               | 0.31 [0.79]                   | 11.35 [28.83] |

‡ For 2-3/8" in dry gas, maximum shot density is 5 spf and limited to low-swell (LS) charges only.



# Shaped Charges

## Deep Penetrating/Extreme Deep Penetrating

### CONVENTIONAL/UNCONVENTIONAL DP/XDP, 2-1/2" - 2-7/8" GUN SYSTEMS

| Carrier O.D.    | Shaped Charge   | Part Number    | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |                | Performance in Stressed Berea |               |
|-----------------|-----------------|----------------|-----------------------|------------|------------------------|--------------|-------------------------|----------------|-------------------------------|---------------|
|                 |                 |                |                       |            |                        | Application  | EHD (in)[cm]            | TTP (in)[cm]   | EHD^ (in)[cm]                 | TTP (in)[cm]  |
| 2-1/2"<br>11.5g | 2511 Connex SDP | EC2-25A1121-RC | Fluid                 | 11.5g, RDX | 6 spf / 60°            | 3-1/2" L-80  |                         |                | 0.28 [0.71]                   | 11.50 [29.21] |
|                 |                 | EC2-25A1122-RC |                       | 11.5g, HMX |                        |              |                         |                | 0.29 [0.74]                   | 12.00 [30.48] |
|                 | 2511 Razor XDP  | EC1-25A1121    |                       | 11.5g, RDX |                        |              |                         |                | 0.26 [0.66]                   | 13.00 [33.02] |
|                 |                 | EC1-25A1122    |                       | 11.5g, HMX |                        |              | 0.32 [0.81]             | 31.10 [78.99]  | 0.24 [0.61]                   | 12.23 [31.06] |
|                 | 2511 Basix XDP  | EC2-25A1121-E  |                       | 11.5g, RDX |                        |              |                         |                | 0.30 [0.76]                   | 9.10 [23.11]  |
|                 |                 | EC2-25A1122-E  |                       | 11.5g, HMX |                        |              |                         |                |                               |               |
| 2-3/4"<br>15g   | 2715 Connex SDP | EC2-27A1521-RC | In Fluid or Dry       | 15.0g, RDX | 6 spf / 60°            | 4-1/2" L-80  |                         |                | 0.30 [0.76]                   | 11.70 [29.72] |
|                 |                 | EC2-27A1522-RC |                       | 15.0g, HMX |                        |              |                         |                | 0.31 [0.79]                   | 12.18 [30.94] |
|                 | 2715 Razor XDP  | EC2-27A1521    |                       | 15.0g, RDX |                        |              | 0.39 [0.99]             | 37.45 [95.12]  |                               |               |
|                 |                 | EC2-27A1522    |                       | 15.0g, HMX |                        |              | 0.39 [0.99]             | 37.45 [95.12]  |                               |               |
|                 |                 | EC2-27A1523    |                       | 15.0g, HNS |                        |              |                         |                | 0.31 [0.79]                   | 10.50 [26.67] |
|                 | 2715 Basix XDP  | EC2-27A1521-E  |                       | 15.0g, RDX |                        |              | 0.39 [0.99]             | 31.78 [80.72]  | 0.32 (0.81)                   | 9.40 [23.88]  |
|                 |                 | EC2-27A1522-E  |                       | 15.0g, HMX |                        |              | 0.38 [0.97]             | 32.75 [83.19]  | 0.35 [0.89]                   | 10.60 [26.92] |
|                 |                 |                |                       |            |                        |              |                         |                |                               |               |
| 2-7/8"<br>15g   | 2715 Connex SDP | EC2-27A1521-RC | In Fluid or Dry       | 15.0g, RDX | 6 spf / 60°            | 4-1/2" L-80  |                         |                | 0.30 [0.76]                   | 11.70 [29.72] |
|                 |                 | EC2-27A1522-RC |                       | 15.0g, HMX |                        |              |                         |                | 0.31 [0.79]                   | 12.18 [30.94] |
|                 |                 | EC2-27A1523-RC |                       | 15.0g, HNS |                        |              |                         |                | 0.25 [0.64]                   | 9.90 [25.15]  |
|                 | 2715 Razor XDP  | EC2-27A1521    |                       | 15.0g, RDX |                        |              |                         |                | 0.26 [0.66]                   | 13.50 [34.29] |
|                 |                 | EC2-27A1522    |                       | 15.0g, HMX |                        |              | 0.34 [0.86]             | 42.46 [107.85] | 0.30 [0.76]                   | 13.13 [33.35] |
|                 |                 | EC2-27A1523    |                       | 15.0g, HNS |                        |              |                         |                | 0.31 [0.79]                   | 10.50 [26.67] |
|                 | 2715 Basix XDP  | EC2-27A1521-E  |                       | 15.0g, RDX |                        |              |                         |                | 0.32 (0.81)                   | 9.40 [23.88]  |
|                 |                 | EC2-27A1522-E  |                       | 15.0g, HMX |                        |              |                         |                |                               |               |
|                 |                 |                |                       |            |                        |              |                         |                |                               |               |
|                 |                 |                |                       |            |                        |              |                         |                |                               |               |
| 2-7/8"<br>18g   | 2818 Connex SDP | EC2-28A1821-RC | Fluid                 | 18.0g, RDX | 6 spf / 60°            | 4-1/2" L-80  |                         |                | 0.42 [1.07]                   | 13.00 [33.02] |
|                 |                 | EC2-28A1822-RC |                       | 18.0g, HMX |                        |              |                         |                | 0.40 [1.02]                   | 14.02 [35.61] |
|                 |                 | EC2-28A1823-RC |                       | 18.0g, HNS |                        |              |                         |                | 0.33 [0.84]                   | 10.55 [26.80] |
|                 | 2818 Razor XDP  | EC2-28A1821    |                       | 18.0g, RDX |                        |              | 0.43 [1.09]             | 40.05 [101.73] | 0.41 [1.04]                   | 14.10 [35.81] |
|                 |                 | EC2-28A1822    |                       | 18.0g, HMX |                        |              | 0.43 [1.09]             | 40.05 [101.73] | 0.37 [0.94]                   | 15.33 [38.94] |
|                 |                 | EC2-28A1823    |                       | 18.0g, HNS |                        |              | 0.32 [0.81]             | 32.38 [82.25]  | 0.33 [0.84]                   | 10.95 [27.81] |
|                 | 2818 Basix XDP  | EC2-28A1821-E  |                       | 18.0g, RDX |                        |              |                         |                | 0.47 [1.19]                   | 10.70 [27.18] |
|                 |                 | EC2-28A1822-E  |                       | 18.0g, HMX |                        |              |                         |                |                               |               |
|                 |                 |                |                       |            |                        |              |                         |                |                               |               |

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

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# Shaped Charges

## Deep Penetrating/Extreme Deep Penetrating

- Connex® delivers clean, open tunnels independent of rock type. Every tunnel receives its own cleaning action, independent of other perforations, resulting in a much greater percentage of clean tunnels and ideal flow path between undamaged reservoir and the wellbore. Connex charges use reactive metals to create a secondary reaction to clear out the compaction zone in a perforating zone. Patented charge liner material deposited along the tunnel reacts exothermically when introduced to heat and pressure. This reaction creates significant pressure within and around the tunnel, breaking up and expelling the crushed zone compacted debris back into the well bore. In sufficiently competent rock, fractures are also formed at the tunnel tip.
- Razor® delivers industry-leading shaped charge performance, achieved by combining cutting-edge designs, state-of-the-art production processes, and rigorous quality control. When it is critical that your perforation tunnel escapes near-wellbore damage and contacts the formation, Razor XDP's best-in-class penetration pushes your perforations to new depths.
- Basix™ delivers impressive quality at an equally impressive price point. High-performing and budget-conscious Basix takes conventional shaped charge technology and kicks it up a notch. Basix charges are available for good hole, big hole, super big hole, and deep-penetration perforating applications.

## CONVENTIONAL/UNCONVENTIONAL DP/XDP, 3-1/8" GUN SYSTEMS

| Carrier O.D. | Shaped Charge   | Part Number    | Perforating Condition | Explosive  | Shot Density / Phasing                   | ^Casing O.D. | Performance in Concrete |                | Performance in Stressed Berea |               |
|--------------|-----------------|----------------|-----------------------|------------|--|--------------|-------------------------|----------------|-------------------------------|---------------|
|              |                 |                |                       |            |  | Application  | EHD (in)[cm]            | TTP (in)[cm]   | EHD^ (in)[cm]                 | TTP (in)[cm]  |
| 3-1/8" 19g   | 3319 Connex RX  | EC2-33A1991-RX | ‡ Fluid or Dry        | 19.0g, RDX | 5 spf / 60° (Dry)<br>6 spf / 60° (Fluid) | 4-1/2" L-80  |                         |                | 0.32 [0.81]                   | 11.30 [28.70] |
|              |                 | EC2-33A1992-RX |                       | 19.0g, HMX |  |              |                         |                | 0.32 [0.81]                   | 11.60 [29.46] |
|              | 3319 Razor XDP  | EC2-33A1921    | ‡ Fluid or Dry        | 19.0g, RDX |  |              | 0.51 [1.30]             | 42.07 [106.86] |                               |               |
|              |                 | EC2-33A1922    |                       | 19.0g, HMX |  |              | 0.49 [1.24]             | 41.10 [104.39] | 0.43 [1.09]                   | 14.60 [37.08] |
|              | 3319 Basix XDP  | EC2-33A1921-E  | ‡ Fluid or Dry        | 19.0g, RDX |  |              | 0.43 [1.09]             | 35.80 [90.93]  |                               |               |
|              |                 | EC2-33A1922-E  |                       | 19.0g, HMX |  |              |                         |                |                               |               |
|              | 3319 Basix XDP  | EC2-33A1921-EG | Fluid                 | 19.0g, RDX |  |              | 0.43 [1.09]             | 35.70 [90.68]  |                               |               |
|              |                 | EC2-33A1951    |                       | 19.0g, RDX |  |              | 0.54 [1.37]             | 29.20 [74.17]  |                               |               |
|              | 3319 Basix DP   | EC2-33A1951    | ‡ Fluid or Dry        | 19.0g, RDX |  |              |                         |                |                               |               |
|              |                 | EC2-33A1952    |                       | 19.0g, HMX |  |              |                         |                |                               |               |
| 3-1/8" 23g   | 3323 Connex SDP | EC2-33A2321-RC | Fluid                 | 22.7g, RDX | 6 spf / 60°                              | 4-1/2" L-80  |                         |                | 0.40 [1.02]                   | 15.60 [39.62] |
|              |                 | EC2-33A2322-RC |                       | 22.7g, HMX |  |              |                         |                | 0.46 [1.17]                   | 15.31 [38.89] |
|              |                 | EC2-33A2323-RC |                       | 22.7g, HNS |  |              |                         |                | 0.36 [0.91]                   | 11.85 [30.10] |
|              | 3323 Razor XDP  | EC2-33A2321    |                       | 22.7g, RDX |  |              |                         |                | 0.41 [1.04]                   | 16.40 [41.66] |
|              |                 | EC2-33A2322    |                       | 22.7g, HMX |  |              | 0.42 [1.07]             | 39.02 [99.11]  | 0.44 [1.12]                   | 15.68 [39.83] |
|              |                 | EC2-33A2323    |                       | 22.7g, HNS |  |              | 0.35 [0.89]             | 26.05 [66.17]  | 0.37 [0.94]                   | 12.12 [30.78] |
|              | 3323 Basix XDP  | EC2-33A2321-E  |                       | 22.7g, RDX |  |              | 0.42 [1.07]             | 46.01 [116.87] | 0.39 [0.99]                   | 12.30 [31.24] |
|              |                 | EC2-33A2322-E  |                       | 22.7g, HMX |  |              | 0.43 [1.09]             | 46.37 [117.78] |                               |               |
|              | 3323 Basix GH   | EC2-33A2321-EG |                       | 22.7g, RDX |  |              |                         |                | 0.41 [1.04]                   | 11.90 [30.23] |
|              |                 | EC2-33A2322-EG |                       | 22.7g, HMX |  |              | 0.43 [1.09]             | 45.70 [116.08] | 0.40 [1.02]                   | 11.90 [30.23] |
|              |                 |                |                       |            |  |              |                         |                |                               |               |
|              |                 |                |                       |            |  |              |                         |                |                               |               |
|              |                 |                |                       |            |  |              |                         |                |                               |               |
|              |                 |                |                       |            |  |              |                         |                |                               |               |
|              |                 |                |                       |            |  |              |                         |                |                               |               |

‡ For 3-1/8" 19g in dry gas, maximum shot density is 5 spf or limited to one- (1) and two- (2) shot short guns only.

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

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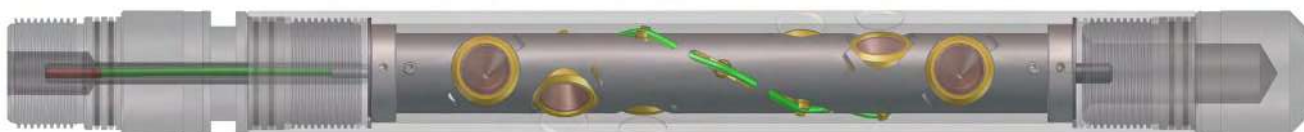
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# Shaped Charges

## Deep Penetrating/Extreme Deep Penetrating

### CONVENTIONAL/UNCONVENTIONAL DP/XDP, 3-3/8" GUN SYSTEMS

| Carrier O.D. | Shaped Charge   | Part Number    | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |                | Performance in Stressed Berea |               |
|--------------|-----------------|----------------|-----------------------|------------|------------------------|--------------|-------------------------|----------------|-------------------------------|---------------|
|              |                 |                |                       |            |                        | Application  | EHD (in)[cm]            | TTP (in)[cm]   | EHD^ (in)[cm]                 | TTP (in)[cm]  |
| 3-3/8" 19g   | 3319 Connex RX  | EC2-33A1991-RX | In Fluid or Dry       | 19.0g, RDX | 6 spf / 60°            | 5-1/2"       |                         |                | 0.32 [0.81]                   | 11.30 [28.70] |
|              |                 | EC2-33A1992-RX |                       | 19.0g, HMX |                        |              |                         |                | 0.32 [0.81]                   | 11.60 [29.46] |
|              | 3319 Razor XDP  | EC2-33A1921    |                       | 19.0g, RDX |                        | 4-1/2"       | 0.51 [1.30]             | 42.07 [106.86] |                               |               |
|              |                 | EC2-33A1922    |                       | 19.0g, HMX |                        |              |                         |                | 0.43 [1.09]                   | 14.60 [37.08] |
| 3-3/8" 23g   | 3323 Connex SDP | EC2-33A2321-RC | In Fluid or Dry       | 22.7g, RDX | 6 spf / 60°            | 4-1/2" L-80  |                         |                | 0.40 [1.02]                   | 15.60 [39.62] |
|              |                 | EC2-33A2322-RC |                       | 22.7g, HMX |                        |              |                         |                | 0.46 [1.17]                   | 15.31 [38.89] |
|              |                 | EC2-33A2323-RC |                       | 22.7g, HNS |                        |              |                         |                | 0.36 [0.91]                   | 11.85 [30.10] |
|              | 3323 Razor XDP  | EC2-33A2321    |                       | 22.7g, RDX |                        |              |                         |                | 0.41 [1.04]                   | 16.40 [41.66] |
|              |                 | EC2-33A2322    |                       | 22.7g, HMX |                        |              | 0.45 [1.14]             | 46.32 [117.65] | 0.44 [1.12]                   | 15.68 [39.83] |
|              |                 | EC2-33A2323    |                       | 22.7g, HNS |                        |              |                         |                | 0.37 [0.94]                   | 12.12 [30.78] |
|              | 3323 Basix XDP  | EC2-33A2321-E  | In Fluid or Dry       | 22.7g, RDX |                        |              | 0.45 [1.14]             | 46.32 [117.65] | 0.39 [0.99]                   | 12.30 [31.24] |
|              |                 | EC2-33A2322-E  |                       | 22.7g, HMX |                        |              | 0.44 [1.12]             | 46.90 [119.13] |                               |               |
|              | 3323 Basix GH   | EC2-33A2321-EG | Fluid                 | 22.7g, RDX |                        |              |                         |                | 0.41 [1.04]                   | 11.90 [30.23] |
|              |                 | EC2-33A2322-EG |                       | 22.7g, HMX |                        |              |                         |                | 0.40 [1.02]                   | 11.90 [30.23] |
|              | 3323 Basix DP   | EC2-33A2351    | In Fluid or Dry       | 22.7g, RDX |                        |              | 0.47 [1.19]             | 32.10 [81.53]  |                               |               |
|              |                 | EC2-33A2352    |                       | 22.7g, HMX |                        |              |                         |                |                               |               |
| 3-3/8" 25g   | 3325 Connex SDP | EC2-33B2521-RC | Fluid                 | 25.0g, RDX | 6 spf / 60°            | 4-1/2" L-80  |                         |                | 0.40 [1.02]                   | 15.10 [38.35] |
|              |                 | EC2-33B2522-RC |                       | 25.0g, HMX |                        |              |                         |                | 0.48 [1.22]                   | 15.45 [39.24] |
|              |                 | EC2-33B2523-RC |                       | 25.0g, HNS |                        |              |                         |                | 0.35 [0.89]                   | 12.30 [31.24] |
|              | 3325 Razor XDP  | EC2-33B2521    |                       | 25.0g, RDX |                        |              | 0.45 [1.14]             | 44.58 [113.23] | 0.39 [0.99]                   | 17.10 [43.43] |
|              |                 | EC2-33B2522    |                       | 25.0g, HMX |                        |              | 0.53 [1.35]             | 47.30 [120.14] | 0.50 [1.27]                   | 16.27 [41.33] |
|              |                 | EC2-33B2523    |                       | 25.0g, HNS |                        |              | 0.37 [0.94]             | 30.20 [76.71]  | 0.36 [0.91]                   | 13.20 [33.53] |
|              | 3325 Basix XDP  | EC2-33B2521-E  |                       | 25.0g, RDX |                        |              | 0.45 [1.14]             | 50.08 [127.20] | 0.40 [1.02]                   | 12.30 [31.24] |
|              |                 | EC2-33B2522-E  |                       | 25.0g, HMX |                        |              | 0.47 [1.19]             | 47.42 [120.45] |                               |               |
|              |                 |                |                       |            |                        |              |                         |                |                               |               |
|              |                 |                |                       |            |                        |              |                         |                |                               |               |



Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

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# Shaped Charges

## Deep Penetrating/Extreme Deep Penetrating

### CONVENTIONAL/UNCONVENTIONAL DP/XDP, 4" - 4-1/2" GUN SYSTEMS

| Carrier O.D. | Shaped Charge   | Part Number    | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete  |                          | Performance in Stressed Berea |                          |  |  |
|--------------|-----------------|----------------|-----------------------|------------|------------------------|--------------|--------------------------|--------------------------|-------------------------------|--------------------------|--|--|
|              |                 |                |                       |            |                        | Application  | EHD <sup>(in)</sup> [cm] | TTP <sup>(in)</sup> [cm] | EHD^ <sup>(in)</sup> [cm]     | TTP <sup>(in)</sup> [cm] |  |  |
| 4" 23g       | 3323 Connex SDP | EC2-33A2322-RC | Fluid                 | 22.7g, HMX | 6 spf / 60°            | 5-1/2" L-80  |                          |                          | 0.46 [1.17]                   | 15.31 [38.89]            |  |  |
| 4" 25g       | 3325 Razor XDP  | EC2-33B2521    | In Fluid or Dry       | 25.0g, RDX |                        |              |                          |                          |                               |                          |  |  |
|              |                 | EC2-33B2522    |                       | 25.0g, HMX |                        |              | 0.47 [1.19]              | 46.11 [117.12]           |                               |                          |  |  |
|              | 3325 Basix XDP  | EC2-33B2521-E  | Fluid                 | 25.0g, RDX |                        |              |                          |                          | 0.44 [1.18]                   | 12.50 [31.75]            |  |  |
|              |                 | EC2-33B2522-E  |                       | 25.0g, HMX |                        |              |                          |                          | 0.44 [1.18]                   | 12.70 [32.26]            |  |  |
| 4" 39g       | 4039 Connex SDP | EC2-40A3921-RC | Fluid                 | 39.0g, RDX | 4 spf / 60°            | 5-1/2" L-80  |                          |                          | 0.41 [1.04]                   | 17.15 [43.56]            |  |  |
|              |                 | EC2-40A3922-RC |                       | 39.0g, HMX |                        |              |                          |                          | 0.43 [1.09]                   | 17.80 [45.21]            |  |  |
|              |                 | EC2-40A3923-RC |                       | 39.0g, HNS |                        |              |                          |                          | 0.36 [0.91]                   | 15.20 [38.61]            |  |  |
|              | 4039 Razor XDP  | EC2-40A3921    |                       | 39.0g, RDX | 4 spf / 60°            |              | 0.39 [0.99]              | 53.00 [134.62]           | 0.38 [0.97]                   | 18.60 [47.24]            |  |  |
|              |                 | EC2-40A3922    |                       | 39.0g, HMX | 4 spf / 90°            |              | 0.39 [0.99]              | 53.00 [134.62]           | 0.37 [0.94]                   | 19.10 [48.51]            |  |  |
|              | 4039 Basix XDP  | EC2-40A3921-E  |                       | 39.0g, RDX | 4 spf / 60°            |              |                          |                          | 0.56 [1.42]                   | 16.10 [40.89]            |  |  |
|              |                 | EC2-40A3922-E  |                       | 39.0g, HMX |                        |              |                          |                          | 0.44 [1.12]                   | 16.30 [41.40]            |  |  |
|              |                 |                |                       |            |                        |              |                          |                          |                               |                          |  |  |
| 4-1/2" 23g   | 3323 Connex SDP | EC2-33A2321-RC | Fluid                 | 22.7g, RDX | 6 spf / 60°            | 5-1/2"       |                          |                          | 0.34 [0.86]                   | 14.75 [37.47]            |  |  |
|              |                 | EC2-33A2322-RC |                       | 22.7g, HMX |                        |              |                          |                          | 0.46 [1.17]                   | 15.31 [38.89]            |  |  |
|              |                 | EC2-33A2323-RC |                       | 22.7g, HNS |                        |              |                          |                          | 0.36 [0.91]                   | 10.50 [26.67]            |  |  |
|              | 3323 Connex SDP | EC2-33A2321-RC | Fluid                 | 22.7g, RDX | 12 spf / 135°-45°      | 7.0" L-80    |                          |                          | 0.46 [1.17]                   | 15.31 [38.89]            |  |  |
|              |                 | EC2-33A2322-RC |                       | 22.7g, HMX |                        |              |                          |                          | 0.43 [1.09]                   | 15.70 [39.88]            |  |  |
|              | 3323 Razor XDP  | EC2-33A2321    |                       | 22.7g, RDX |                        |              |                          |                          | 0.38 [0.97]                   | 34.90 [88.65]            |  |  |
|              |                 | EC2-33A2322    |                       | 22.7g, HMX |                        |              |                          |                          |                               |                          |  |  |
|              |                 |                |                       |            |                        |              |                          |                          |                               |                          |  |  |
| 4-1/2" 25g   | 3325 Razor XDP  | EC2-33B2521    | In Fluid or Dry       | 25.0g, RDX | 6 spf / 60°            | 7.0"         |                          |                          | 0.44 [1.12]                   | 16.30 [41.40]            |  |  |
|              |                 | EC2-33B2522    |                       | 25.0g, HMX |                        |              |                          |                          | 0.34 [0.86]                   | 15.70 [39.88]            |  |  |
| 4-1/2" 39g   | 4039 Connex SDP | EC2-40A3921-RC | Fluid                 | 39.0g, RDX | 5 spf / 60°            | 7.0" L-80    |                          |                          | 0.41 [1.04]                   | 17.15 [43.56]            |  |  |
|              |                 | EC2-40A3922-RC |                       | 39.0g, HMX |                        |              |                          |                          | 0.43 [1.09]                   | 17.80 [45.21]            |  |  |
|              |                 | EC2-40A3923-RC |                       | 39.0g, HNS |                        |              |                          |                          | 0.36 [0.91]                   | 15.20 [38.61]            |  |  |
|              | 4039 Razor XDP  | EC2-40A3921    |                       | 39.0g, RDX |                        |              | 0.44 [1.12]              | 58.59 [148.82]           | 0.38 [0.97]                   | 18.60 [47.24]            |  |  |
|              |                 | EC2-40A3922    |                       | 39.0g, HMX |                        |              | 0.45 [1.14]              | 72.93 [185.24]           | 0.37 [0.94]                   | 19.10 [48.51]            |  |  |
|              | 4039 Basix XDP  | EC2-40A3921-E  |                       | 39.0g, RDX |                        |              |                          |                          | 0.56 [1.42]                   | 16.10 [40.89]            |  |  |
|              |                 | EC2-40A3922-E  |                       | 39.0g, HMX |                        |              | 0.44 [1.12]              | 51.97 [132.00]           | 0.44 [1.12]                   | 16.30 [41.40]            |  |  |
|              |                 |                |                       |            |                        |              |                          |                          |                               |                          |  |  |

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

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# Shaped Charges

## Deep Penetrating/Extreme Deep Penetrating

### CONVENTIONAL/UNCONVENTIONAL DP/XDP, 4-5/8" - 7" GUN SYSTEMS

| Carrier O.D. | Shaped Charge   | Part Number    | Perforating Condition | Explosive    | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |                | Performance in Stressed Berea |               |
|--------------|-----------------|----------------|-----------------------|--------------|------------------------|--------------|-------------------------|----------------|-------------------------------|---------------|
|              |                 |                |                       |              |                        | Application  | EHD (in)[cm]            | TTP (in)[cm]   | EHD^ (in)[cm]                 | TTP (in)[cm]  |
| 4-5/8" 23g   | 3323 Connex SDP | EC2-33A2321-RC | Fluid                 | 22.7g, RDX   | 12 spf / 135°-45°      | 7.0" L-80    |                         |                | 0.46 [1.17]                   | 15.31 [38.89] |
|              |                 | EC2-33A2322-RC |                       | 22.7g, HMX   |                        |              |                         |                |                               |               |
|              | 3323 Razor XDP  | EC2-33A2321    |                       | 22.7g, RDX   |                        |              |                         |                |                               |               |
|              |                 | EC2-33A2322    |                       | 22.7g, HMX   |                        |              | 0.37 [0.94]             | 35.03 [88.98]  |                               |               |
| 4-5/8" 39g   | 4039 Connex SDP | EC2-40A3921-RC | Fluid                 | 39.0g, RDX   | 5 spf / 60°            | 7.0"         |                         |                | 0.41 [1.04]                   | 17.15 [43.56] |
|              |                 | EC2-40A3922-RC |                       | 39.0g, HMX   |                        |              |                         |                | 0.43 [1.09]                   | 17.80 [45.21] |
|              |                 | EC2-40A3923-RC |                       | 39.0g, HNS   |                        |              |                         |                | 0.36 [0.91]                   | 15.20 [38.61] |
|              | 4039 Razor XDP  | EC2-40A3921    |                       | 39.0g, RDX   |                        |              |                         |                | 0.38 [0.97]                   | 18.60 [47.24] |
|              |                 | EC2-40A3922    |                       | 39.0g, HMX   |                        |              |                         |                | 0.37 [0.94]                   | 19.10 [48.51] |
|              |                 | EC2-40A3923    |                       | 39.0g, HNS   |                        |              |                         |                | 0.33 [0.84]                   | 16.40 [41.66] |
|              | 4039 Basix XDP  | EC2-40A3921-E  |                       | 39.0g, RDX   |                        |              |                         |                | 0.56 [1.42]                   | 16.10 [40.89] |
|              |                 | EC2-40A3922-E  |                       | 39.0g, HMX   |                        |              |                         |                | 0.44 [1.12]                   | 16.30 [41.40] |
|              |                 |                |                       |              |                        |              |                         |                |                               |               |
|              |                 |                |                       |              |                        |              |                         |                |                               |               |
| 5-1/8" 19g   | 3319 Basix DP   | EC2-33A1921-EG | Fluid                 | † 19.0g, RDX | 22 spf / 140°-20°      | 7-5/8"       | 0.36 [0.91]             | 26.30 [66.80]  |                               |               |
| 5-1/8" 23g   | 3323 Razor XDP  | EC2-33A2321    | Fluid                 | † 22.7g, RDX | 12 spf / 135°-45°      | 7-5/8"       |                         |                |                               |               |
|              |                 | EC2-33A2322    |                       | † 22.7g, HMX |                        |              |                         |                | 0.38 [0.97]                   | 12.60 [32.00] |
| 7" 39g       | 4039 Connex SDP | EC2-40A3921-RC | Fluid                 | 39.0g, RDX   | 12 spf / 135°-45°      | 9-5/8" L-80  |                         |                | 0.46 [1.17]                   | 16.50 [41.91] |
|              |                 | EC2-40A3922-RC |                       | 39.0g, HMX   |                        |              |                         |                | 0.42 [1.07]                   | 17.50 [44.45] |
|              | 4039 Razor XDP  | EC2-40A3921    |                       | 39.0g, RDX   |                        |              |                         |                | 0.38 [0.97]                   | 16.90 [42.93] |
|              |                 | EC2-40A3922    |                       | 39.0g, HMX   |                        |              | 0.41 [1.04]             | 53.59 [136.12] | 0.44 [1.12]                   | 17.65 [44.83] |
|              | 4039 Basix XDP  | EC2-40A3921-E  |                       | 39.0g, RDX   |                        |              |                         |                | 0.50 [1.27]                   | 15.70 [39.88] |
|              |                 | EC2-40A3922-E  |                       | 39.0g, HMX   |                        |              |                         |                |                               |               |
|              |                 |                |                       |              |                        |              |                         |                |                               |               |
|              |                 |                |                       |              |                        |              |                         |                |                               |               |

† 33A charge case must be grooved. For 5-1/8" 12 spf, max. explosive load is 22.7g. For 22 spf, max. explosive load is 19g.

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

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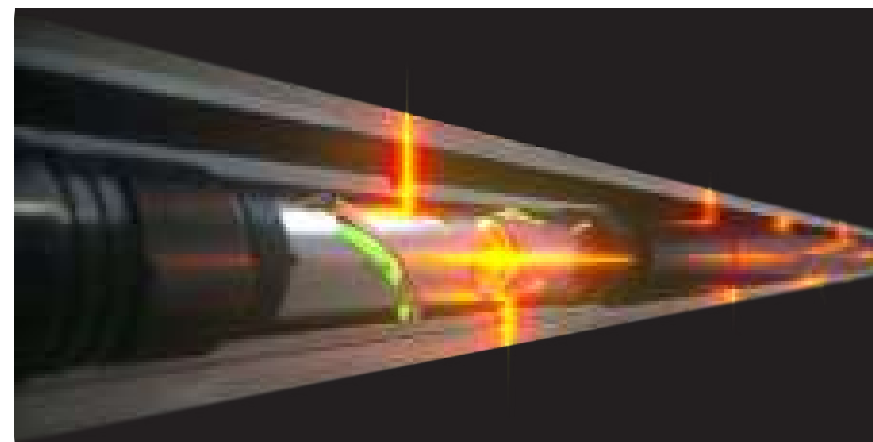
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# Shaped Charges

## Constant Entry Hole and Penetration

GEODynamics delivers several Limited Entry Perforating System options for unconventional reservoirs.

- FracIQ® provides constant casing hole sizes, regardless of decentralized position, casing size, weight, and grade, for optimal pressure drop during Frac. With a constant entry hole and penetration, each cluster can be treated more efficiently. Subsequent stages and wells can then be further optimized for limited entry fracture stimulation. FracIQ provides superior perforation efficiency during fracture stimulation when compared to conventional perforators which traditionally exhibit a higher entry hole diameter variance across shot phasings.
- FracIQ® Connex® combines FracIQ performance with Connex® Clean Perforation Technology, which delivers clear, open tunnels independent of rock type.
- Basix™ Frac delivers cost-effective constant entry hole and limited penetration to improve the productivity of your well and reduce your completion costs.



## CONVENTIONAL/UNCONVENTIONAL CONSTANT ENTRY HOLE, 2-3/4" - 2-7/8" GUN SYSTEMS

| Carrier O.D.   | Shaped Charge | Part Number | Perforating Condition | Explosive  | Shot Density / Phasing | API 19B Targeted Pipe* | Performance in Stressed Berea (API RP19B Sec. 2) |                             |              |
|----------------|---------------|-------------|-----------------------|------------|------------------------|------------------------|--|-----------------------------|--------------|
|                |               |             |                       |            |                        |                        | EHD <sup>^</sup> (in)[cm]                        | EHD Variation Decentralized | TTP (in)[cm] |
| 2-3/4" 11g-15g | FracIQ 30     | EC2-27A1171 | Fluid                 | 11.0g, RDX | 6 spf / 60°            | 4.5" OD, P110          | 0.30 [0.76]                                      | 2.7 %                       | 5.0 [12.70]  |
|                | FracIQ 35     | EC2-27A1271 |                       | 12.0g, RDX |                        |                        | 0.35 [0.89]                                      | 5.9 %                       |              |
|                | FracIQ 40     | EC2-27A1571 |                       | 15.0g, RDX |                        |                        | 0.40 [1.02]                                      | 6.3 %                       |              |
| 2-7/8" 11g-16g | FracIQ 35     | EC2-28A1171 | Fluid                 | 11.0g, RDX | 6 spf / 60°            | 4.5" OD, P110          | 0.36 [0.91]                                      | 3.3 %                       | 5.0 [12.70]  |
|                |               | EC2-28A1172 |                       | 11.0g, HMX |                        |                        | 0.36 [0.91]                                      | 2.1 %                       |              |
|                | FracIQ 40     | EC2-28A1671 |                       | 16.0g, RDX |                        |                        | 0.40 [1.02]                                      | 2.7 %                       |              |
|                |               | EC2-28A1672 |                       | 16.0g, HMX |                        |                        | 0.40 [1.02]                                      | 2.7 %                       |              |
|                |               |             |                       |            |                        |                        | 0.40 [1.02]                                      | 2.7 %                       |              |

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

<sup>^</sup>EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

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# Shaped Charges

## Constant Entry Hole and Penetration

### CONVENTIONAL/UNCONVENTIONAL CONSTANT ENTRY HOLE, 3-1/8" - 3-3/8" GUN SYSTEMS

| Carrier O.D.   | Shaped Charge    | Part Number                         | Perforating Condition | Explosive  | Shot Density / Phasing | API 19B Targeted Pipe* | Performance in Stressed Berea (API RP19B Sec. 2) |                             |              |
|----------------|------------------|-------------------------------------|-----------------------|------------|------------------------|------------------------|--|-----------------------------|--------------|
|                |                  |                                     |                       |            |                        |                        | EHD <sup>^</sup> (in)[cm]                        | EHD Variation Decentralized | TTP (in)[cm] |
| 3-1/8" 12g-13g | FracIQ 20        | EC2-33A1271                         | Fluid                 | 12.0g, RDX | 6 spf / 60°            | 4.5"-5.5" OD, P110     | 0.22 [0.56]                                      | 5.5%                        | 5.0 [12.70]  |
|                | Basix Frac 25    | EC2-33A1271-BF                      |                       | 12.0g, RDX |                        |                        | 0.26 [0.66]                                      | 2.4 %                       | 4.0 [10.16]  |
|                | FracIQ 25        | EC2-33A1371                         |                       | 13.0g, RDX |                        |                        | 0.26 [0.66]                                      | 4.1 %                       | 5.0 [12.70]  |
| 3-1/8" 13g-16g | FracIQ Connex 30 | EC2-33A1471-FRX                     | Fluid                 | 14.0g, RDX | 6 spf / 60°            | 4.5"-5.5" OD, P110     | 0.31 [0.79]                                      | 6.0 %                       | 5.0 [12.70]  |
|                | Basix Frac 30    | EC2-33A1471-BF                      |                       | 14.0g, RDX |                        |                        | 0.31 [0.79]                                      | 4.0 %                       | 4.0 [10.16]  |
|                | FracIQ 30        | EC2-33A1671                         |                       | 16.0g, RDX |                        |                        | 0.31 [0.79]                                      | 3.1 %                       | 5.0 [12.70]  |
|                | FracIQ 30        | EC2-33A1672                         |                       | 16.0g, HMX |                        |                        | 0.34 [0.86]                                      | 3.8 %                       |              |
|                | FracIQ Connex 35 | EC2-33A1671-FRX                     |                       | 16.0g, RDX |                        |                        | 0.36 [0.91]                                      | 5.0 %                       | 5.0 [12.70]  |
| 3-1/8" 16g-20g | Basix Frac 35    | EC2-33A1871-BF                      | Fluid                 | 18.0g, RDX | 6 spf / 60°            | 4.5"-5.5" OD, P110     | 0.36 [0.91]                                      | 3.4 %                       | 4.0 [10.16]  |
|                | FracIQ 35        | EC2-33A2071                         |                       | 20.0g, RDX |                        |                        | 0.36 [0.91]                                      | 2.5 %                       | 5.0 [12.70]  |
|                | FracIQ 35        | EC2-33A2072                         |                       | 20.0g, HMX |                        |                        | 0.37 [0.94]                                      | 3.0 %                       |              |
|                | FracIQ Connex 40 | EC2-33A1971-FRX                     |                       | 19.0g, RDX |                        |                        | 0.41 [1.04]                                      | 6.5 %                       | 5.0 [12.70]  |
| 3-1/8" 19g-23g | FracIQ 40        | EC2-33A2371                         | Fluid                 | 23.0g, RDX | 6 spf / 60°            | 4.5"-5.5" OD, P110     | 0.40 [1.02]                                      | 3.3 %                       |              |
|                | FracIQ 40        | EC2-33A2372                         |                       | 23.0g, HMX |                        |                        | 0.41 [1.04]                                      | 3.8 %                       | 4.0 [10.16]  |
|                | Basix Frac 40    | EC2-33A2371-BF                      |                       | 23.0g, RDX |                        |                        | 0.40 [1.02]                                      | 6.6 %                       |              |
|                | Basix Frac 40    | EC2-33A2371-BF                      |                       | 23.0g, RDX |                        | 6.0" OD, P110          | 0.40 [1.02]                                      | 7.5 %                       |              |
|                | FracIQ 45        | EC2-33A2071-45                      |                       | 20.0g, RDX |                        | 4.5"-5.5" OD, P110     | 0.45 [1.14]                                      | 5.6 %                       | 5.0 [12.70]  |
|                | FracIQ Connex 45 | EC2-33A2371-FRX                     |                       | 21.0g, RDX |                        |                        | 0.45 [1.14]                                      | 3.2 %                       |              |
| 3-1/8" 20g-23g | Basix Frac 45    | EC2-33A2371-BF45                    | Fluid                 | 23.0g, RDX |                        |                        | 0.45 [1.14]                                      | 5.9 %                       | 4.0 [10.16]  |
| 3-1/8" 23g     | FracIQ 50        | EC2-33A2371-50<br>† EC2-33A2371-50G | Fluid                 | 23.0g, RDX | 6 spf / 60°            | 4.5"-5.5" OD, P110     | 0.50 [1.27]                                      | 1.5 %                       | 5.0 [12.70]  |
|                | FracIQ 50        | EC2-33A2372-RX                      |                       | 23.0g, HMX |                        | 5.5" OD, P110          | 0.50 [1.27]                                      | 4.6 %                       |              |
|                | Basix Frac 50    | EC2-33A2371-BF50                    |                       | 23.0g, RDX |                        | 4.5"-5.5" OD, P110     | 0.50 [1.27]                                      | 4.8 %                       | 4.0 [10.16]  |
|                | FracIQ 55        | EC2-33A2371-55                      |                       | 23.0g, RDX |                        | 4.5" OD, P110          | 0.55 [1.40]                                      | 3.8 %                       | 5.0 [12.70]  |
| 3-3/8" 12g-13g | FracIQ 20        | EC2-33A1271                         | Fluid                 | 12.0g, RDX | 6 spf / 60°            | 4.5"-5.5" OD, P110     | 0.22 [0.56]                                      | 5.5%                        | 5.0 [12.70]  |
|                | FracIQ 25        | EC2-33A1371                         |                       | 13.0g, RDX |                        | 6.0" OD, P110          | 0.26 [0.66]                                      | 2.3 %                       |              |

\*3-1/8" FracIQ charge performance is compatible in 4.5" 11.6-15.1# and 5.5" 17-23# P-110 casing. FRX designates FracIQ® Connex® reactive technology.

†EC2-33A2371-50G has a custom, externally-grooved case (special application).

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

<sup>^</sup>EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

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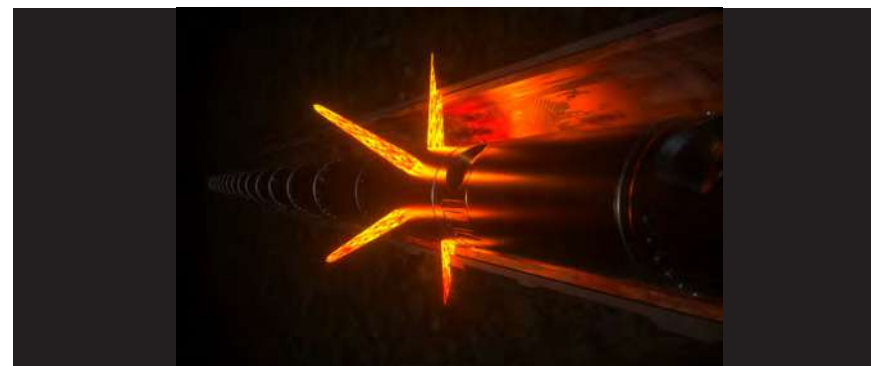
Revised: August 31, 2023 6:56 PM

# Shaped Charges

## Constant Entry Hole and Penetration, Cluster/Planar Phasing

HELLFire® allows more effective multi-stage plug-and-perf operations. HELLFire's three- or six-shot cluster options unlock stage completions not possible with lengthy conventional spiral-phased technology.

The short-bodied HELLFire system minimizes wireline tool string length and delivers more clusters per stage. HELLFire's flexible design options allow engineers to specify ideal cluster count and spacing, resulting in lower costs, fewer stages, maximized injectivity, and optimal proppant placement, all with less equipment and a smaller crane.



## UNCONVENTIONAL CLUSTER/PLANAR, 3-1/8" - 4" HELLFire® GUN SYSTEMS

| Carrier O.D.                      | Shaped Charge | Part Number    | Perforating Condition | Explosive  | Shot Density / Phasing   | API 19B Targeted Pipe | Performance in Stressed Berea (API RP19B Sec. 2) |                             |              |
|-----------------------------------|---------------|----------------|-----------------------|------------|--------------------------|-----------------------|--|-----------------------------|--------------|
|                                   |               |                |                       |            |                          |                       | EHD <sup>^</sup> (in)[cm]                        | EHD Variation Decentralized | TTP (in)[cm] |
| 3-1/8" External<br>Scallops 6g-7g | HELLFire 26   | EC2-31K0671-26 | Fluid                 | 6.0g, RDX  | 1 to 6 shots per cluster | 4.5" OD, P110         | 0.26 [0.66]                                      | 7.4 %                       | 3.2 [8.13]   |
|                                   | HELLFire 28   | EC2-31K0671-28 |                       | 6.0g, RDX  |                          |                       | 0.28 [0.71]                                      | 5.5 %                       |              |
|                                   | HELLFire 33   | EC2-31K0771-33 |                       | 7.0g, RDX  |                          |                       | 0.33 [0.84]                                      | 2.9 %                       |              |
|                                   | HELLFire 36   | EC2-31K0771-36 |                       | 7.0g, RDX  |                          |                       | 0.36 [0.91]                                      | 1.6 %                       |              |
|                                   | HELLFire 42   | EC2-31K0771-42 |                       | 7.0g, RDX  |                          |                       | 0.42 [1.07]                                      | 3.8 %                       |              |
| 3-3/8" Internal<br>Scallops 5g-7g | HELLFire 25   | EC2-33K0571    | Fluid                 | 5.0g, RDX  | 1 to 6 shots per cluster | 5.5" - 6.0" OD, P110  | 0.25 [0.64]                                      | 4.3 %                       | 3.5 [8.89]   |
|                                   | HELLFire 30   | EC2-33K0771    |                       | 7.0g, RDX  |                          |                       | 0.30 [0.76]                                      | 2.7 %                       |              |
|                                   | HELLFire 36   | EC2-33K0771-RX |                       | 7.0g, RDX  |                          |                       | 0.36 [0.91]                                      | 4.6 %                       |              |
| 3-3/8" External<br>Scallops 6g-7g | HELLFire 25   | EC2-33K0671-25 | Fluid                 | 6.0g, RDX  | 1 to 6 shots per cluster | 5.5" OD, P110         | 0.25 [0.64]                                      | 3.9%                        | 3.5 [8.89]   |
|                                   | HELLFire 30   | EC2-33K0771-30 |                       | 7.0g, RDX  |                          |                       | 0.30 [0.76]                                      | 5.5%                        |              |
|                                   | HELLFire 33   | EC2-33K0771-33 |                       | 7.0g, RDX  |                          |                       | 0.33 [0.84]                                      | 3.6%                        |              |
|                                   | HELLFire 34   | EC2-33K0771-34 |                       | 7.0g, RDX  |                          |                       | 0.34 [0.86]                                      | 5.8%                        |              |
| 4" Internal<br>Scallops 12g       | HELLFire 40   | EC2-40K1271    | Fluid                 | 12.0g, RDX | 1 to 6 shots per cluster | 6.0" OD, 26# P110     | 0.40 [1.02]                                      | 3.9%                        | 3.0 [7.62]   |

HELLFire 31K and 33K charges are NOT interchangeable. EC2-31K series are for 3-1/8" HELLFire; EC2-33K series are for 3-3/8" HELLFire.

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

<sup>^</sup>EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

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# Shaped Charges

## Constant Entry Hole and Penetration, 45° Tilt Angle

SandIQ® charges provide an “off ramp” for more efficient diversion of proppant. Perforating tunnels are tilted 45 degrees in direction of fluid flow. Angled holes are engineered to create a physical diversion on toe side of casing for proppant to naturally flow into the formation.

SandIQ shaped charges are engineered to produce precision holes in casing size, weights, and grades which are used in unconventional wells.



## UNCONVENTIONAL 45° CHARGE TILT ANGLE, 3-1/8" SandIQ® GUN SYSTEMS

| Carrier O.D. | Shaped Charge | Part Number    | Perforating Condition | Explosive  | Phasing / Charge Tilt Angle | API 19B Targeted Pipe* | Performance in Stressed Berea (API RP19B Sec. 2) |                             |              |
|--------------|---------------|----------------|-----------------------|------------|-----------------------------|------------------------|--|-----------------------------|--------------|
|              |               |                |                       |            |                             |                        | EHD^ at 45° (in)[cm]                             | EHD Variation Decentralized | TTP (in)[cm] |
| 3-1/8" 13g   | SandIQ B      | EC2-33A1371-SB | Fluid                 | 13.0g, RDX | 60° / 45°                   | 5.5" OD, P-110         | 0.28 [0.71]                                      | 4.2 %                       | 5.0 [12.70]  |
| 3-1/8" 16g   | SandIQ C      | EC2-33A1671-SC |                       | 16.0g RDX  |                             |                        | 0.31 [0.79]                                      | 3.8 %                       |              |
|              | SandIQ D      | EC2-33A1671-SD |                       | 16.0g, RDX |                             |                        | 0.38 [0.97]                                      | 2.6 %                       |              |
|              |               | EC2-33A1672-SD |                       | 16.0g, HMX |                             |                        | 0.35 [0.89]                                      | 1.7 %                       |              |
| 3-1/8" 20g   | SandIQ E      | EC2-33A2071-SE |                       | 20.0g, RDX |                             |                        | 0.42 [1.07]                                      | 3.7 %                       |              |
|              |               | EC2-33A2072-SE |                       | 20.0g, HMX |                             |                        | 0.41 [1.04]                                      | 4.8 %                       |              |
|              |               | EC2-33A2371-SF |                       | 23.0g, RDX |                             |                        | 0.44 [1.12]                                      | 1.0 %                       |              |
| 3-1/8" 23g   | SandIQ F      | EC2-33A2372-SF |                       | 23.0g, HMX |                             |                        | 0.43 [1.09]                                      | 6.0 %                       |              |
|              |               | EC2-33A2371-SG |                       | 23.0g, RDX |                             |                        | 0.51 [1.30]                                      | 5.2 %                       |              |
|              | SandIQ G      | EC2-33A2371-SG |                       |            |                             |                        |  |                             |              |

\*3-1/8" SandIQ charge performance is compatible in 4.5" 11.6-15.1# and 5.5" 17-23# P-110 casing.

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# Shaped Charges

## Dual Casing

Refrax™ shaped charges allow operators to optimize depleted wells while providing constant entry hole size and penetration through two strings of casing. Initially, this technology was developed for clients utilizing expandable liners inside existing casing. Now, the perforating system has been further developed for various refracturing applications with several entry hole diameter (EHD) options.

The system's performance is independent of gun position, casing specifications, or target formation. Perforating performance results in optimal pressure diversion and repeatable breakdown pressures that ultimately correlates to better fracturing treatments, lower costs, and more productive wells.



## CONVENTIONAL/UNCONVENTIONAL DUAL CASING, 2-3/8" - 3-1/8" GUN SYSTEMS

| Carrier O.D.   | Shaped Charge | Part Number   | Perforating Condition | Explosive  | Shot Density / Phasing | Inner Casing       |                       | Outer Casing  |                       |
|----------------|---------------|---------------|-----------------------|------------|------------------------|--------------------|-----------------------|---------------|-----------------------|
|                |               |               |                       |            |                        | O.D./Material      | EHD (in)[cm]          | O.D./Material | EHD (in)[cm]          |
| 2-3/8" 11g     | 2311 Refrax   | EC2-23A1171-R | Fluid                 | 11.0g, RDX | 6 spf / 60°            | 3.5" P110          | 0.33-0.38 [0.84-0.95] | 4.5" P110     | 0.33-0.35 [0.84-0.89] |
| 2-1/2" 11g     | 2511 Refrax   | EC2-25A1171-R | Fluid                 | 11.0g, RDX | 6 spf / 60°            | 3.5" P110          | 0.38-0.42 [0.97-1.07] | 5.5" P110     | 0.33-0.35 [0.84-0.89] |
| 2-3/4" 11g-15g | 2711 Refrax   | EC2-27A1171-R | Fluid                 | 11.0g, RDX | 6 spf / 60°            | 4.0" P110          | 0.29-0.30 [0.74-0.76] | 5.5" P110     | 0.37-0.41 [0.94-1.04] |
|                | 2715 Refrax   | EC2-27A1571-R |                       | 15.0g, RDX |                        |                    | 0.34-0.36 [0.86-0.91] |               | 0.34-0.42 [0.86-1.07] |
| 3-1/8" 14g-23g | 3314 Refrax   | EC2-33A1471-D | Fluid                 | 14.0g, RDX | 6 spf / 60°            | Expanded 4.0" P110 | 0.33-0.33 [0.84-0.84] | 5.5" P110     | 0.30-0.30 [0.76-0.76] |
|                | 3316 Refrax   | EC2-33A1671-D |                       | 16.0g, RDX |                        |                    | 0.37-0.38 [0.94-0.95] |               | 0.35-0.35 [0.89-0.89] |
|                | 3320 Refrax   | EC2-33A2071-D |                       | 20.0g, RDX |                        |                    | 0.41-0.42 [1.04-1.07] |               | 0.40-0.40 [1.02-1.02] |
|                | 3316 Refrax   | EC2-33A1671-D |                       | 16.0g, RDX | 6 spf / 60°            | 4.5" P110          | 0.30-0.32 [0.76-0.81] | 7.0" P110     | 0.39-0.41 [0.99-1.04] |
|                | 3323 Refrax   | EC2-33A2371-D |                       | 23.0g, RDX |                        |                    | 0.41-0.42 [1.04-1.07] |               | 0.35-0.35 [0.89-0.89] |

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^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

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# Shaped Charges

## Dynamic Underbalance Punchers, Circulating (Tubing Punchers)

GEOPunch™ minimizes or eliminates perforation damage by optimizing the well's dynamic underbalance, which is the transient underbalance that occurs just after creation of the perforation cavity.

Proprietary design software specifies a custom perforating configuration and the optimal completion process. This approach generates and controls the dynamic underbalance, rather than relying on the estimated reservoir pressure to create underbalance.

GEOPunch perforating is successfully performed in hard- and soft-rock formations, oil and gas reservoirs, and sandstones and carbonates and it also minimizes disruption of the cement/sandface hydraulic bond.



### CONVENTIONAL/UNCONVENTIONAL DYNAMIC UNDERBALANCE PUNCHERS, 1-9/16" - 7" GUN SYSTEMS

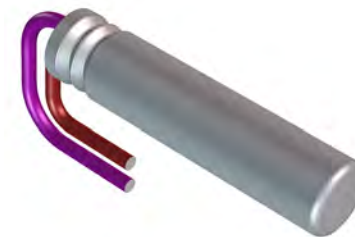
| Circulating Charges (Tubing Punchers) |             | Explosive<br>(g), load | Tubing/Drill Pipe<br>Wall Thickness (in)[cm] | Entrance Hole<br>(in)[cm] | Penetration<br>(in)[cm] | Carrier<br>O.D.   | Product Name         | Part Number       | Explosive   | Exit Hole<br>(in)[cm] |
|---------------------------------------|-------------|------------------------|--|---------------------------|-------------------------|-------------------|----------------------|-------------------|-------------|-----------------------|
| Carrier O.D.                          | Part Number |                        |  |                           |                         |                   |                      |                   |             |                       |
| 1-9/16"                               | TG39CS2     | 2.7g, HMX              | 0.190 [0.4826]                               | 0.45 [1.1430]             | <=0.100<br>[0.254]      | 2-3/4",<br>2-7/8" | 2708 GEOPunch RDX    | EC2-27A0861       | 8.0g, RDX   | 1.05 [2.67]           |
|                                       |             |                        | 0.375 [0.9525]                               | 0.31 [0.7874]             |                         |                   | 2708 GEOPunch HMX    | EC2-27A0862       | 8.0g, HMX   |                       |
|                                       | TG39CM2     | 3.4g, HMX              | 0.375 [0.9525]                               | 0.43 [1.0922 ]            | <=0.100<br>[0.254]      |                   | 2-7/8"               | 2708 GEOPunch HNS | EC2-27A0863 |                       |
|                                       |             |                        | 0.500 [1.2700]                               | 0.24 [0.6096 ]            |                         | 2808 GEOPunch RDX |                      | EC2-28A0861       | 8.0g, RDX   |                       |
|                                       | TG39CL2     | 3.4g, HMX              | 0.500 [1.2700]                               | 0.21 [0.5334 ]            | <=0.100<br>[0.254]      | 3-1/8",<br>3-3/8" |                      | 2808 GEOPunch HMX | EC2-28A0862 | 8.0g, HMX             |
|                                       |             |                        | 0.580 [1.4732]                               | 0.18 [0.4572 ]            |                         |                   | 2808 GEOPunch HNS    | EC2-28A0863       | 8.0g, HNS   |                       |
|                                       | TG39CM2-78  | 3.4g, HMX              | 0.625 [1.5875]                               | 0.28 [0.7112 ]            | <=0.100<br>[0.254]      |                   | 4",<br>4-1/2",<br>7" | 3308 GEOPunch RDX | EC2-33A0861 | 8.0g, RDX             |
|                                       |             |                        | 0.785 [1.9939 ]                              | 0.17 [0.4318 ]            |                         | 3308 GEOPunch HMX |                      | EC2-33A0862       | 8.0g, HMX   |                       |
|                                       | TG39CL2-88  | 3.4g, HMX              | 0.750 [1.9050 ]                              | 0.20 [0.5080 ]            | <=0.100<br>[0.254]      | 4008 GEOPunch RDX |                      | EC2-40A0861       | 8.0g, RDX   | 1.05 [2.67]           |
|                                       |             |                        |  |                           |                         | 4008 GEOPunch HMX | EC2-40A0862          | 8.0g, HMX         |             |                       |
|                                       |             |                        |  |                           |                         | 4008 GEOPunch HNS | EC2-40A0863          | 8.0g, HNS         |             |                       |

# Detonators, Detonating Cord, and Accessories

## Detonators and Accessories

### DETONATORS

| Part Number    | Description   |
|----------------|---|
| DET-E-A105     | Detonator, Electric, A105   |
| DET-E-A140     | Detonator, Electric, A-140 w/block (219192)                                   |
| DET-E-A140F    | Detonator, Electric, A-140F w/block   |
| DET-E-A140F-SL | Detonator, Electric, A-140F w/ 6.5" leads and block                           |
| DET-E-A140S    | Detonator, Electric, A-140S Fluid Disabled Resistorized Instantaneous RDX     |
| DET-E-A140S-DM | Detonator, Electric, A-140S Fluid Disabled Resistorized Instantaneous RDX, DM |
| DET-E-A161     | Detonator, Electric, A-161  |
| DET-E-A85      | Detonator, Electric, A85  |
| DET-E-A96L     | Detonator, Electric, A96L   |
| DET-E-R140     | Detonator, Electric, R-140 RDX  |
| DET-E-R140H    | Detonator, Electric, R-140H HMX   |
| DET-102350510  | Detonator, RED, Top Fire, Electric, 1.02 Grams                                |
| DET-102478439  | Detonator, TOP FIRE, RED Det. 102350510                                       |
| DET-2-300770-1 | Detonator, TOP FIRE, RF-SAFE GREENDET   |
| DET-3050-008   | Detonator, Resistor Bridge Top Fire   |



DETONATOR, ELECTRIC, A-140S  
DET-E-A140S

### ACCESSORIES

| Part Number      | Description   |
|------------------|---|
| DET-0010-006     | Rubber Grommet  |
| DET-0100-018     | Detcord Sizing Adapter (40/60 gr round to accept 80 gr detonator/booster; 0.22" O.D. x 0.5" long) |
| DET-2000-000     | Detonator Safety Shield   |
| DET-A161-ADAPTER | Cord Adapter for A161 (40/60gr round to 80gr round)   |
| DET-PE-4070      | Crimp Sleeve for A140S Detonator  |
| DT-0875-242      | End Seal for 80 Grain Detonating Cord, 0.24" x 0.88"  |
| GN-000-0018      | Teflon Grommet  |
| MS-1000-004      | Detonating Cord Charge Clip   |
| MS-1000-115      | Low Profile Charge Clip   |
| MS-1000-120      | Super Big Hole Charge Clip  |



40/60GR ROUND TO 80GR ROUND CORD  
DET-A161-ADAPTER

### CUTTERS AND CRIMPERS

| Part Number  | Description                      |
|--------------|----------------------------------|
| DET-0000-036 | Primacord Cutter                 |
| DET-0000-050 | Scale 12" Detonating Cord Cutter |
| DET-0000-053 | Booster Crimpers                 |
| DET-0100-053 | Super Crimper Assembly           |
| DET-14882BTS | Dual Cap Crimper                 |
| DET-80592    | Crimper/Cutter Tool Kit          |

# Detonators, Detonating Cord, and Accessories

## Detonating Cords

### DETONATING CORDS, SPOOL AND AIR PACK

| Load (gr/ft) | Part Number | Description  |
|--------------|-------------|--|
| 40           | DET-40H212  | Detonating Cord, 40 grain HMX LS (Detotec)                           |
|              | DET-40H512  | Detonating Cord, 40 grain HMX LS Ribbon (Detotec)                    |
|              | DET-40R211  | Detonating Cord, 40 grain RDX LS (Detotec)                           |
|              | DET-40R511  | Detonating Cord, 40 grain RDX LS Ribbon (Detotec)                    |
|              | DET-A538017 | Detonating Cord, Fireline 8/40 RDX LS Ribbon 1.4S Airpack            |
|              | DET-A545010 | Detonating Cord, 40 grain HMX Ribbon                                 |
|              | DET-A545015 | Detonating Cord, FireLine 40 gr HMX LS Ribbon, Air Packed, 36 lbs/bx |
| 60           | DET-60H212  | Detonating Cord, 60 grain HMX LS (Detotec)                           |
|              | DET-A574010 | Detonating Cord, 60 Gr HMX LS  |
|              | DET-A574015 | Detonating Cord, 60 Gr HMX LS FirePak 1.4D                           |
| 70           | DET-70H212  | Detonating Cord, 70 grain HMX LS (Detotec)                           |
| 80           | DET-80H212  | Detonating Cord, 80g HMX LS Zytac                                    |
|              | DET-80H212A | Detonating Cord, 80 grain HMX LS Zytel Airpack (Detotec)             |
|              | DET-80H312  | Detonating Cord, 80 grain HMX XHV (Detotec)                          |
|              | DET-80H312A | Detonating Cord, 80 grain HMX XHV Airpack (Detotec)                  |
|              | DET-80I111  | Detonating Cord, 80 grain Inert                                      |
|              | DET-80P113  | Detonating Cord, 80 grain PETN WP (Detotec)                          |
|              | DET-80R111  | Detonating Cord, 80 grain RDX Nylon (Detotec)                        |
|              | DET-80R211  | Detonating Cord, 80 grain RDX LS (Detotec)                           |
|              | DET-80R211A | Detonating Cord, 80 grain RDX LS Airpack (Detotec)                   |
|              | DET-80R311  | Detonating Cord, 80 grain RDX LS XHV (Detotec)                       |
|              | DET-80R311A | Detonating Cord, 80 grain RDX LS XHV Airpack (Detotec)               |
|              | DET-A580010 | Detonating Cord, Fireline 17/80 RDX Nylon                            |
|              | DET-A585010 | Detonating Cord, Fireline 17/80 HNS LS (EXPOSED) (500'/ CS)          |
|              | DET-PT250   | Detonating Cord, 80 gr HNS FEP Jacket, (DE P/N 2315353)              |





# Bi-Directional Boosters

## HMX, DT-BIDI-400

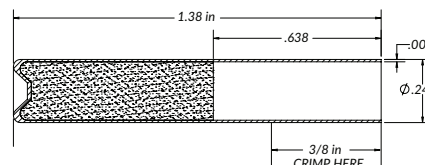


GEOdynamics' uniquely formed bi-directional boosters take advantage of an E.I. DuPont "taper jet" design which provides a uniform, high-output jet and increases the output of our boosters in excess of four times that which is provided by other boosters on the market. The "taper jet" design provides a benefit on the receiver side of the booster as well by focusing energy from the donor to initiate the receiving booster. This efficient transfer of energy between the two boosters provides a reliable detonation wave required for a dependable transfer.

## TECHNICAL INFORMATION

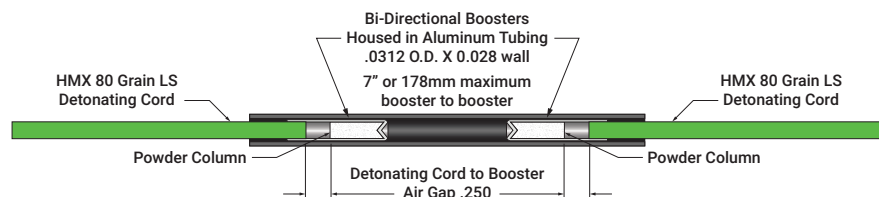
| Temperature Resistance |            |         |
|------------------------|------------|---------|
| HMX 10 grains (650 mg) |            |         |
| Time                   | Fahrenheit | Celsius |
| 1 hr                   | 400°F      | 204°C   |
| 24 hr                  | 356°F      | 180°C   |
| 100 hr                 | 300°F      | 148°C   |

| Dimensions              |         |         |
|-------------------------|---------|---------|
| Shell Length            | 1.38 in | 3.51 cm |
| Shell OD                | 0.24 in | 0.61 cm |
| Shell ID                | 0.22 in | 0.56 cm |
| Powder Depth (open end) | 0.63 in | 1.60 cm |
| Crimp Area (open end)   | 0.38 in | 0.97 cm |



## QC TEST CONFIGURATION

Our HMX bi-di is designed and tested to shoot over a 7" air gap between the donor and receiving booster, while the detonating cord on each booster has a 0.250" air gap from the powder column. When new powder is received at our facility, Legacy tests the transfer over a 9" air gap before the powder is released into production. This lot-by-lot testing ensures our boosters are superior in transfer reliability over all other bi-directional boosters on the market.



| Sensitivity                |                  |          |
|----------------------------|------------------|----------|
| Application                | Maximum Distance |          |
| Booster to Booster         | 177.80 mm        | 7.000 in |
| Detonating Cord to Booster | 6.35 mm          | 0.250 in |
| Output in Steel Plate      | 1.02 mm          | 0.040 in |



| Packaging Information                  |   |         |
|--|---|---------|
| Quantity (per box)                     | 50 pcs                                    | 100 pcs |
| Gross Weight (per box)                 | 2.0 lb                                    | 4.0 lb  |
|  | .90 kg                                    | 1.81 kg |
| Net Weight (per box)                   | .12 lb                                    | .23 lb  |
|  | .05 kg                                    | .10 kg  |
| Net Explosive Quantity (NEQ) (per box) | .07 lb                                    | .14 lb  |
|  | .03 kg                                    | .06 kg  |
| Box Dimensions                         | 12 w x 12 l x 7.5 h (in.)                 |         |
|  | 30.5 w x 30.5 l x 17.8 h (cm.)            |         |
| Product Weight                         | 16.8 grains                               |         |
|  | 1.1 gram                                  |         |
| U.N. Proper Shipping Name              | Components, explosive train, n.o.s. (HMX) |         |
| U. N. Number                           | UN0384                                    |         |
| DOT Approval Number                    | EX2008080032                              |         |
| U.N. Classification Code               | 1.4S                                      |         |

## USAGE, STORAGE, AND DISPOSAL

### WARNING

Use of explosives by untrained personnel is extremely dangerous and may injure or kill.  
**IMPORTANT:** All users of this product should read GEOdynamics "Responsibilities of Purchase/User and Disclaimer of Warranties and Representations and Warnings and Instructions."

### SHELF LIFE

- 10 YEARS AT STORAGE CONDITIONS
- TEMPERATURE RANGE: +41°F to +95°F (+5°C to +35°C)
- RELATIVE HUMIDITY: MAX. 65%
- GOOD VENTILATION

### DISPOSAL

Boosters should be destroyed only by AUTHORIZED persons (COMPLIANT WITH NATIONAL AND STATE LAW AND REGULATION). Refer to Section 13 of the product SDS for disposal considerations.

# Bi-Directional Boosters

## HNS, DT-BIDI-475

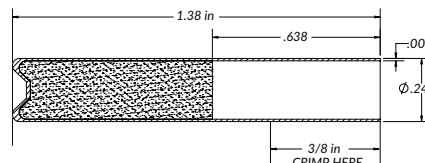


GEODynamics' uniquely formed bi-directional boosters take advantage of an E.I. DuPont "taper jet" design which provides a uniform, high-output jet and increases the output of our boosters in excess of four times that which is provided by other boosters on the market. The "taper jet" design provides a benefit on the receiver side of the booster as well by focusing energy from the donor to initiate the receiving booster. This efficient transfer of energy between the two boosters provides a reliable detonation wave required for a dependable transfer.

### TECHNICAL INFORMATION

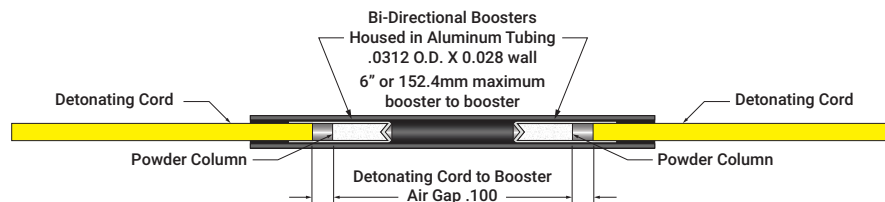
| Temperature Resistance |            |         |
|------------------------|------------|---------|
| HNS 10 grains (650 mg) |            |         |
| Time                   | Fahrenheit | Celsius |
| 1 hr                   | 475°F      | 246.1°C |
| 100 hr                 | 450°F      | 232.2°C |

| Dimensions              |         |         |
|-------------------------|---------|---------|
| Shell Length            | 1.38 in | 3.51 cm |
| Shell OD                | 0.24 in | 0.61 cm |
| Shell ID                | 0.22 in | 0.56 cm |
| Powder Depth (open end) | 0.63 in | 1.60 cm |
| Crimp Area (open end)   | 0.38 in | 0.97 cm |



### QC TEST CONFIGURATION

Our HNS bi-di is designed and tested to shoot over a 6" air gap between the donor and receiving booster, while the detonating cord on each booster has a 0.10" air gap from the powder column. This testing ensures our boosters are superior in transfer reliability over all other bi-directional boosters on the market.



| Sensitivity                |                  |          |
|----------------------------|------------------|----------|
| Application                | Maximum Distance |          |
| Booster to Booster         | 152.40 mm        | 6.000 in |
| Detonating Cord to Booster | 2.54 mm          | 0.100 in |



| Packaging Information                  |   |         |
|--|---|---------|
| Quantity (per box)                     | 50 pcs                                    | 100 pcs |
| Gross Weight (per box)                 | 2.0 lb                                    | 4.2 lb  |
|  | .90 kg                                    | 1.9 kg  |
| Net Weight (per box)                   | .12 lb                                    | .22 lb  |
|  | .05 kg                                    | .10 kg  |
| Net Explosive Quantity (NEQ) (per box) | .07 lb                                    | .13 lb  |
|  | .03 kg                                    | .06 kg  |
| Box Dimensions                         | 12 w x 12 l x 7.5 h (in.)                 |         |
|  | 30.5 w x 30.5 l x 17.8 h (cm.)            |         |
| Product Weight                         | 15.4 grains                               |         |
|  | 1 gram                                    |         |
| U.N. Proper Shipping Name              | Components, explosive train, n.o.s. (HNS) |         |
| U. N. Number                           | UN0384                                    |         |
| DOT Approval Number                    | EX2008080032                              |         |
| U.N. Classification Code               | 1.4S                                      |         |

### USAGE, STORAGE, AND DISPOSAL

#### WARNING

Use of explosives by untrained personnel is extremely dangerous and may injure or kill.  
**IMPORTANT:** All users of this product should read GEODynamics "Responsibilities of Purchase/User and Disclaimer of Warranties and Representations and Warnings and Instructions."

#### SHELF LIFE

- 10 YEARS AT STORAGE CONDITIONS
- TEMPERATURE RANGE: +41°F to +95°F (+5°C to +35°C)
- RELATIVE HUMIDITY: MAX. 65%
- GOOD VENTILATION

#### DISPOSAL

Boosters should be destroyed only by AUTHORIZED persons (COMPLIANT WITH NATIONAL AND STATE LAW AND REGULATION). Refer to Section 13 of the product SDS for disposal considerations.

# STRATX® Perforating System

## 3-1/8 in (79 mm), GIC Spiral



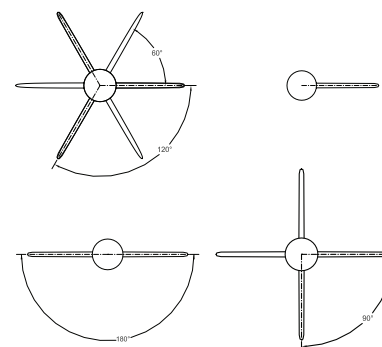
GEODynamics STRATX® offers a factory-loaded, plug-and-play, limited entry perforating system for unconventional reservoirs. STRATX integrates EPIC™ Switch addressable technology with industry-standard detonator options into a programmable initiation control (PIC) module, delivering an intrinsically-safe, deployment-ready design. Quick and simple gun-string assembly saves time and increases efficiencies at the wellsite. GEODynamics delivers STRATX carriers fully loaded to match customer specifications and preferences.

## APPLICATION SPECIFICATIONS

|                                  |   |
|----------------------------------|---|
| Shot Density and Phasing Options | Multiple <a href="#">Shot &amp; Phasing Options</a> , one (1) to 10 shots per carrier |
| Initiation Point                 | Top-fired, wireline   |
| Mode of Fire                     | Select fire, addressable  |
| Detonating Cord                  | 80-grain round, factory-loaded  |
| Compatible Perforating Charges   | FracIQ®, Connex®, Razor®, Basix™, Basix Frac, Refrax™                                 |
| Maximum Gun Swell (in)[mm]       | 3.46 [87.88] @ 22.7g In Fluid; 3.60 [91.44] @ 19.0g Dry                               |

## ENVIRONMENTAL

|                             |  |
|-----------------------------|--|
| Maximum Pressure (psi)[MPa] | 20,000 [137.90]                                      |
| Maximum Tensile* (lbf)[kN]  | 140,000 [622.75] *Hardware Calculated Breaking Point |



## CARRIER SPECIFICATIONS

| Carrier Assembly<br>Part Number | Shot & Phasing Options |         | Gun Lengths |      | Gun End to Center of<br>First Scallop @ 0° |        | Distance Shot<br>to Shot |      | Gross Weights<br>(Fully Loaded) |       | Make-Up Lengths<br>with Tandem Subs |             |
|---------------------------------|------------------------|---------|-------------|------|--|--------|--------------------------|------|---------------------------------|-------|-------------------------------------|-------------|
|                                 | # Shots                | Phasing | (in)        | (cm) | (in)                                       | (mm)   | (in)                     | (mm) | (lbs)                           | (kgs) | T076 (in)                           | T279 (in)   |
| GIC31-O01                       | 1 Shot                 | 0°      | 9.5         | 24.1 | 4.25                                       | 107.95 | 2.0                      | 50.8 | 12.1                            | 5.5   | 9.63                                | 10.38-10.55 |
| GIC31-J02                       | 2 Shot                 | 180°    | 11.5        | 29.2 |  |        |                          |      | 14.2                            | 6.4   | 11.63                               | 12.38-12.55 |
| GIC31-G03                       | 3 Shot                 | 120°    | 13.5        | 34.3 |  |        |                          |      | 16.2                            | 7.4   | 13.63                               | 14.38-14.55 |
| GIC31-B04                       | 4 Shot                 | 90°     | 15.5        | 39.4 |  |        |                          |      | 18.3                            | 8.3   | 15.63                               | 16.38-16.55 |
| GIC31-P05                       | 5 Shot                 | 72°     | 17.5        | 44.5 |  |        |                          |      | 20.4                            | 9.3   | 17.63                               | 18.38-18.55 |
| GIC31-A06                       | 6 Shot                 | 60°     | 19.5        | 49.5 |  |        |                          |      | 22.5                            | 10.2  | 19.63                               | 20.38-20.55 |

Additional shot and phasing options available by special order with lead time:

- GIC31-AXX—Six (6) to 20 shots with 60° phasing (2" shot-to-shot distance for all lengths).
- GIC31-OXX—One (1) to 9 shots with 0° phasing (2" shot-to-shot for -O02; 3" shot-to-shot for -O03 and greater (4 spf equivalent)).
- GIC31-JXX—Two (2) to 17 shots with 180° phasing (2" between shots #1 and #2; 2.40" between all other shots thereafter (5 spf equivalent)).
- Nitrile or Viton o-rings and standard tandem (T076) or orienting tandem (T279) available with any assembly.
- Contact your sales representative for additional shot and phasing options.

Refer to [Components and Accessories](#) for ancillary equipment.



# STRATX® Perforating System

## 3-1/8 in (79 mm), GIC Spiral



### BIG HOLE

| Carrier O.D. | Shaped Charge | Part Number | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |              | Performance in Stressed Berea |              |
|--------------|---------------|-------------|-----------------------|------------|------------------------|--------------|-------------------------|--------------|-------------------------------|--------------|
|              |               |             |                       |            |                        | Application  | EHD (in)[cm]            | TTP (in)[cm] | EHD^ (in)[cm]                 | TTP (in)[cm] |
| 3-1/8" 23g   | 3323 Basix BH | EC2-33A2331 | Fluid                 | 22.7g, RDX | 6 spf / 60°            | 4-1/2" L-80  | 0.78 [1.98]             | 7.60 [19.30] |                               |              |
|              |               | EC2-33A2332 |                       | 22.7g, HMX |                        |              | 0.79 [2.01]             | 7.80 [19.81] |                               |              |

### CONSTANT ENTRY HOLE AND PENETRATION

| Carrier O.D.   | Shaped Charge    | Part Number                         | Perforating Condition | Explosive  | Shot Density / Phasing | API 19B Targeted Pipe* | Performance in Stressed Berea (API RP19B Sec. 2) |                             |              |
|----------------|------------------|-------------------------------------|-----------------------|------------|------------------------|------------------------|--|-----------------------------|--------------|
|                |                  |                                     |                       |            |                        |                        | EHD^ (in)[cm]                                    | EHD Variation Decentralized | TTP (in)[cm] |
| 3-1/8" 12g-13g | FracIQ 20        | EC2-33A1271                         | Fluid                 | 12.0g, RDX | 6 spf / 60°            | 4.5"-5.5" OD, P110     | 0.22 [0.56]                                      | 5.5 %                       | 5.0 [12.70]  |
|                | Basix Frac 25    | EC2-33A1271-BF                      |                       | 12.0g, RDX |                        |                        | 0.26 [0.66]                                      | 2.4 %                       | 4.0 [10.16]  |
|                | FracIQ 25        | EC2-33A1371                         |                       | 13.0g, RDX |                        |                        | 0.26 [0.66]                                      | 4.1 %                       | 5.0 [12.70]  |
| 3-1/8" 13g-16g | FracIQ Connex 30 | EC2-33A1471-FRX                     | Fluid                 | 14.0g, RDX | 6 spf / 60°            | 4.5"-5.5" OD, P110     | 0.31 [0.79]                                      | 6.0 %                       | 5.0 [12.70]  |
|                | Basix Frac 30    | EC2-33A1471-BF                      |                       | 14.0g, RDX |                        |                        | 0.31 [0.79]                                      | 4.0 %                       | 4.0 [10.16]  |
|                | FracIQ 30        | EC2-33A1671                         |                       | 16.0g, RDX |                        |                        | 0.31 [0.79]                                      | 3.1 %                       | 5.0 [12.70]  |
|                | FracIQ 30        | EC2-33A1672                         |                       | 16.0g, HMX |                        |                        | 0.34 [0.86]                                      | 3.8 %                       |              |
| 3-1/8" 16g-20g | FracIQ Connex 35 | EC2-33A1671-FRX                     | Fluid                 | 16.0g, RDX | 6 spf / 60°            | 4.5"-5.5" OD, P110     | 0.36 [0.91]                                      | 5.0 %                       | 5.0 [12.70]  |
|                | Basix Frac 35    | EC2-33A1871-BF                      |                       | 18.0g, RDX |                        |                        | 0.36 [0.91]                                      | 3.4 %                       | 4.0 [10.16]  |
|                | FracIQ 35        | EC2-33A2071                         |                       | 20.0g, RDX |                        |                        | 0.36 [0.91]                                      | 2.5 %                       | 5.0 [12.70]  |
|                | FracIQ 35        | EC2-33A2072                         |                       | 20.0g, HMX |                        |                        | 0.37 [0.94]                                      | 3.0 %                       |              |
| 3-1/8" 19g-23g | FracIQ Connex 40 | EC2-33A1971-FRX                     | Fluid                 | 19.0g, RDX | 6 spf / 60°            | 4.5"-5.5" OD, P110     | 0.41 [1.04]                                      | 6.5 %                       | 5.0 [12.70]  |
|                | FracIQ 40        | EC2-33A2371                         |                       | 23.0g, RDX |                        |                        | 0.40 [1.02]                                      | 3.3 %                       |              |
|                | FracIQ 40        | EC2-33A2372                         |                       | 23.0g, HMX |                        |                        | 0.41 [1.04]                                      | 3.8 %                       |              |
|                | Basix Frac 40    | EC2-33A2371-BF                      |                       | 23.0g, RDX |                        |                        | 0.40 [1.02]                                      | 6.6 %                       | 4.0 [10.16]  |
|                | Basix Frac 40    | EC2-33A2371-BF                      |                       | 23.0g, RDX |                        | 6.0" OD, P110          | 0.40 [1.02]                                      | 7.5 %                       |              |
| 3-1/8" 20g-23g | FracIQ 45        | EC2-33A2071-45                      | Fluid                 | 20.0g, RDX | 6 spf / 60°            | 4.5"-5.5" OD, P110     | 0.45 [1.14]                                      | 5.6 %                       | 5.0 [12.70]  |
|                | FracIQ Connex 45 | EC2-33A2371-FRX                     |                       | 21.0g, RDX |                        |                        | 0.45 [1.14]                                      | 3.2 %                       |              |
|                | Basix Frac 45    | EC2-33A2371-BF45                    |                       | 23.0g, RDX |                        |                        | 0.45 [1.14]                                      | 5.9 %                       | 4.0 [10.16]  |
| 3-1/8" 23g     | FracIQ 50        | EC2-33A2371-50<br>† EC2-33A2371-50G | Fluid                 | 23.0g, RDX | 6 spf / 60°            | 4.5"-5.5" OD, P110     | 0.50 [1.27]                                      | 1.5 %                       | 5.0 [12.70]  |
|                | FracIQ 50        | EC2-33A2372-RX                      |                       | 23.0g, HMX |                        | 5.5" OD, P110          | 0.50 [1.27]                                      | 4.6 %                       |              |
|                | Basix Frac 50    | EC2-33A2371-BF50                    |                       | 23.0g, RDX |                        | 4.5"-5.5" OD, P110     | 0.50 [1.27]                                      | 4.8 %                       | 4.0 [10.16]  |
|                | FracIQ 55        | EC2-33A2371-55                      |                       | 23.0g, RDX |                        | 4.5" OD, P110          | 0.55 [1.40]                                      | 3.8 %                       | 5.0 [12.70]  |

\*3-1/8" FracIQ charge performance is compatible in 4.5" 11.6-15.1# and 5.5" 17-23# P-110 casing. FRX designates FracIQ® Connex® reactive technology.

†EC2-33A2371-50G has a custom, externally-grooved case (special application).

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

FLUID: Qualified for shooting in FLUID only with perforating systems qualified by GEODynamics.

IN FLUID or DRY: Qualified for shooting in FLUID or DRY GAS with perforating systems qualified by GEODynamics.

Revised: August 31, 2023 3:22 PM

# STRATX® Perforating System

## 3-1/8 in (79 mm), GIC Spiral



### DEEP PENETRATING/EXTREME DEEP PENETRATING

| Carrier O.D. | Shaped Charge   | Part Number    | Perforating Condition | Explosive  | Shot Density / Phasing                   | ^Casing O.D. | Performance in Concrete |                | Performance in Stressed Berea |               |
|--------------|-----------------|----------------|-----------------------|------------|--|--------------|-------------------------|----------------|-------------------------------|---------------|
|              |                 |                |                       |            |  | Application  | EHD (in)[cm]            | TTP (in)[cm]   | EHD^ (in)[cm]                 | TTP (in)[cm]  |
| 3-1/8" 19g   | 3319 Connex RX  | EC2-33A1991-RX | ‡ Fluid or Dry        | 19.0g, RDX | 5 spf / 60° (Dry)<br>6 spf / 60° (Fluid) | 4-1/2" L-80  |                         |                | 0.32 [0.81]                   | 11.30 [28.70] |
|              |                 | EC2-33A1992-RX |                       | 19.0g, HMX |  |              |                         |                | 0.32 [0.81]                   | 11.60 [29.46] |
|              | 3319 Razor XDP  | EC2-33A1921    | ‡ Fluid or Dry        | 19.0g, RDX |  |              | 0.51 [1.30]             | 42.07 [106.86] |                               |               |
|              |                 | EC2-33A1922    |                       | 19.0g, HMX |  |              | 0.49 [1.24]             | 41.10 [104.39] | 0.43 [1.09]                   | 14.60 [37.08] |
|              | 3319 Basix XDP  | EC2-33A1921-E  | ‡ Fluid or Dry        | 19.0g, RDX |  |              | 0.43 [1.09]             | 35.80 [90.93]  |                               |               |
|              |                 | EC2-33A1922-E  |                       | 19.0g, HMX |  |              |                         |                |                               |               |
|              | 3319 Basix XDP  | EC2-33A1921-EG | Fluid                 | 19.0g, RDX |  |              | 0.43 [1.09]             | 35.70 [90.68]  |                               |               |
|              | 3319 Basix DP   | EC2-33A1951    | ‡ Fluid or Dry        | 19.0g, RDX |  |              | 0.54 [1.37]             | 29.20 [74.17]  |                               |               |
|              |                 | EC2-33A1952    |                       | 19.0g, HMX |  |              |                         |                |                               |               |
| 3-1/8" 23g   | 3323 Connex SDP | EC2-33A2321-RC | Fluid                 | 22.7g, RDX | 6 spf / 60°                              | 4-1/2" L-80  |                         |                | 0.40 [1.02]                   | 15.60 [39.62] |
|              |                 | EC2-33A2322-RC |                       | 22.7g, HMX |  |              |                         |                | 0.46 [1.17]                   | 15.31 [38.89] |
|              |                 | EC2-33A2323-RC |                       | 22.7g, HNS |  |              |                         |                | 0.36 [0.91]                   | 11.85 [30.10] |
|              | 3323 Razor XDP  | EC2-33A2321    |                       | 22.7g, RDX |  |              |                         |                | 0.41 [1.04]                   | 16.40 [41.66] |
|              |                 | EC2-33A2322    |                       | 22.7g, HMX |  |              | 0.42 [1.07]             | 39.02 [99.11]  | 0.44 [1.12]                   | 15.68 [39.83] |
|              |                 | EC2-33A2323    |                       | 22.7g, HNS |  |              | 0.35 [0.89]             | 26.05 [66.17]  | 0.37 [0.94]                   | 12.12 [30.78] |
|              | 3323 Basix XDP  | EC2-33A2321-E  |                       | 22.7g, RDX |  |              | 0.42 [1.07]             | 46.01 [116.87] | 0.39 [0.99]                   | 12.30 [31.24] |
|              |                 | EC2-33A2322-E  |                       | 22.7g, HMX |  |              | 0.43 [1.09]             | 46.37 [117.78] |                               |               |
|              |                 | EC2-33A2321-EG |                       | 22.7g, RDX |  |              |                         |                | 0.41 [1.04]                   | 11.90 [30.23] |
|              | 3323 Basix GH   | EC2-33A2322-EG |                       | 22.7g, HMX |  |              | 0.43 [1.09]             | 45.70 [116.08] | 0.40 [1.02]                   | 11.90 [30.23] |
|              |                 |                |                       |            |  |              |                         |                |                               |               |
|              |                 |                |                       |            |  |              |                         |                |                               |               |

‡ For 3-1/8" 19g in dry gas, maximum shot density is 5 spf or limited to one- (1) and two- (2) shot short guns only.

### DUAL CASING

| Carrier<br>O.D.   | Shaped Charge | Part Number   | Perforating<br>Condition | Explosive  | Shot Density /<br>Phasing | Inner Casing          |                       | Outer Casing  |                       |
|-------------------|---------------|---------------|--------------------------|------------|---------------------------|-----------------------|-----------------------|---------------|-----------------------|
|                   |               |               |                          |            |                           | O.D./Material         | EHD <i>(in)[cm]</i>   | O.D./Material | EHD <i>(in)[cm]</i>   |
| 3-1/8"<br>14g-23g | 3314 Refrax   | EC2-33A1471-D | Fluid                    | 14.0g, RDX | 6 spf / 60°               | Expanded 4.0"<br>P110 | 0.33-0.33 [0.84-0.84] | 5.5" P110     | 0.30-0.30 [0.76-0.76] |
|                   | 3316 Refrax   | EC2-33A1671-D |                          | 16.0g, RDX |                           |                       | 0.37-0.38 [0.94-0.95] |               | 0.35-0.35 [0.89-0.89] |
|                   | 3320 Refrax   | EC2-33A2071-D |                          | 20.0g, RDX |                           |                       | 0.41-0.42 [1.04-1.07] |               | 0.40-0.40 [1.02-1.02] |
|                   | 3316 Refrax   | EC2-33A1671-D |                          | 16.0g, RDX | 6 spf / 60°               | 4.5" P110             | 0.30-0.32 [0.76-0.81] | 7.0" P110     | 0.39-0.41 [0.99-1.04] |
|                   | 3323 Refrax   | EC2-33A2371-D |                          | 23.0g, RDX |                           |                       | 0.41-0.42 [1.04-1.07] |               | 0.35-0.35 [0.89-0.89] |

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

FLUID: Qualified for shooting in FLUID only with perforating systems qualified by GEODynamics.

IN FLUID or DRY: Qualified for shooting in FLUID or DRY GAS with perforating systems qualified by GEODynamics.

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# STRATX® Perforating System

## 3-1/8 in (79 mm), GIC Spiral



### GOOD HOLE

| Carrier O.D. | Shaped Charge   | Part Number    | Perforating Condition | Explosive  | Shot Density / Phasing                   | ^Casing O.D. | Performance in Concrete |               | Performance in Stressed Berea |               |
|--------------|-----------------|----------------|-----------------------|------------|--|--------------|-------------------------|---------------|-------------------------------|---------------|
|              |                 |                |                       |            |  | Application  | EHD (in)[cm]            | TTP (in)[cm]  | EHD^ (in)[cm]                 | TTP (in)[cm]  |
| 3-1/8" 19g   | 3319 Connex XEH | EC2-33A1941-RC | ‡ Fluid or Dry        | 19.0g, RDX | 5 spf / 60° (Dry)<br>6 spf / 60° (Fluid) | 4-1/2" L-80  |                         |               | 0.41 [1.04]                   | 14.20 [36.07] |
|              |                 | EC2-33A1942-RC |                       | 19.0g, HMX |  |              |                         |               | 0.42 [1.07]                   | 14.37 [36.50] |
|              | 3319 Basix GH   | EC2-33A1941    |                       | 19.0g, RDX |  |              | 0.60 [1.52]             | 28.55 [72.52] |                               |               |
|              |                 | EC2-33A1942    |                       | 19.0g, HMX |  |              |                         |               |                               |               |
| 3-1/8" 23g   | 3323 Connex XEH | EC2-33A2341-RC | Fluid                 | 22.7g, RDX | 6 spf / 60°                              | 4-1/2"       |                         |               | 0.43 [1.09]                   | 15.60 [39.62] |
|              |                 | EC2-33A2342-RC |                       | 22.7g, HMX |  |              |                         |               | 0.43 [1.09]                   | 15.89 [40.36] |
|              | 3323 Basix GH   | EC2-33A2341-E  |                       | 22.7g, RDX |  | 5-1/2" L-80  | 0.48 [1.22]             | 31.40 [79.76] |                               |               |
|              |                 | EC2-33A2342-E  |                       | 22.7g, HMX |  | 4-1/2"       |                         |               |                               |               |

‡ For 3-1/8" 19g in dry gas, maximum shot density is 5 spf or limited to one- (1) and two- (2) shot short guns only.

### HARDWARE

|                                      |  |
|--------------------------------------|--|
| Gun Body Configuration/Material      | Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel |
| Charge Tube Type & Retention         | Round steel tube strip; bend tab retention                                 |
| Type of Tandem Connection            | Disposable switch tandem sub   |
| Nominal OD / Wall Thickness (in)[mm] | 3.15 [80.01] / 0.315 [8.00] or 3.125 [79.38] / 0.3125 [7.94]               |
| Upper/Lower Thread Connections       | 2.750" 6P ACME-2G  |

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

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IN FLUID or DRY: Qualified for shooting in FLUID or DRY GAS with perforating systems qualified by GEODynamics.

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# STRATX® Perforating System

## 3-1/8 in (79 mm), GIC Spiral



### COMPONENTS AND ACCESSORIES

| Description  | Part Number(s)   |
|--|--|
| <b>3.13" Direct Connect Quick Change Assy</b> ( <i>direct connection to top gun tandem</i> )<br>Intermediate Rebuild Kit ( <i>contacts, teflon tubing, screw, spring, insulating ret.</i> )<br>Complete Rebuild Kit with O-Rings ( <i>all required parts</i> )         | GN-QC31-GIC31<br>RKI-GN-QC31-0001<br>RKC-GN-QC31-0001  |
| <b>3.13" STRATX® Portless Tandem Subs</b> , Disposable Assembly<br>Orienting Disposable Tandem Sub Assembly<br>Lock Ring for Orienting Disposable Tandem ( <i>left hand threads</i> )  | GN-R31-T076-A<br>GN-R31-T279-A<br>GN-R31-L75-320   |
| <b>O-Ring Materials and Size</b> , Nitrile (Standard)<br>Viton 95D (optional)  | OR-N569-230<br>OR-V95G-230   |
| <b>STRATX® PIC Module with Detonator</b><br><b>EPIC™ Gen 2V Detonator Module</b> (alternate shell design)  | DT-EPIC-R140<br>DT-EPIC2-110-R140  |
| <b>Detonating Cord</b>   | DET-80R111 (RDX)<br>DET-80H212(HMX)  |
| <b>EPIC™ Module Ignitor</b> ( <i>T076-A tandem sub in bottom gun (sub mates with -GIC crossover)</i> )   | DT-0425-106  |
| <b>3.13" Crossover, GI Box (Bottom Gun Tandem) to Setting Tool</b><br>GI Box x Size 10 Setting Tool<br>GI Box x Size 20 Setting Tool<br>GI Box x 3.63" Wireline Compact Setting Tool<br>GI Box x 3.5" Shorty Setting Tool<br>GI Box x Size 20 Diamondback Setting Tool | GN-RX31-BK10-GIC<br>GN-RX31-BK20-GIC<br>GN-RX31-3625-GIC<br>GN-RX31-3500-GIC<br>GN-RX31-DB20-GIC |
| <b>3.13" Crossover to Pumpdown Sub</b><br>GI Pin x 3.13" Conventional Pin, ( <i>connects bottom gun to pumpdown sub</i> )  | GN-RX31-GIC31-050  |
| <b>3.13" Bull Plug</b> (bottom gun, e.g., for toe preps in vertical wells)   | GN-R31HF-0022  |
| <b>3.13" Plastic Thread Protectors, Carrier (Gun)</b> ( <i>o-ring: OR-N569-232</i> )<br>Tandem Sub Protector   | GN-THD-31HF-100<br>GN-THD-31GI-065P  |
| <b>3.13" Disposable Portless Top Sub Assy, 2.75" ACME Pin x GI Pin</b><br><i>For existing industry standard quick change connections</i>   | GN-R31-T173-A  |
| <b>3.13" Disposable Crossover, GI Pin x 1.63" ACME Box</b> ( <i>disposable bottom sub</i> )<br>Thread Protector (1.63" box connection)<br>Thread Protector o-ring<br><i>For existing industry-standard quick change connections</i>                                    | GN-R31-T172-A<br>EM-EL1-THD-GOCQP<br>OR-N569-222   |

STRATX DISPOSABLE PORTLESS  
TANDEM SUB ASSEMBLY  
GN-R31-T076-A



EPIC MODULE IGNITOR  
DT-0425-106

3.13" CROSSOVER,  
GI BOX x SIZE 20 SETTING TOOL  
GN-RX31-BK20-GIC

3.13" CROSSOVER, GI BOX x SIZE 20  
DIAMONDBACK SETTING TOOL  
GN-RX31-DB20-GIC



DIRECT CONNECT QUICK CHANGE ASSY  
GN-QC31-GIC31

STRATX® ORIENTING DISPOSABLE  
PORTLESS TANDEM SUB ASSEMBLY  
GN-R31-T279-A  
(Lock Ring: GN-R31-L75-320)

STRATX PIC MODULE W/DETONATOR  
DT-EPIC-A140

STRATX GIC31-J02  
2-SHOT, 180° SHOWN  
MULTIPLE SHOT AND PHASING OPTIONS

STRATX DISPOSABLE  
PORTLESS TANDEM SUB ASSEMBLY  
GN-R31-T076-A

EPIC™ MODULE IGNITOR  
DT-0425-106

3.13" CROSSOVER,  
GI BOX x SIZE 20 SETTING TOOL  
GN-RX31-BK20-GIC

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# STRATX<sup>®</sup> Perforating System

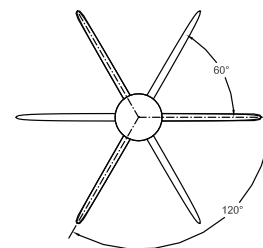
## 3-1/8 in (79 mm), HELLFire<sup>®</sup> (GIC-HF) Planar



GEODynamics STRATX<sup>®</sup> offers a factory-loaded, plug-and-play, limited entry perforating system for unconventional reservoirs. STRATX integrates EPIC<sup>™</sup> Switch addressable technology with industry-standard detonator options into a programmable initiation control (PIC) module, delivering an intrinsically-safe, deployment-ready design. Quick and simple gun-string assembly saves time and increases efficiencies at the wellsite. GEODynamics delivers STRATX carriers fully loaded to match customer specifications and preferences.

### APPLICATION SPECIFICATIONS

|                                |  |
|--------------------------------|--|
| Shot Density and Phasing       | 1 to 6 shots per cluster, 120° planar phasing<br>(shots 1-3: 0°, 120°, 240°; shots 4-6: 60°, 180°, 300°) |
| Initiation Point               | Top-fired, wireline  |
| Mode of Fire                   | Select fire, addressable   |
| Perforating Condition          | In Fluid   |
| Detonating Cord                | 80-grain round, factory-loaded   |
| Compatible Perforating Charges | HELLFire <sup>®</sup>  |
| Maximum Gun Swell (in)[mm]     | 3.46 [87.88] @ 7.0g  |



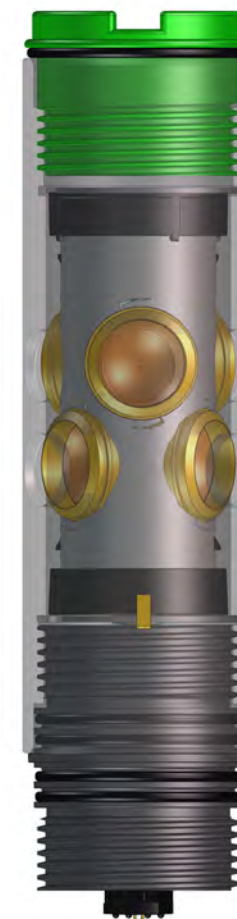
### ENVIRONMENTAL

|                             |  |
|-----------------------------|--|
| Maximum Pressure (psi)[MPa] | 16,000 [110.32]                                      |
| Maximum Tensile* (lbf)[kN]  | 140,000 [622.75] *Hardware Calculated Breaking Point |

### CARRIER SPECIFICATIONS

| Carrier Assembly<br>Part Number                      | Shot & Phasing<br>Options |         | Gun Lengths |       | Gun End to Center of<br>First Scallop @ 0° |       | Distance Shot to<br>Shot |       | Approx. Weights<br>(Fully Loaded) |       | Make-Up Lengths<br>with Tandem Subs |             |
|--|---------------------------|---------|-------------|-------|--|-------|--------------------------|-------|-----------------------------------|-------|-------------------------------------|-------------|
|  | # Shots                   | Phasing | (in)        | (cm)  | (in)                                       | (mm)  | (in)                     | (mm)  | (lbs)                             | (kgs) | T076 (in)                           | T279 (in)   |
| GIC31-HF03   | 1-3                       | 120°    | 8.00        | 20.32 | 3.87                                       | 98.30 | N/A                      |       |                                   |       | 8.13                                | 8.88-9.05   |
| GIC31-HF06   | 4-6                       | 60°     | 9.50        | 24.13 |  |       | 1.42                     | 36.07 | 7.90                              | 3.58  | 9.63                                | 10.38-10.55 |
| Fully Loaded 6-Shot Carrier with attached Tandem Sub |                           |         |             |       |  |       |                          |       | 11.55                             | 5.24  |                                     |             |

Refer to [Components and Accessories](#) for ancillary equipment.



# STRATX® Perforating System

## 3-1/8 in (79 mm), HELLFire® (GIC-HF) Planar



### HELLFire® CONSTANT ENTRY HOLE AND PENETRATION - EXTERNAL SCALLOPS

| Carrier O.D.                   | Shaped Charge | Part Number    | Perforating Condition | Explosive | Shot Density / Phasing   | API 19B Targeted Pipe | Performance in Stressed Berea (API RP19B Sec. 2) |                             |              |
|--------------------------------|---------------|----------------|-----------------------|-----------|--------------------------|-----------------------|--|-----------------------------|--------------|
|                                |               |                |                       |           |                          |                       | EHD <sup>^</sup> (in)[cm]                        | EHD Variation Decentralized | TTP (in)[cm] |
| 3-1/8" External Scallops 6g-7g | HELLFire 26   | EC2-31K0671-26 | Fluid                 | 6.0g, RDX | 1 to 6 shots per cluster | 4.5" OD, P110         | 0.26 [0.66]                                      | 7.4 %                       | 3.2 [8.13]   |
|                                | HELLFire 28   | EC2-31K0671-28 |                       | 6.0g, RDX |                          |                       | 0.28 [0.71]                                      | 5.5 %                       |              |
|                                | HELLFire 33   | EC2-31K0771-33 |                       | 7.0g, RDX |                          |                       | 0.33 [0.84]                                      | 2.9 %                       |              |
|                                | HELLFire 36   | EC2-31K0771-36 |                       | 7.0g, RDX |                          |                       | 0.36 [0.91]                                      | 1.6 %                       |              |
|                                | HELLFire 42   | EC2-31K0771-42 |                       | 7.0g, RDX |                          |                       | 0.42 [1.07]                                      | 3.8 %                       |              |

HELLFire 31K and 33K charges are NOT interchangeable. EC2-31K series are for 3-1/8" HELLFire; EC2-33K series are for 3-3/8" HELLFire.

### HARDWARE SPECIFICATIONS

|                                      |  |
|--------------------------------------|--|
| Gun Body Configuration/Material      | Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel |
| Charge Tube Type & Retention         | Round steel tube strip; bend tab retention                                 |
| Type of Tandem Connection            | Disposable switch tandem sub   |
| Nominal OD / Wall Thickness (in)[mm] | 3.15 [80.01] / 0.315 [8.00] or 3.125 [79.38] / 0.3125 [7.94]               |
| Upper/Lower Thread Connections       | 2.750" 6P ACME-2G  |

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

<sup>^</sup>EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

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# STRATX® Perforating System

## 3-1/8 in (79 mm), HELLFire® (GIC-HF) Planar



### COMPONENTS AND ACCESSORIES

| Description  | Part Number(s)   |
|--|--|
| <b>3.13" Direct Connect Quick Change Assy</b> ( <i>direct connection to top gun tandem</i> )<br>Intermediate Rebuild Kit ( <i>contacts, teflon tubing, screw, spring, insulating ret.</i> )<br>Complete Rebuild Kit with O-Rings ( <i>all required parts</i> )         | GN-QC31-GIC31<br>RKI-GN-QC31-0001<br>RKC-GN-QC31-0001  |
| <b>3.13" STRATX® Portless Tandem Subs</b> , Disposable Assembly<br>Orienting Disposable Tandem Sub Assembly<br>Lock Ring for Orienting Disposable Tandem ( <i>left hand threads</i> )  | GN-R31-T076-A<br>GN-R31-T279-A<br>GN-R31-L75-320   |
| <b>O-Ring Materials and Size</b> , Nitrile (Standard)<br>Viton 95D (optional)  | OR-N569-230<br>OR-V95G-230   |
| <b>STRATX® PIC Module with Detonator</b><br><b>EPIC™ Gen 2V Detonator Module</b> (alternate shell design)  | DT-EPIC-R140<br>DT-EPIC2-110-R140  |
| <b>Detonating Cord</b>   | DET-80R111 (RDX)<br>DET-80H212(HMX)  |
| <b>EPIC™ Module Ignitor</b> ( <i>T076-A tandem sub in bottom gun (sub mates with -GIC crossover)</i> )   | DT-0425-106  |
| <b>3.13" Crossover, GI Box (Bottom Gun Tandem) to Setting Tool</b><br>GI Box x Size 10 Setting Tool<br>GI Box x Size 20 Setting Tool<br>GI Box x 3.63" Wireline Compact Setting Tool<br>GI Box x 3.5" Shorty Setting Tool<br>GI Box x Size 20 Diamondback Setting Tool | GN-RX31-BK10-GIC<br>GN-RX31-BK20-GIC<br>GN-RX31-3625-GIC<br>GN-RX31-3500-GIC<br>GN-RX31-DB20-GIC |
| <b>3.13" Crossover to Pumpdown Sub</b><br>GI Pin x 3.13" Conventional Pin, ( <i>connects bottom gun to pumpdown sub</i> )  | GN-RX31-GIC31-050  |
| <b>3.13" Bull Plug</b> (bottom gun, e.g., for toe preps in vertical wells)   | GN-R31HF-0022  |
| <b>3.13" Plastic Thread Protectors, Carrier (Gun)</b> ( <i>o-ring: OR-N569-232</i> )<br>Tandem Sub Protector   | GN-THD-31HF-100<br>GN-THD-31GI-065P  |
| <b>3.13" Disposable Portless Top Sub Assy, 2.75" ACME Pin x GI Pin</b><br><i>For existing industry standard quick change connections</i>   | GN-R31-T173-A  |
| <b>3.13" Disposable Crossover, GI Pin x 1.63" ACME Box</b> ( <i>disposable bottom sub</i> )<br>Thread Protector (1.63" box connection)<br>Thread Protector o-ring<br><i>For existing industry-standard quick change connections</i>                                    | GN-R31-T172-A<br>EM-EL1-THD-GOCQP<br>OR-N569-222   |

STRATX DISPOSABLE PORTLESS  
TANDEM SUB ASSEMBLY  
GN-R31-T076-A



EPIC MODULE IGNITOR  
DT-0425-106



3.13" CROSSOVER,  
GI BOX x SIZE 20 SETTING TOOL  
GN-RX31-BK20-GIC



3.13" CROSSOVER, GI BOX x SIZE 20  
DIAMONDBACK SETTING TOOL  
GN-RX31-DB20-GIC



DIRECT CONNECT QUICK CHANGE ASSY  
GN-QC31-GIC31



DISPOSABLE PORTLESS TANDEM  
SUB ASSEMBLY  
GN-R31-T076-A



STRATX PIC MODULE w/DETONATOR  
DT-EPIC-A140



GIC31-HF06  
EXTERNALLY-SCALLOPED CARRIER



EPIC MODULE IGNITOR  
DT-0425-106



3.13" CROSSOVER,  
GI BOX x SIZE 20 SETTING TOOL  
GN-RX31-BK20-GIC

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# STRATX® Perforating System

## 3-1/8 in (79 mm), SandIQ® (GIC-SIQ) Spiral



GEODynamics STRATX® offers a factory-loaded, plug-and-play, limited entry perforating system for unconventional reservoirs. STRATX integrates EPIC™ Switch addressable technology with an industry-standard detonator into a programmable initiation control (PIC) module, delivering an intrinsically-safe, deployment-ready design. Quick and simple gun-string assembly saves time and increases efficiencies at the wellsite.

SandIQ® charge technology provides an “off ramp” for more efficient diversion of proppant. Perforating tunnels are tilted 45 degrees in direction of fluid flow. Angled holes are engineered to create a physical diversion on the toe side of the casing for proppant to naturally flow into the formation. GEODynamics delivers STRATX carriers fully loaded to match customer specifications and preferences.

## APPLICATION SPECIFICATIONS

|                                  |   |
|----------------------------------|---|
| Shot Density and Phasing Options | Multiple <a href="#">Shot &amp; Phasing Options</a> available |
| Initiation Point                 | Top-fired, wireline   |
| Mode of Fire                     | Select fire, addressable                                      |
| Detonating Cord                  | 80-grain round  |
| Compatible Perforating Charges   | SandIQ®   |
| Maximum Gun Swell (in)[mm]       | 3.46 [87.88] @ 22.7g In Fluid                                 |

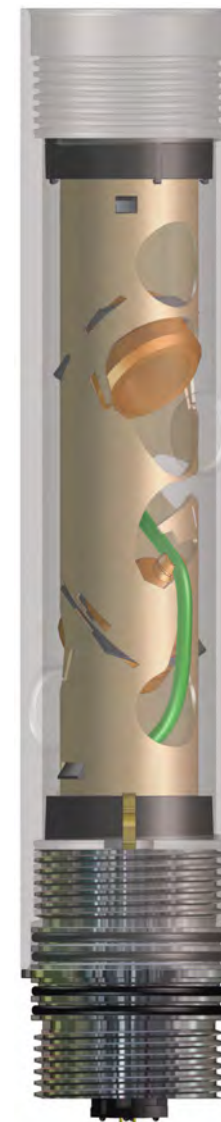
## ENVIRONMENTAL

|                             |  |
|-----------------------------|--|
| Maximum Pressure (psi)[MPa] | 20,000 [137.90]                                      |
| Maximum Tensile* (lbf)[kN]  | 140,000 [622.75] *Hardware Calculated Breaking Point |

## CARRIER SPECIFICATIONS

| Carrier Assembly<br>Part Number | Shot & Phasing<br>Options |         | Gun Lengths |       | Gun End to Center of<br>First Scallop @ 0° |       | Distance<br>Shot to Shot |      | Shipping Assy<br>Weights |       | Make-Up Lengths<br>with Tandem Subs |             |
|---------------------------------|---------------------------|---------|-------------|-------|--|-------|--------------------------|------|--------------------------|-------|-------------------------------------|-------------|
|                                 | # Shots                   | Phasing | (in)        | (cm)  | (in)                                       | (mm)  | (in)                     | (mm) | (lbs)                    | (kgs) | T076 (in)                           | T279 (in)   |
| GIC31-SO01                      | 1                         | 0°      | 10.5        | 26.7  | 3.805                                      | 96.65 | N/A                      | N/A  | 7.9                      | 3.6   | 10.63                               | 11.38-11.55 |
| GIC31-SO02                      | 2                         | 0°      | 15.0        | 38.1  |  |       | 3.50                     | 88.9 | 11.3                     | 5.1   | 15.13                               | 15.88-16.05 |
| GIC31-SJ02                      | 2                         | 180°    | 15.0        | 38.1  |  |       |                          |      | 11.3                     | 5.1   | 15.13                               | 15.88-16.05 |
| GIC31-SG03                      | 3                         | 120°    | 19.0        | 48.3  |  |       |                          |      | 14.3                     | 6.5   | 19.13                               | 19.88-20.05 |
| GIC31-SO03                      | 3                         | 0°      | 18.0        | 45.7  |  |       |                          |      | 13.5                     | 6.1   | 18.13                               | 18.88-19.05 |
| GIC31-SO04                      | 4                         | 0°      | 21.5        | 54.6  |  |       |                          |      | 17.3                     | 7.9   | 21.63                               | 22.38-22.55 |
| GIC31-SB04                      | 4                         | 90°     | 21.5        | 54.6  |  |       |                          |      | 17.3                     | 7.9   | 21.63                               | 22.38-22.55 |
| GIC31-SP05                      | 5                         | 72°     | 25.5        | 64.8  |  |       |                          |      | 20.3                     | 9.2   | 25.63                               | 26.38-26.55 |
| GIC31-SA06                      | 6                         | 60°     | 29.5        | 74.9  |  |       |                          |      | 23.3                     | 10.6  | 29.63                               | 30.38-30.55 |
| GIC31-SA09                      | 9                         | 60°     | 40.0        | 101.6 |  |       |                          |      | 33.3                     | 15.1  | 40.13                               | 40.88-41.05 |
| GIC31-SA10                      | 10                        | 60°     | 43.5        | 110.5 |  |       |                          |      | 35.3                     | 16.0  | 43.63                               | 44.38-44.55 |

Refer to [Components and Accessories](#) for ancillary equipment.



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# STRATX<sup>®</sup> Perforating System

## 3-1/8 in (79 mm), SandIQ<sup>®</sup> (GIC-SIQ) Spiral



### SandIQ<sup>®</sup> 45° TILT ANGLE

| Carrier O.D. | Shaped Charge | Part Number    | Perforating Condition | Explosive  | Phasing / Charge Tilt Angle | API 19B Targeted Pipe* | Performance in Stressed Berea (API RP19B Sec. 2) |                             |              |
|--------------|---------------|----------------|-----------------------|------------|-----------------------------|------------------------|--|-----------------------------|--------------|
|              |               |                |                       |            |                             |                        | EHD <sup>^</sup> at 45° (in)[cm]                 | EHD Variation Decentralized | TTP (in)[cm] |
| 3-1/8"       | SandIQ B      | EC2-33A1371-SB | Fluid                 | 13.0g, RDX | 60° / 45°                   | 5.5" OD, P-110         | 0.28 [0.71]                                      | 4.2 %                       | 5.0 [12.70]  |
|              | SandIQ C      | EC2-33A1671-SC |                       | 16.0g, RDX |                             |                        | 0.31 [0.79]                                      | 3.8 %                       |              |
|              | SandIQ D      | EC2-33A1671-SD |                       | 16.0g, RDX |                             |                        | 0.38 [0.97]                                      | 2.6 %                       |              |
|              |               | EC2-33A1672-SD |                       | 16.0g, HMX |                             |                        | 0.35 [0.89]                                      | 1.7 %                       |              |
|              | SandIQ E      | EC2-33A2071-SE |                       | 20.0g, RDX |                             |                        | 0.42 [1.07]                                      | 3.7 %                       |              |
|              |               | EC2-33A2072-SE |                       | 20.0g, HMX |                             |                        | 0.41 [1.04]                                      | 4.8 %                       |              |
|              | SandIQ F      | EC2-33A2371-SF |                       | 23.0g, RDX |                             |                        | 0.44 [1.12]                                      | 1.0 %                       |              |
|              |               | EC2-33A2372-SF |                       | 23.0g, HMX |                             |                        | 0.43 [1.09]                                      | 6.0 %                       |              |
|              | SandIQ G      | EC2-33A2371-SG |                       | 23.0g, RDX |                             |                        | 0.51 [1.30]                                      | 5.2 %                       |              |

\*3-1/8" SandIQ charge performance is compatible in 4.5" 11.6-15.1# and 5.5" 17-23# P-110 casing.

### HARDWARE

|                                      |  |
|--------------------------------------|--|
| Gun Body Configuration/Material      | Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel |
| Charge Tube Type & Retention         | Round steel tube strip; bend tab retention                                 |
| Type of Tandem Connection            | Disposable switch tandem subs  |
| Nominal OD / Wall Thickness (in)[mm] | 3.15 [80.01] / 0.315 [8.00] or 3.125 [79.38] / 0.3125 [7.94]               |
| Upper/Lower Thread Connections       | 2.750" 6P ACME-2G  |

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

<sup>^</sup>EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

FLUID: Qualified for shooting in FLUID only with perforating systems qualified by GEODynamics.

IN FLUID or DRY: Qualified for shooting in FLUID or DRY GAS with perforating systems qualified by GEODynamics.

Revised: August 31, 2023 7:05 PM

# STRATX® Perforating System

## 3-1/8 in (79 mm), SandIQ® (GIC-SIQ) Spiral



### COMPONENTS AND ACCESSORIES

| Description  | Part Number(s)   |
|--|--|
| <b>3.13" Direct Connect Quick Change Assy</b> ( <i>direct connection to top gun tandem</i> )<br>Intermediate Rebuild Kit ( <i>contacts, teflon tubing, screw, spring, insulating ret.</i> )<br>Complete Rebuild Kit with O-Rings ( <i>all required parts</i> )         | GN-QC31-GIC31<br>RKI-GN-QC31-0001<br>RKC-GN-QC31-0001  |
| <b>3.13" STRATX® Portless Tandem Subs</b> , Disposable Assembly<br>Orienting Disposable Tandem Sub Assembly<br>Lock Ring for Orienting Disposable Tandem ( <i>left hand threads</i> )  | GN-R31-T076-A<br>GN-R31-T279-A<br>GN-R31-L75-320   |
| <b>O-Ring Materials and Size</b> , Nitrile (Standard)<br>Viton 95D (optional)  | OR-N569-230<br>OR-V95G-230   |
| <b>STRATX® PIC Module with Detonator</b><br><b>EPIC™ Gen 2V Detonator Module</b> (alternate shell design)  | DT-EPIC-R140<br>DT-EPIC2-110-R140  |
| <b>Detonating Cord</b>   | DET-80R111 (RDX)<br>DET-80H212(HMX)  |
| <b>EPIC™ Module Ignitor</b> ( <i>T076-A tandem sub in bottom gun (sub mates with -GIC crossover)</i> )   | DT-0425-106  |
| <b>3.13" Crossover, GI Box (Bottom Gun Tandem) to Setting Tool</b><br>GI Box x Size 10 Setting Tool<br>GI Box x Size 20 Setting Tool<br>GI Box x 3.63" Wireline Compact Setting Tool<br>GI Box x 3.5" Shorty Setting Tool<br>GI Box x Size 20 Diamondback Setting Tool | GN-RX31-BK10-GIC<br>GN-RX31-BK20-GIC<br>GN-RX31-3625-GIC<br>GN-RX31-3500-GIC<br>GN-RX31-DB20-GIC |
| <b>3.13" Crossover to Pumpdown Sub</b><br>GI Pin x 3.13" Conventional Pin, ( <i>connects bottom gun to pumpdown sub</i> )  | GN-RX31-GIC31-050  |
| <b>3.13" Bull Plug</b> (bottom gun, e.g., for toe preps in vertical wells)   | GN-R31HF-0022  |
| <b>3.13" Plastic Thread Protectors, Carrier (Gun)</b> ( <i>o-ring: OR-N569-232</i> )<br>Tandem Sub Protector   | GN-THD-31HF-100<br>GN-THD-31GI-065P  |
| <b>3.13" Disposable Portless Top Sub Assy, 2.75" ACME Pin x GI Pin</b><br><i>For existing industry standard quick change connections</i>   | GN-R31-T173-A  |
| <b>3.13" Disposable Crossover, GI Pin x 1.63" ACME Box</b> ( <i>disposable bottom sub</i> )<br>Thread Protector ( <i>1.63" box connection</i> )<br>Thread Protector o-ring<br><i>For existing industry-standard quick change connections</i>                           | GN-R31-T172-A<br>EM-EL1-THD-GOCQP<br>OR-N569-222   |

STRATX DISPOSABLE PORTLESS  
TANDEM SUB ASSEMBLY  
GN-R31-T076-A



EPIC MODULE IGNITOR  
DT-0425-106

3.13" CROSSOVER,  
GI BOX x SIZE 20 SETTING TOOL  
GN-RX31-BK20-GIC

3.13" CROSSOVER, GI BOX x SIZE 20  
DIAMONDBACK SETTING TOOL  
GN-RX31-DB20-GIC



DIRECT CONNECT QUICK CHANGE ASSY  
GN-QC31-GIC31

STRATX® ORIENTING DISPOSABLE  
PORTLESS TANDEM SUB ASSEMBLY  
GN-R31-T279-A  
(Lock Ring: GN-R31-L75-320)

STRATX PIC MODULE W/DETONATOR  
DT-EPIC-A140

STRATX GIC31-SJ02  
2-SHOT, 180° SHOWN  
MULTIPLE SHOT AND PHASING OPTIONS

STRATX DISPOSABLE  
PORTLESS TANDEM SUB ASSEMBLY  
GN-R31-T076-A

EPIC™ MODULE IGNITOR  
DT-0425-106

3.13" CROSSOVER,  
GI BOX x SIZE 20 SETTING TOOL  
GN-RX31-BK20-GIC

Revised: August 31, 2023 7:05 PM

# STRATX® Perforating System

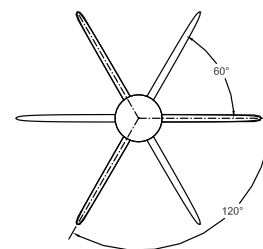
## 3-3/8 in (86 mm), HELLFire® (GIC-HF) Planar



GEODynamics STRATX® offers a factory-loaded, plug-and-play, limited entry perforating system for unconventional reservoirs. STRATX integrates EPIC™ Switch addressable technology with industry-standard detonator options into a programmable initiation control (PIC) module, delivering an intrinsically-safe, deployment-ready design. Quick and simple gun-string assembly saves time and increases efficiencies at the wellsite. GEODynamics delivers STRATX carriers fully loaded to match customer specifications and preferences.

## APPLICATION SPECIFICATIONS

|                                |  |
|--------------------------------|--|
| Shot Density and Phasing       | 1 to 6 shots per cluster, 120° planar phasing<br>(shots 1-3: 0°, 120°, 240°; shots 4-6: 60°, 180°, 300°) |
| Initiation Point               | Top-fired, wireline  |
| Mode of Fire                   | Select fire, addressable   |
| Perforating Condition          | In Fluid   |
| Detonating Cord                | 80-grain round, factory-loaded   |
| Compatible Perforating Charges | HELLFire®  |
| Maximum Gun Swell (in)[mm]     | Ø3.48" [88.39] @ 7.0g  |



## ENVIRONMENTAL

|                             |   |
|-----------------------------|---|
| Maximum Pressure (psi)[MPa] | 15,000 [103.42]                                   |
| Maximum Tensile* (lbf)[kN]  | 175,000 [778] *Hardware Calculated Breaking Point |

## CARRIER SPECIFICATIONS

| Carrier Assembly<br>Part Number   | Shot & Phasing<br>Options |         | Gun Lengths |      | Gun End to Center of<br>First Scallop @ 0° |       | Distance Shot to<br>Shot |       | Approx. Weights<br>(Fully Loaded) |       | Make-Up Lengths<br>with T076 Tandem Sub |      |
|---|---------------------------|---------|-------------|------|--|-------|--------------------------|-------|-----------------------------------|-------|---|------|
|   | # Shots                   | Phasing | (in)        | (cm) | (in)                                       | (mm)  | (in)                     | (mm)  | (lbs)                             | (kgs) | (in)                                    | (cm) |
| GIC33-HF06<br>(External Scallops)   | 1-3                       | 120°    | 9.5         | 24.1 | 3.87                                       | 98.30 | 1.42                     | 36.07 | 9.93                              | 4.50  | 9.63                                    | 24.5 |
|   | 4-6                       | 60°     |             |      |  |       |                          |       |                                   |       |   |      |
| GIC33-HD06<br>(Internal Scallops)   | 1-3                       | 120°    | 9.5         | 24.1 | 3.87                                       | 98.30 | 1.42                     | 36.07 |                                   |       | 9.63                                    | 24.5 |
|   | 4-6                       | 60°     |             |      |  |       |                          |       |                                   |       |   |      |
| Fully Loaded (Externally Scalloped) 6-Shot Carrier with attached Tandem Sub |                           |         |             |      |  |       |                          |       | 13.79                             | 6.26  |   |      |

Refer to [Components and Accessories](#) for ancillary equipment.



**GIC33-HF06**  
EXTERNALLY-SCALLOPED CARRIER



**GIC33-HD06**  
INTERNALLY-SCALLOPED CARRIER OFFERS  
MORE CHARGE PERFORMANCE OPTIONS  
(SEE NEXT PAGE FOR DETAILS)

# STRATX® Perforating System

## 3-3/8 in (86 mm), HELLFire® (GIC-HF) Planar



### CONSTANT ENTRY HOLE AND PENETRATION

| Carrier O.D.                   | Shaped Charge | Part Number    | Perforating Condition | Explosive | Shot Density / Phasing   | API 19B Targeted Pipe | Performance in Stressed Berea (API RP19B Sec. 2) |                             |              |
|--------------------------------|---------------|----------------|-----------------------|-----------|--------------------------|-----------------------|--|-----------------------------|--------------|
|                                |               |                |                       |           |                          |                       | EHD <sup>^</sup> (in)[cm]                        | EHD Variation Decentralized | TTP (in)[cm] |
| 3-3/8" Internal Scallops 5g-7g | HELLFire 25   | EC2-33K0571    | Fluid                 | 5.0g, RDX | 1 to 6 shots per cluster | 5.5" - 6.0" OD, P110  | 0.25 [0.64]                                      | 4.3 %                       | 3.5 [8.89]   |
|                                | HELLFire 30   | EC2-33K0771    |                       | 7.0g, RDX |                          |                       | 0.30 [0.76]                                      | 2.7 %                       |              |
|                                | HELLFire 36   | EC2-33K0771-RX |                       | 7.0g, RDX |                          |                       | 0.36 [0.91]                                      | 4.6 %                       |              |
| 3-3/8" External Scallops 6g-7g | HELLFire 25   | EC2-33K0671-25 | Fluid                 | 6.0g, RDX | 1 to 6 shots per cluster | 5.5" OD, P110         | 0.25 [0.64]                                      | 3.9%                        | 3.5 [8.89]   |
|                                | HELLFire 30   | EC2-33K0771-30 |                       | 7.0g, RDX |                          |                       | 0.30 [0.76]                                      | 5.5%                        |              |
|                                | HELLFire 33   | EC2-33K0771-33 |                       | 7.0g, RDX |                          |                       | 0.33 [0.84]                                      | 3.6%                        |              |
|                                | HELLFire 34   | EC2-33K0771-34 |                       | 7.0g, RDX |                          |                       | 0.34 [0.86]                                      | 5.8%                        |              |

HELLFire 31K and 33K charges are NOT interchangeable. EC2-31K series are for 3-1/8" HELLFire; EC2-33K series are for 3-3/8" HELLFire.

### HARDWARE SPECIFICATIONS

|                                      |  |
|--------------------------------------|--|
| Gun Body Configuration/Material      | Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel |
| Charge Tube Type & Retention         | Round steel tube strip; bend tab retention                                 |
| Type of Tandem Connection            | Disposable switch tandem sub   |
| Nominal OD / Wall Thickness (in)[mm] | 3.375" [86] / 0.375" [9.53]  |
| Upper/Lower Thread Connections       | 2.8125" 6P ACME-2G   |

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

<sup>^</sup>EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

FLUID: Qualified for shooting in FLUID only with perforating systems qualified by GEODynamics.

IN FLUID or DRY: Qualified for shooting in FLUID or DRY GAS with perforating systems qualified by GEODynamics.

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# STRATX® Perforating System

## 3-3/8 in (86 mm), HELLFire® (GIC-HF) Planar



### COMPONENTS AND ACCESSORIES

| Description  | Part Number(s)   |
|--|--|
| <b>3.38" Direct Connect Quick Change Assy</b> <i>(direct connection to top gun tandem)</i><br>Intermediate Rebuild Kit <i>(contacts, teflon tubing, screw, spring, insulating ret.)</i><br>Complete Rebuild Kit with O-Rings <i>(all required parts)</i>               | GN-QC33-GIC33<br>RKI-GN-QC31-0001<br>RKC-GN-QC31-0001  |
| <b>3.38" Disposable Portless Tandem Sub Assy</b>   | GN-R33-T076-A  |
| <b>O-Ring Materials and Size, Nitrile Standard</b><br>Viton 95D (standard)   | OR-N569-231<br>OR-V95G-231   |
| <b>STRATX PIC Module with Detonator</b>  | DT-EPIC-A140   |
| <b>Detonating Cord</b>   | DET-80R111 (RDX)<br>DET-80H212 (HMX)   |
| <b>EPIC™ Module Ignitor</b><br><i>Threads into STRATX® T076-A tandem sub in bottom gun (to -GIC crossover)</i>   | DT-0425-106  |
| <b>3.38" Crossover, GI Box (Bottom Gun Tandem) to Setting Tool</b><br>GI Box x Size 10 Setting Tool<br>GI Box x Size 20 Setting Tool<br>GI Box x 3.63" Wireline Compact Setting Tool<br>GI Box x 3.5" Shorty Setting Tool<br>GI Box x Size 20 Diamondback Setting Tool | GN-RX33-BK10-GIC<br>GN-RX33-BK20-GIC<br>GN-RX33-3625-GIC<br>GN-RX33-3500-GIC<br>GN-RX33-DB20-GIC |
| <b>3.38" Crossover to Pumpdown Sub</b><br>GI Pin x 3.13" Conventional Pin, <i>(connects bottom gun to pumpdown sub)</i>  | GN-RX31-GIC33-050  |
| <b>3.38" Bull Plug</b> <i>(bottom gun, e.g., for toe preps in vertical wells)</i>  | GN-R33HF-0022  |
| <b>3.38" Plastic Thread Protectors</b><br>Carrier (Gun) Protector <i>(o-ring: OR-N569-232)</i><br>Tandem Sub Protector   | GN-THD-33HF-100<br>GN-THD-33HF-067   |
| <b>3.38" Disposable Portless Top Sub Assy, 2.75" ACME Pin x GI Pin</b><br><i>For existing industry standard quick change connections</i>   | GN-R33-T173-A  |
| <b>3.38" Disposable Crossover, GI Pin x 1.63" ACME Box</b> <i>(disposable bottom sub)</i><br>Thread Protector <i>(1.63" box connection)</i><br>Thread Protector o-ring<br><i>For existing industry-standard quick change connections</i>                               | GN-R33-T172-A<br>EM-EL1-THD-GOCQP<br>OR-N569-222   |



3.38" CROSSOVER, GI BOX x SIZE 20  
DIAMONDBACK SETTING TOOL  
GN-RX33-DB20-GIC



DIRECT CONNECT QUICK CHANGE ASSY  
GN-QC33-GIC33



DISPOSABLE PORTLESS TANDEM  
SUB ASSEMBLY  
GN-R33-T076-A



STRATX PIC MODULE W/DETONATOR  
DT-EPIC-A140



GIC33-HF06  
EXTERNALLY-SCALLOPED CARRIER



EPIC MODULE IGNITOR  
DT-0425-106



3.38" CROSSOVER,  
GI BOX x SIZE 20 SETTING TOOL  
GN-RX33-BK20-GIC



Revised: August 31, 2023 3:22 PM

# STRATX® Direct Connection Crossovers

## Top Gun Connector

GEODynamics' direct connect crossovers provide reliable and efficient connections directly to the STRATX® perforating system. The top connector shoulders up to industry-standard casing collar locators (CCL) or GEODynamics wireline release tool, and makes up to the standard STRATX tandem sub at the top gun.

| Mechanical Specifications |                  |                      |               |                 |                    |                      |
|---------------------------|------------------|----------------------|---------------|-----------------|--------------------|----------------------|
| Gun Size (OD)             | Makeup Length    | Assembly Part Number | Upper O-Rings | Internal O-Ring | Uphole Thread      | Downhole Thread      |
| 2-3/4"                    | 5.98 in/15.19 cm | GN-QC27-GIC27        | OR-N569-222   | OR-N569-210     | 1-5/8" 6P ACME Pin | 2-3/8" 8P ACME Box   |
| 3-1/8"                    | 5.98 in/15.19 cm | GN-QC31-GIC31        | OR-N569-222   | OR-N569-210     | 1-5/8" 6P ACME Pin | 2-3/4" 6P ACME Box   |
| 3-3/8"                    | 5.98 in/15.19 cm | GN-QC33-GIC33        | OR-N569-222   | OR-N569-210     | 1-5/8" 6P ACME Pin | 2-13/16" 6P ACME Box |

| Environmental Specifications |            |             |
|------------------------------|------------|-------------|
| Maximum Pressure             | 20,000 psi | 1378.95 bar |
| Maximum Temperature          | 350°F      | 177°C       |
| Maximum Tensile Force        | 50,000 lbs | 224.41 kN   |

| Electrical Specifications |        |
|---------------------------|--------|
| Maximum Voltage (QC)      | 500VDC |
| Maximum Current (QC)      | 3A     |

| Rebuild Kits      |                  |
|-------------------|------------------|
| Quick Rebuild*    | RKI-GN-QC31-0001 |
| Complete Rebuild* | RKC-GN-QC31-0001 |

\*Rebuild Kit BOM lists on next page

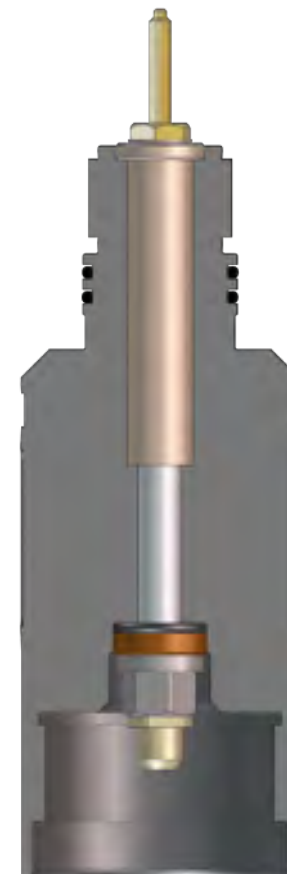
DIRECT CONNECTION  
TOP CONNECTOR ASSY  
GN-QC31-GIC31

HOUSING STAMPED P/N  
GN-QC31-0041

DISPOSABLE PORTLESS  
TANDEM SUB ASSY  
GN-R31-T076-A



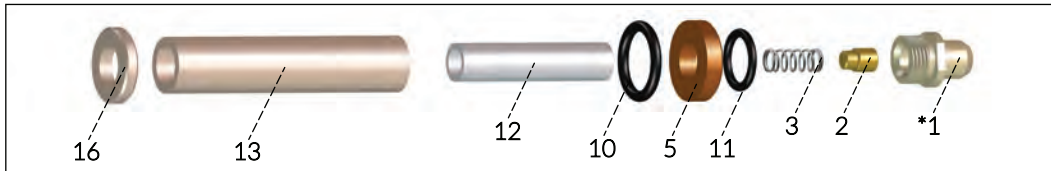
ASSEMBLED VIEW



# STRATX® Direct Connection Crossovers

## Top Gun Connector Rebuild Kits

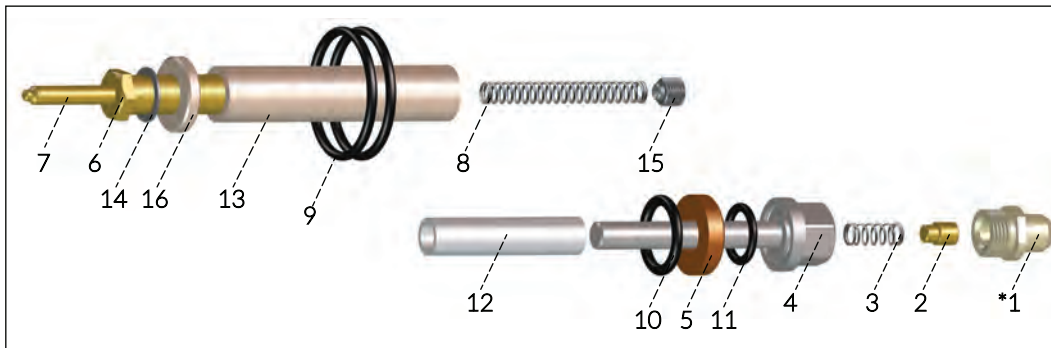
### RKI-GN-QC31-0001, Quick Rebuild Kit



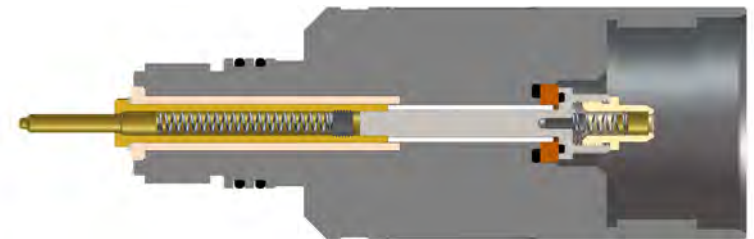
\*Requires EM-EMC-REMOVAL-TOOL for installation.



### RKC-GN-QC31-0001, Complete Rebuild Kit



\*Requires EM-EMC-REMOVAL-TOOL for installation.



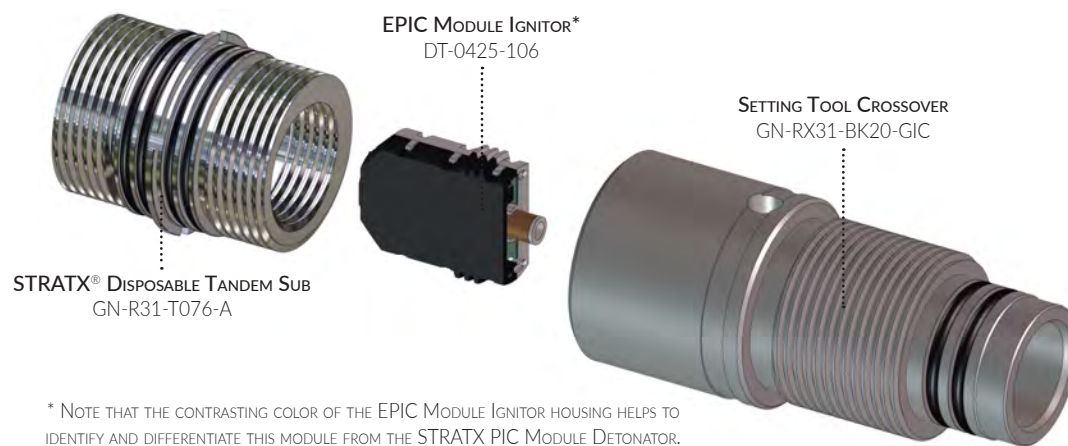
| Item | Part Number           | Description   | QTY |
|------|-----------------------|---|-----|
| 1    | EM-QC31-0022*         | Short QC Bottom Insulating Retainer   | 1   |
| 2    | EM-032-0040           | Contact, Sliding Contact V2   | 1   |
| 3    | HD-SPG-296X236X031WD  | Spring, Compression, .296 OD x .236 ID x .031 WD x .88 length, Century Spring # GG-2 SS | 1   |
| 4    | GN-QC27-0033          | Contact Rod, 3-1/4" Short QC V2   | 1   |
| 5    | EM-EN-035-02684-0003  | Washer, Insulating, QC Assembly   | 1   |
| 6    | EM-EC-3354            | Barrel, Sliding Contact, QC Assembly  | 1   |
| 7    | EM-EC-3356            | Contact, Plunger, QC Assembly   | 1   |
| 8    | HD-SPG-296X224X2_63   | Spring, Compression, QC Assembly, Upper   | 1   |
| 9    | OR-N569-222           | O-Ring, #222 Nitrile, 90 Durometer (six total in kit; two used for each redress)        | 6   |
| 10   | OR-N569-210           | O-Ring, #210 Nitrile, 90 Durometer  | 1   |
| 11   | OR-HN90-114           | O-Ring, HNBR #114, 90 Durometer   | 1   |
| 12   | EM-EN-500x375x50 TT   | PTFE Tubing, 3/8" ID X 1/2" OD by 3/8" ID by 1/16" Wall, 2.23" Nominal Length           | 1   |
| 13   | EM-EN-3354            | Insulator, Sliding Contact  | 1   |
| 14   | EM-EC-3355            | Washer, Contact, Sliding, QC Assembly   | 1   |
| 15   | EM-QC-QC275-00GO-0020 | Set Screw, Modified, QC Assembly  | 1   |
| 16   | EM-EC-3357            | Washer, Insulating, Top, QC Assembly  | 1   |

Shaded rows with bold text represent parts in the quick rebuild kit.

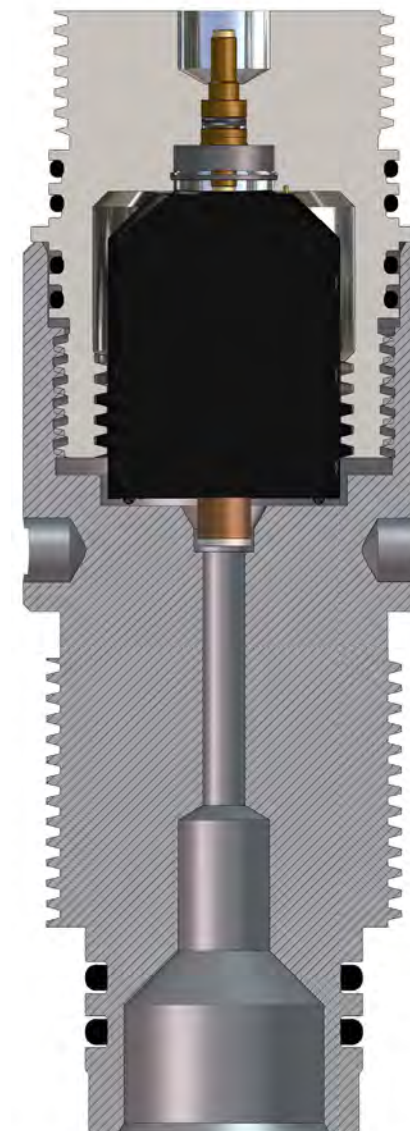
# STRATX® Direct Connection Crossovers

## EPIC™ Module Ignitor and Setting Tool Crossovers

GEODynamics' STRATX® perforating system provides reliable and efficient connections directly to a selection of setting tools. The EPIC™ Module Ignitor is a patented combination of EPIC™ electronics and ignitor technology, specifically designed to run with the EPIC™ Command Shooting Panel.



- Initiated by the bottom switch in the gun string
- Compatible with third-party addressable switches
- Not an addressable component



| Mechanical Specifications |                  |   |             |               |
|---------------------------|------------------|---|-------------|---------------|
| Gun OD                    | Part Number      | Description   | O-Ring Size | Makeup Length |
| 3-1/8"                    | GN-RX31-BK10-GIC | 3.13" Crossover, GI Box x Size 10   | #222        | 3.25"         |
|                           | GN-RX31-BK20-GIC | 3.13" Crossover, GI Box x Size 20   | #328        | 3.00"         |
|                           | GN-RX31-3625-GIC | † 3.13" Crossover, GI Box x 3.63" Compact                                       | #226        | 6.53"         |
|                           | GN-RX31-3500-GIC | 3.13" Crossover, GI Box x 3.5" Shorty   | #332        | 3.00"         |
|                           | GN-RX31-DB20-GIC | 3.13" Crossover, GI Box x Diamondback Setting Tool                              | n/a         | 5.67"         |
| 3-3/8"                    | GN-RX33-BK10-GIC | 3.38" Crossover, GI Box x Size 10   | #222        | 3.25"         |
|                           | GN-RX33-BK20-GIC | 3.38" Crossover, GI Box x Size 20   | #328        | 3.00"         |
|                           | GN-RX33-3625-GIC | † 3.38" Crossover, GI Box x 3.63" Compact                                       | #226        | 6.53"         |
|                           | GN-RX33-3500-GIC | 3.38" Crossover, GI Box x 3.5" Shorty   | #332        | 3.00"         |
|                           | GN-RX33-DB20-GIC | 3.38" Crossover, GI Box x Diamondback Setting Tool                              | n/a         | 5.67"         |
| †Bleeder Valve Components |                  | Brass Rupture Disc: ST-0000-001; Bleeder Nut: 025-1020-001; O-Ring: OR-N569-213 |             |               |

# HELLFire® Perforating System

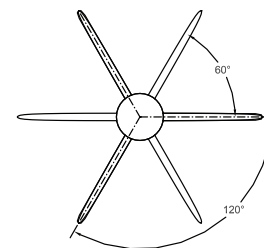
## 3-1/8 in (79 mm), Planar, External Scallops



The HELLFire® perforating system allows more effective multi-stage plug-and-perf operations. At just 9.5-inches total length, HELLFire's three- or six-shot cluster options unlock stage completions not possible with lengthy conventional spiral-phased technology. The short-bodied HELLFire system minimizes wireline tool string length and delivers more clusters per stage. HELLFire's flexible design options allow engineers to specify ideal cluster count and spacing, resulting in lower costs, fewer stages, maximized injectivity, and optimal proppant placement, all with less equipment and a smaller crane.

### APPLICATION SPECIFICATIONS

|                                |  |
|--------------------------------|--|
| Shot Density and Phasing       | 1 to 6 shots per cluster, 120° planar phasing<br>(shots 1-3: 0°, 120°, 240°; shots 4-6: 60°, 180°, 300°) |
| Initiation Point               | Bottom-fired, wireline   |
| Mode of Fire                   | Select fire, addressable   |
| Perforating Condition          | In Fluid   |
| Detonating Cord                | 80-grain round, factory-loaded   |
| Compatible Perforating Charges | HELLFire®  |
| Maximum Gun Swell (in)[mm]     | 3.46 [87.88] @7.0g   |



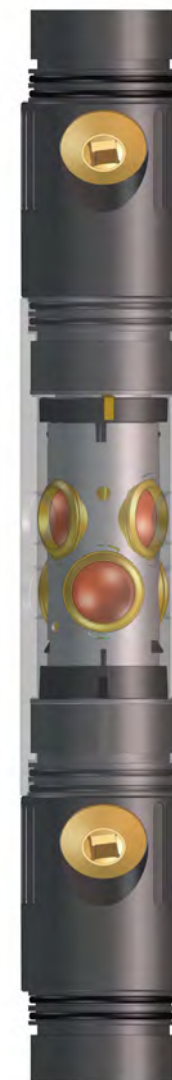
### ENVIRONMENTAL

|                             |   |
|-----------------------------|---|
| Maximum Pressure (psi)[MPa] | 16,000 [110.32]                         |
| Maximum Tensile* (lbf)[kN]  | TBD *Hardware Calculated Breaking Point |

### CARRIER SPECIFICATIONS

| Carrier Assembly Part Number                         | Shot & Phasing Options |         | Gun Lengths |       | Gun End to Center of First Scallop @ 0° |       | Distance Shot to Shot |       | Approx. Weights (Fully Loaded) |
|--|------------------------|---------|-------------|-------|---|-------|-----------------------|-------|--------------------------------|
|  | # Shots                | Phasing | (in)        | (cm)  | (in)                                    | (mm)  | (in)                  | (mm)  |                                |
| GHF31-06C  | 1-3                    | 120°    | 9.50        | 24.13 | 3.87                                    | 98.30 | 1.42                  | 36.07 | 9.25 lb/ft                     |
|  | 4-6                    | 60°     |             |       |   |       |                       |       |                                |
| Fully Loaded 6-Shot Carrier with attached Tandem Sub |                        |         |             |       |   |       |                       |       | 20.0 lb/ft                     |

Refer to [Components and Accessories](#) for ancillary equipment.





# HELLFire® Perforating System

## 3-1/8 in (79 mm), Planar, External Scallops



### HELLFire® CONSTANT ENTRY HOLE AND PENETRATION - EXTERNAL SCALLOPS

| Carrier O.D.                   | Shaped Charge | Part Number    | Perforating Condition | Explosive | Shot Density / Phasing   | API 19B Targeted Pipe | Performance in Stressed Berea (API RP19B Sec. 2) |                             |              |
|--------------------------------|---------------|----------------|-----------------------|-----------|--------------------------|-----------------------|--|-----------------------------|--------------|
|                                |               |                |                       |           |                          |                       | EHD <sup>^</sup> (in)[cm]                        | EHD Variation Decentralized | TTP (in)[cm] |
| 3-1/8" External Scallops 6g-7g | HELLFire 26   | EC2-31K0671-26 | Fluid                 | 6.0g, RDX | 1 to 6 shots per cluster | 4.5" OD, P110         | 0.26 [0.66]                                      | 7.4 %                       | 3.2 [8.13]   |
|                                | HELLFire 28   | EC2-31K0671-28 |                       | 6.0g, RDX |                          |                       | 0.28 [0.71]                                      | 5.5 %                       |              |
|                                | HELLFire 33   | EC2-31K0771-33 |                       | 7.0g, RDX |                          |                       | 0.33 [0.84]                                      | 2.9 %                       |              |
|                                | HELLFire 36   | EC2-31K0771-36 |                       | 7.0g, RDX |                          |                       | 0.36 [0.91]                                      | 1.6 %                       |              |
|                                | HELLFire 42   | EC2-31K0771-42 |                       | 7.0g, RDX |                          |                       | 0.42 [1.07]                                      | 3.8 %                       |              |

HELLFire 31K and 33K charges are NOT interchangeable. EC2-31K series are for 3-1/8" HELLFire; EC2-33K series are for 3-3/8" HELLFire.

### HARDWARE

|                                      |  |
|--------------------------------------|--|
| Gun Body Configuration/Material      | Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel |
| Charge Tube Type & Retention         | Round steel tube strip; bend tab retention                                 |
| Type of Tandem Connection            | Switch tandem subs (ported)  |
| Nominal OD / Wall Thickness (in)[mm] | 3.15 [80.01] / 0.315 [8.00] or 3.125 [79.38] / 0.3125 [7.94]               |
| Upper/Lower Thread Connections       | 2.750" 6P ACME-2G  |

| Components and Accessories  | Part Number(s)   |
|---|--|
| Short Quick Change Assembly (above top sub)   | GN-QC31-0001   |
| Top Sub, 3-1/8" HF (Wireline)   | GN-R31HF-QC20  |
| Switch Tandem Sub, 3-1/8" HF (Wireline)   | GN-R31HF-T077  |
| Bottom Sub, 3-1/8" (Wireline)<br>Lower sub connection o-rings, 3-1/8"<br>Bottom sub shoot-thru plug and o-ring for shoot-thru plug  | GN-R31HF-T075ST<br>OR-N569-230<br>GN-R33HF-PLG1 / OR-N569-111                          |
| O-Ring Materials and Size, Nitrile (standard option)  | OR-N569-230  |
| Port Plug, HELLFire Subs and Port Plug O-ring   | GN-R00-T001 / OR-N569-217  |
| Plug/Shoot Adapter Assembly, 3-1/8"   | GN-R31-ST30  |
| GO Style Quick Change (bottom sub connection)   | EM-QC-QC312-00GO   |
| Thread Protectors<br>Carrier (Gun) Protector, 3-1/8"<br>Carrier (Gun) Plastic Plug Protector, 3-1/8"<br>Top Sub (Top Pin) Thread Protector, 3-1/8"<br>Tandem Sub & Bull Plug Thread Protector, 3-1/8"<br>Bottom Sub Thread Protector (lower connection), 3-1/8" | GN-THD-312-030<br>GN-THD-312-300<br>GN-THD-312-020<br>GN-THD-312-040<br>GN-THD-312-040 |
| Bull Plug, 3-1/8" HF  | GN-R31HF-0022  |

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# HELLFire® Perforating System

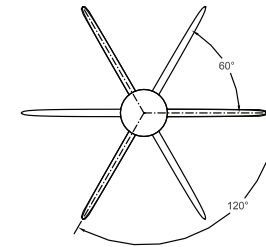
## 3-3/8 in (86 mm), Planar, Internal and External Scallop



The HELLFire® perforating system allows more effective multi-stage plug-and-perf operations. At just 9.5-inches total length, HELLFire's three- or six-shot cluster options unlock stage completions not possible with lengthy conventional spiral-phased technology. The short-bodied HELLFire system minimizes wireline tool string length and delivers more clusters per stage. HELLFire's flexible design options allow engineers to specify ideal cluster count and spacing, resulting in lower costs, fewer stages, maximized injectivity, and optimal proppant placement, all with less equipment and a smaller crane.

### APPLICATION SPECIFICATIONS

|                                  |  |
|----------------------------------|--|
| Shot Density and Phasing Options | 1 to 6 shots per cluster, 120° planar phasing<br>(shots 1-3: 0°, 120°, 240°; shots 4-6: 60°, 180°, 300°) |
| Initiation Point                 | Bottom-fired, wireline   |
| Mode of Fire                     | Select fire, addressable   |
| Perforating Condition            | In Fluid   |
| Detonating Cord                  | 80-grain round, factory-loaded   |
| Compatible Perforating Charges   | HELLFire®  |
| Maximum Gun Swell (in)[mm]       | Ø3.48" [88.39] @ 7.0g  |



### ENVIRONMENTAL

|                             |   |
|-----------------------------|---|
| Maximum Pressure (psi)[MPa] | 15,000 [103.42]                                       |
| Maximum Tensile* (lbf)[kN]  | 331,900 [1476.36] *Hardware Calculated Breaking Point |

### CARRIER SPECIFICATIONS

| Carrier Assembly Part Number                         | Shot & Phasing Options |         | Gun Lengths |       | Gun End to Center of First Scallop @ 0° |       | Distance Shot to Shot |       | Approx. Weights (Fully Loaded) |       |
|--|------------------------|---------|-------------|-------|---|-------|-----------------------|-------|--------------------------------|-------|
|  | # Shots                | Phasing | (in)        | (cm)  | (in)                                    | (mm)  | (in)                  | (mm)  | (lbs)                          | (kgs) |
| GHF33-06<br>(Internal Scallops)                      | 1-3                    | 120°    | 9.50        | 24.13 | 3.87                                    | 98.30 | 1.42                  | 36.07 | 10.00                          | 4.54  |
|  | 4-6                    | 60°     |             |       |   |       |                       |       |                                |       |
| GHF33-06C<br>(External Scallops)                     | 1-3                    | 120°    | 9.50        | 24.13 | 3.87                                    | 98.30 | 1.42                  | 36.07 | 10.00                          | 4.54  |
|  | 4-6                    | 60°     |             |       |   |       |                       |       |                                |       |
| Fully Loaded 6-Shot Carrier with attached Tandem Sub |                        |         |             |       |   |       |                       |       | 24.00                          | 10.89 |

Refer to [Components and Accessories](#) for ancillary equipment.



HELLFIRE 6-SHOT CARRIER  
(INTERNAL SCALLOPS),  
SWITCH TANDEM SUBS



TOP SUB, HELLFIRE 6-SHOT CARRIER (INTERNAL SCALLOPS), SWITCH TANDEM SUBS, BOTTOM SUB, AND PLUG/SHOOT ADAPTER

# HELLFire® Perforating System

## 3-3/8 in (86 mm), Planar, Internal and External Scallops



### CONSTANT ENTRY HOLE AND PENETRATION

| Carrier O.D.                   | Shaped Charge | Part Number    | Perforating Condition | Explosive | Shot Density / Phasing   | API 19B Targeted Pipe | Performance in Stressed Berea (API RP19B Sec. 2) |                             |              |
|--------------------------------|---------------|----------------|-----------------------|-----------|--------------------------|-----------------------|--|-----------------------------|--------------|
|                                |               |                |                       |           |                          |                       | EHD <sup>^</sup> (in)[cm]                        | EHD Variation Decentralized | TTP (in)[cm] |
| 3-3/8" Internal Scallops 5g-7g | HELLFire 25   | EC2-33K0571    | Fluid                 | 5.0g, RDX | 1 to 6 shots per cluster | 5.5" - 6.0" OD, P110  | 0.25 [0.64]                                      | 4.3 %                       | 3.5 [8.89]   |
|                                | HELLFire 30   | EC2-33K0771    |                       | 7.0g, RDX |                          |                       | 0.30 [0.76]                                      | 2.7 %                       |              |
|                                | HELLFire 36   | EC2-33K0771-RX |                       | 7.0g, RDX |                          |                       | 0.36 [0.91]                                      | 4.6 %                       |              |
| 3-3/8" External Scallops 6g-7g | HELLFire 25   | EC2-33K0671-25 | Fluid                 | 6.0g, RDX | 1 to 6 shots per cluster | 5.5" OD, P110         | 0.25 [0.64]                                      | 3.9%                        | 3.5 [8.89]   |
|                                | HELLFire 30   | EC2-33K0771-30 |                       | 7.0g, RDX |                          |                       | 0.30 [0.76]                                      | 5.5%                        |              |
|                                | HELLFire 33   | EC2-33K0771-33 |                       | 7.0g, RDX |                          |                       | 0.33 [0.84]                                      | 3.6%                        |              |
|                                | HELLFire 34   | EC2-33K0771-34 |                       | 7.0g, RDX |                          |                       | 0.34 [0.86]                                      | 5.8%                        |              |

HELLFire 31K and 33K charges are NOT interchangeable. EC2-31K series are for 3-1/8" HELLFire; EC2-33K series are for 3-3/8" HELLFire.

### HARDWARE

|                                      |  |
|--------------------------------------|--|
| Gun Body Configuration/Material      | Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel |
| Charge Tube Type & Retention         | Round steel tube strip; bend tab retention                                 |
| Type of Tandem Connection            | Switch tandem subs (ported)  |
| Nominal OD / Wall Thickness (in)[mm] | 3.375" [86] / 0.375" [9.53]  |
| Upper/Lower Thread Connections       | 2.8125" 6P ACME-2G   |

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

<sup>^</sup>EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

FLUID: Qualified for shooting in FLUID only with perforating systems qualified by GEODynamics.

IN FLUID or DRY: Qualified for shooting in FLUID or DRY GAS with perforating systems qualified by GEODynamics.

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# HELLFire® Perforating System

## 3-3/8 in (86 mm), Planar, Internal and External Scallops



### COMPONENTS AND ACCESSORIES

| Components and Accessories                                | Part Number(s)              |
|---|-----------------------------|
| Short Quick Change Assembly (above top sub)               | GN-QC31-0001                |
| Top Sub, Short Connect 3-3/8" (Wireline)                  | GN-R33HF-QC20-A             |
| Switch Tandem Sub, 3-3/8" (Wireline)                      | GN-R33HF-T077               |
| Centralizer Ring, 3-3/4" OD                               | GN-R33HF-R375               |
| Protector Ring (Lock Ring)                                | GN-R33-R001HF               |
| Bottom Sub, 3-3/8" (Wireline)                             | GN-R33HF-T075ST-A           |
| Lower sub connection o-rings, 3-1/8"                      | OR-N569-230                 |
| Bottom sub shoot-thru plug and o-ring for shoot-thru plug | GN-R33HF-PLG1 / OR-N569-111 |
| O-Ring Materials and Size, Nitrile (standard option)      | OR-N569-231                 |
| Port Plug, HELLFire Subs and Port Plug O-Ring             | GN-R00-T001 / OR-N569-217   |
| Plug/Shoot Adapter Assembly, 3-1/8"                       | GN-R31-ST30                 |
| Pumpdown Crossover Sub, QC Pin X 3.12" Box                | GN-RX31-QC31                |
| Bull Plug, 3-1/8" HF                                      | GN-R31HF-0022               |
| GO Style Quick Change (bottom sub connection)             | EM-QC-QC312-00GO            |
| Thread Protectors   |                             |
| Carrier (Gun) Protector, 3-3/8"                           | GN-THD-338-030              |
| Carrier (Gun) Plastic Plug Protector, 3-3/8"              | GN-THD-33HF-300             |
| Top Sub (Top Pin) Thread Protector, 3-1/8"                | GN-THD-312-020              |
| Tandem Sub & Bull Plug Thread Protector, 3-3/8"           | GN-THD-338-040              |
| Bottom Sub Thread Protector (lower connection), 3-1/8"    | GN-THD-312-040              |

# HELLFire® Perforating System

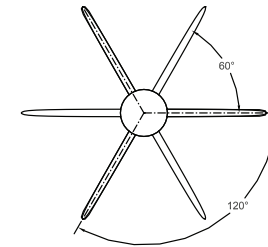
## 4 in (102 mm), Planar, Internal Scallops



The HELLFire® perforating system allows more effective multi-stage plug-and-perf operations. HELLFire's three- and six-shot cluster options unlock stage completions not possible with lengthy conventional spiral-phased technology. The short-bodied HELLFire system minimizes wireline tool string length and delivers more clusters per stage. HELLFire's flexible design options allow engineers to specify ideal cluster count and spacing, resulting in lower costs, fewer stages, maximized injectivity, and optimal proppant placement, all with less equipment and a smaller crane.

### APPLICATION SPECIFICATIONS

|                                |  |
|--------------------------------|--|
| Shot Density and Phasing       | 1 to 6 shots per cluster, 120° planar phasing<br>(shots 1-3: 0°, 120°, 240°; shots 4-6: 60°, 180°, 300°) |
| Initiation Point               | Bottom-fired, wireline   |
| Mode of Fire                   | Select fire, addressable   |
| Perforating Condition          | In Fluid   |
| Detonating Cord                | 80-grain round, factory-loaded   |
| Compatible Perforating Charges | HELLFire®  |
| Maximum Gun Swell (in)[mm]     | 4.60 [116.84] with bur @ 12.0g   |



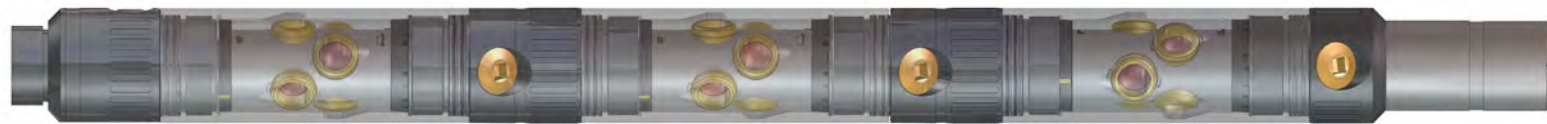
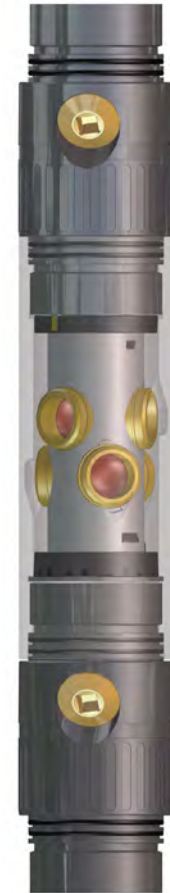
### ENVIRONMENTAL

|                             |  |
|-----------------------------|--|
| Maximum Pressure (psi)[MPa] | 15,000 [103.42]  |
| Maximum Tensile* (lbf)[kN]  | 318,000 [1,414.53] *Hardware Calculated Breaking Point |

### CARRIER SPECIFICATIONS

| Carrier Assembly Part Number | Shot & Phasing Options |         | Gun Lengths |       | Gun End to Center of First Scallop @ 0° |        | Distance Shot to Shot |       | Approx. Weights (Fully Loaded) (lb/ft) |                |
|------------------------------|------------------------|---------|-------------|-------|---|--------|-----------------------|-------|--|----------------|
|                              | # Shots                | Phasing | (in)        | (cm)  | (in)                                    | (mm)   | (in)                  | (mm)  | Carrier                                | w/Attached Sub |
| HF40-40K-N03                 | 1-3                    | 120°    | 9.00        | 22.86 | 3.80                                    | 96.52  | N/A                   |       | 12.5                                   | 33.0           |
| HF40-40K-N06                 | 4-6                    | 60°     | 11.00       | 27.94 | 4.75                                    | 120.65 | 1.50                  | 38.10 | 15.75                                  | 36.25          |

Refer to [Components and Accessories](#) for ancillary equipment.



TOP SUB, HELLFIRE 6-SHOT CARRIERS, SWITCH TANDEM SUBS, BOTTOM SUB, AND PLUG/SHOOT ADAPTER



# HELLFire® Perforating System

## 4 in (102 mm), Planar, Internal Scallops



### CONSTANT ENTRY HOLE AND PENETRATION

| Carrier O.D.             | Shaped Charge | Part Number | Perforating Condition | Explosive  | Shot Density / Phasing   | API 19B Targeted Pipe | Performance in Stressed Berea (API RP19B Sec. 2) |                             |              |
|--------------------------|---------------|-------------|-----------------------|------------|--------------------------|-----------------------|--|-----------------------------|--------------|
|                          |               |             |                       |            |                          |                       | EHD <sup>^</sup> (in)[cm]                        | EHD Variation Decentralized | TTP (in)[cm] |
| 4" Internal Scallops 12g | HELLFire 40   | EC2-40K1271 | Fluid                 | 12.0g, RDX | 1 to 6 shots per cluster | 6.0" OD, 26# P110     | 0.40 [1.02]                                      | 3.9%                        | 3.0 [7.62]   |

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

<sup>^</sup>EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

FLUID: Qualified for shooting in FLUID only with perforating systems qualified by GEODynamics.

IN FLUID or DRY: Qualified for shooting in FLUID or DRY GAS with perforating systems qualified by GEODynamics.

### HARDWARE

|                                      |  |
|--------------------------------------|--|
| Gun Body Configuration/Material      | Threaded, internally scalloped, proprietary gun steel, similar to 41XX alloy steel |
| Charge Tube Type & Retention         | Round steel tube strip, bend tab retention   |
| Type of Tandem Connection            | Switch tandem subs (ported)  |
| Nominal OD / Wall Thickness (in)[mm] | 4.00 [101.60] / 0.375 [9.53]   |
| Upper/Lower Thread Connections       | 3.4375" 6P ACME-2G   |

### COMPONENTS AND ACCESSORIES

| Description   | Part Number(s)                    |
|---|-----------------------------------|
| Short Quick Change Assembly (above top sub)               | GN-QC31-0001                      |
| Top Sub, Compact 4" (Wireline)                            | GN-R40HC-CQC20                    |
| Switch Tandem Sub, 4" (Wireline)                          | GN-R40HC-T077                     |
| Centralizer Ring/Protector (Lock) Ring                    | Not Applicable for 4" OD HELLFire |
| Bottom Sub, 4" (Wireline)                                 | GN-R40HC-T075ST2                  |
| Lower sub connection o-rings, 3-1/8"                      | OR-N569-230                       |
| Bottom sub shoot-thru plug and o-ring for shoot-thru plug | GN-R40HC-PLG1 / OR-N569-214       |
| O-Ring Materials and Size, Nitrile (standard option)      | OR-N569-236                       |
| Port Plug, HELLFire Subs and Port Plug O-ring             | GN-R00-T001 / OR-N569-217         |
| Plug/Shoot Adapter Assembly, 3-1/8"                       | GN-R31-ST30                       |
| Pumpdown Crossover Sub, QC Pin X 3.12" Box                | GN-RX31-QC31                      |
| GO Style Quick Change (bottom sub connection)             | EM-QC-QC312-00GO                  |
| Thread Protectors   |                                   |
| Carrier (Gun) Protector, 4"                               | GN-THD-400-030                    |
| Carrier (Gun) Plastic Plug Protector, 4"                  | GN-THD40-308                      |
| Top Sub (Top Pin) Thread Protector, 3-1/8"                | GN-THD-312-020                    |
| Tandem Sub & Bull Plug Thread Protector, 4"               | GN-THD-400-040                    |
| Bottom Sub Thread Protector (lower connection), 3-1/8"    | GN-THD-312-040                    |
| Bull Plug, 3-1/8" HF                                      | GN-R31HF-0022                     |

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# SandIQ® PRO Perforating System

## 3-1/8 in (79 mm), GT Spiral



GEODynamics' SandIQ® PRO technology provides an “off ramp” for more efficient diversion of proppant. Perforating tunnels are tilted 45 degrees in direction of fluid flow. Angled holes are engineered to create a physical diversion on toe side of casing for proppant to naturally flow into the formation. SandIQ shaped charges are engineered to produce precision holes in casing size, weights, and grades which are used in unconventional wells.

## APPLICATION SPECIFICATIONS

|                                  |  |
|----------------------------------|--|
| Shot Density and Phasing Options | Multiple <a href="#">Shot &amp; Phasing Options</a> , one (1) to eight (8) shots per carrier |
| Initiation Point                 | Bottom-fired, wireline   |
| Mode of Fire                     | Mechanical or addressable, select fire   |
| Detonating Cord                  | 80-grain round   |
| Compatible Perforating Charges   | SandIQ®  |
| Maximum Gun Swell (in)[mm]       | 3.46 [87.88] @22.7g In Fluid   |

## ENVIRONMENTAL

|                             |   |
|-----------------------------|---|
| Maximum Pressure (psi)[MPa] | 22,500 [155.13]                                   |
| Maximum Tensile* (lbf)[kN]  | 202,300 [900] *Hardware Calculated Breaking Point |

## CARRIER SPECIFICATIONS

| Carrier Assembly Part Number | Shot & Phasing Options |         | Gun Lengths |       | Gun End to Center of First Scallop @ 0° |        | Distance Shot to Shot |        | Shipping Assembly Weight |       |
|------------------------------|------------------------|---------|-------------|-------|---|--------|-----------------------|--------|--------------------------|-------|
|                              | # Shots                | Phasing | (in)        | (cm)  | (in)                                    | (mm)   | (in)                  | (mm)   | (lbs)                    | (kgs) |
| GT31-45-J002A                | 2                      | 180°    | 18          | 45.72 | 5.03                                    | 127.76 | 4.50                  | 114.30 | 19.0                     | 8.62  |
| GT31-45-G003A                | 3                      | 120°    | 24          | 60.96 | 5.036                                   | 127.91 | varies                |        | 23.0                     | 10.43 |
| GT31-45-B004A                | 4                      | 90°     | 27          | 68.58 | 5.036                                   | 127.91 | varies                |        | 26.0                     | 11.79 |
| GT31-45-A006A                | 6                      | 60°     | 30          | 76.20 | 5.03                                    | 127.76 | 3.50                  | 88.90  | 29.0                     | 13.15 |
| GT31-45-A008A                | 8                      | 60°     | 38          | 96.52 | 6.03                                    | 153.16 | 3.50                  | 88.90  | 37.0                     | 16.78 |

Refer to [Components and Accessories](#) for ancillary equipment.



# SandIQ® PRO Perforating System

## 3-1/8 in (79 mm), GT Spiral



### SandIQ® 45° TILT ANGLE

| Carrier O.D. | Shaped Charge | Part Number    | Perforating Condition | Explosive  | Phasing / Charge Tilt Angle | API 19B Targeted Pipe* | Performance in Stressed Berea (API RP19B Sec. 2) |                             |                     |       |
|--------------|---------------|----------------|-----------------------|------------|-----------------------------|------------------------|--|-----------------------------|---------------------|-------|
|              |               |                |                       |            |                             |                        | EHD^ at 45°<br><i>(in)[cm]</i>                   | EHD Variation Decentralized | TTP <i>(in)[cm]</i> |       |
| 3-1/8" 13g   | SandIQ B      | EC2-33A1371-SB | Fluid                 | 13.0g, RDX | 60° / 45°                   | 5.5" OD, P-110         | 0.28 [0.71]                                      | 4.2 %                       | 5.0 [12.70]         |       |
| 3-1/8" 16g   | SandIQ C      | EC2-33A1671-SC |                       | 16.0g RDX  |                             |                        | 0.31 [0.79]                                      | 3.8 %                       |                     |       |
|              | SandIQ D      | EC2-33A1671-SD |                       | 16.0g, RDX |                             |                        | 0.38 [0.97]                                      | 2.6 %                       |                     |       |
|              |               | EC2-33A1672-SD |                       | 16.0g, HMX |                             |                        | 0.35 [0.89]                                      | 1.7 %                       |                     |       |
| 3-1/8" 20g   | SandIQ E      | EC2-33A2071-SE |                       | 20.0g, RDX |                             |                        | 0.42 [1.07]                                      | 3.7 %                       |                     |       |
|              |               | EC2-33A2072-SE |                       | 20.0g, HMX |                             |                        | 0.41 [1.04]                                      | 4.8 %                       |                     |       |
| 3-1/8" 23g   | SandIQ F      | EC2-33A2371-SF |                       | 23.0g, RDX |                             |                        | 0.44 [1.12]                                      | 1.0 %                       |                     |       |
|              |               | EC2-33A2372-SF |                       | 23.0g, HMX |                             |                        | 0.43 [1.09]                                      | 6.0 %                       |                     |       |
|              | SandIQ G      | EC2-33A2371-SG |                       | 23.0g, RDX |                             |                        |  | 0.51 [1.30]                 |                     | 5.2 % |
|              |               |                |                       |            |                             |                        |  |                             |                     |       |

\*3-1/8" SandIQ charge performance is compatible in 4.5" 11.6-15.1# and 5.5" 17-23# P-110 casing.

### HARDWARE

|                                      |  |
|--------------------------------------|--|
| Gun Body Configuration/Material      | Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel |
| Charge Tube Type & Retention         | Round steel tube strip; bend tab retention                                 |
| Type of Tandem Connection            | Switch tandem sub  |
| Nominal OD / Wall Thickness (in)[mm] | 3.15 [80.01] / 0.315 [8.00] or 3.125 [79.38] / 0.3125 [7.94]               |
| Upper/Lower Thread Connections       | 2.750" 6P ACME-2G  |

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

<sup>^</sup>EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

FLUID: Qualified for shooting in FLUID only with perforating systems qualified by GEODynamics.

IN FLUID or DRY: Qualified for shooting in FLUID or DRY GAS with perforating systems qualified by GEODynamics.

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# SandIQ® PRO Perforating System

## 3-1/8 in (79 mm), GT Spiral



### COMPONENTS AND ACCESSORIES

| Description   | Part Number(s)   |
|---|--|
| <b>Short Quick Change (SQC) Assembly</b> (one per string, CCL to top sub)<br>Quick Rebuild Kit ( <i>contacts, teflon tubing, screw, spring, insulating retainer</i> )<br>Complete Rebuild Kit with O-Rings ( <i>all required parts</i> )                        | GN-QC31-0001<br>RKQ-GN-QC31-0001<br>RKC-GN-QC31-0001                                   |
| <b>Top Subs, 3-1/8", Ported</b><br>Top Sub Assembly, Ported, SQC Connection ( <i>recommended</i> )<br>Top Sub Assembly, Ported ( <i>connects to industry-standard quick change</i> )  | GN-R31-CQC20-A<br>GN-R31-T080-A  |
| <b>Switch Tandem Subs, 3-1/8", Ported</b><br>Switch Sub Assembly, 12" long, 6.24" make-up length<br>Switch Sub Assembly, 3.25" make-up length   | GN-R31-T150-A<br>GN-R31-T101-A   |
| Aligning Switch Sub, LH Lock Ring, 6.24" make-up length (MUL)<br>Aligning Switch Sub, RH Lock Ring, 6.24" MUL<br>Aligning Short Switch Sub, RH*, <i>*compatible with centralizer rings</i>  | GN-R31-T150L-A<br>GN-R31-T150R-A<br>GN-R31-T109R-A                                     |
| <b>Locking Rings, 3-1/8" Tandem Subs</b><br>Left-Hand Thread, HD<br>Right-Hand Thread, HD   | GN-R31-L001-319<br>GN-R31-R001-319   |
| <b>O-Ring Materials and Size, Nitrile</b> ( <i>standard option</i> )  | OR-N569-230  |
| <b>Port Plug and Port Plug O-Ring</b>   | GN-R00-T001 / OR-N569-217  |
| <b>Plug/Shoot Adapter Assembly, 3-1/8"</b>  | GN-R31-ST30  |
| <b>Bull Plugs</b><br>3-1/8" Standard<br>3-1/8" with 2-3/8" EUE Pin<br>3-1/8" with 2-7/8" EUE Pin  | GN-R31-0022<br>GN-R31-0023<br>GN-R31-0024  |
| <b>Thread Protectors</b><br>Carrier (Gun) Protector, 3-1/8"<br>Carrier (Gun) Plastic Plug Protector, 3-1/8"<br>Top Sub (Top Pin) Protector, 3-1/8"<br>Tandem Sub & Bull Plug Thread Protector, 3-1/8"<br>Bottom Sub Thread Protector (lower connection), 3-1/8" | GN-THD-312-030<br>GN-THD-312-300<br>GN-THD-312-020<br>GN-THD-312-040<br>GN-THD-312-040 |



# Conventional Short Guns

## 2-3/4 in (70 mm), GLB Spiral

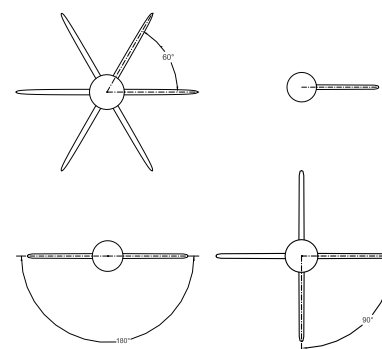
GEODynamics' perforating systems use bi-directional boosters, non-lead azide explosives, customized connectors and inserts, and high-velocity, low-shrink detonating cord. Additionally, all GEODynamics gun assemblies are scalloped to optimize charge performance and prevent casing damage from perforating exit hole burrs. Shot phasing is designed to maintain the integrity and collapse resistance of the casing after perforating. These attributes, along with premium quality gun material and gun connectors, allow GEODynamics to deliver safe, efficient, and reliable perforating gun solutions to our customers.

## APPLICATION SPECIFICATIONS

|                                  |  |
|----------------------------------|--|
| Shot Density and Phasing Options | Multiple Shot & Phasing Options; one (1) to 19 shots per carrier |
| Initiation Point                 | Bottom-fired, wireline, slickline, or tubing                     |
| Mode of Fire                     | Mechanical or addressable, select fire                           |
| Detonating Cord                  | 80-grain round   |
| Compatible Perforating Charges   | FracIQ®, Connex®, Razor®, Basix™, Refrax™                        |
| Maximum Gun Swell (in)[mm]       | 2.91 [73.91] @ 15.0g In Fluid; 3.02 [76.20] @ 15.0g Dry          |

## ENVIRONMENTAL

|                             |  |
|-----------------------------|--|
| Maximum Pressure (psi)[MPa] | 25,000 [172.37]                                      |
| Maximum Tensile* (lbf)[kN]  | 176,600 [785.56] *Hardware Calculated Breaking Point |



## CARRIER SPECIFICATIONS

| Carrier Assembly Part Number | Shot & Phasing Options |         | Gun Lengths |        | Gun End to Center of First Scallop @ 0° |       | Distance Shot to Shot |       | Shipping Assembly Weight |       |
|------------------------------|------------------------|---------|-------------|--------|---|-------|-----------------------|-------|--------------------------|-------|
|                              | # Shots                | Phasing | (in)        | (cm)   | (in)                                    | (mm)  | (in)                  | (mm)  | (lbs)                    | (kgs) |
| GLB27-O001                   | 1                      | 0°      | 12          | 30.48  | 6.0                                     | 152.4 | N/A                   |       | 11.0                     | 5.0   |
| GLB27-J002                   | 2                      | 180°    | 15          | 38.10  | 6.0                                     | 152.4 | 3.0                   | 76.20 | 13.0                     | 10.0  |
| GLB27-A002                   | 2                      | 60°     | 15          | 38.10  | 6.0                                     | 152.4 | 2.0                   | 50.80 | 13.0                     | 10.0  |
| GLB27-A007                   | 7                      |         | 24          | 60.96  |   |       |                       |       | 21.0                     | 10.0  |
| GLB27-A010                   | 10                     |         | 30          | 76.20  |   |       |                       |       | 27.0                     | 12.0  |
| GLB27-A013                   | 13                     |         | 36          | 91.44  |   |       |                       |       | 30.0                     | 14.0  |
| GLB27-A016                   | 16                     |         | 42          | 106.68 |   |       |                       |       | 35.0                     | 16.0  |
| GLB27-A019                   | 19                     |         | 48          | 121.92 |   |       |                       |       | 39.0                     | 18.0  |
| GLB27-B003                   | 3                      | 90°     | 18          | 45.72  | 6.0                                     | 152.4 | 3.0                   | 76.20 | 15.0                     | 8.0   |
| GLB27-B004                   | 4                      |         | 18          | 45.72  |   |       | 2.0                   | 50.80 | 15.0                     | 8.0   |
| GLB27-B007                   | 7                      |         | 24          | 60.96  |   |       |                       |       | 21.0                     | 10.0  |
| GLB27-B010                   | 10                     |         | 30          | 76.20  |   |       |                       |       | 27.0                     | 12.0  |
| GLB27-B013                   | 13                     |         | 36          | 91.44  |   |       |                       |       | 30.0                     | 14.0  |
| GLB27-B016                   | 16                     |         | 42          | 106.68 |   |       |                       |       | 35.0                     | 16.0  |
| GLB27-B019                   | 19                     |         | 48          | 121.92 |   |       |                       |       | 39.0                     | 18.0  |

Refer to [Components and Accessories](#) for ancillary equipment.





# Conventional Short Guns

## 2-3/4 in (70 mm), GLB Spiral

### CARRIER SPECIFICATIONS, cont.

| Carrier Assembly Part Number | Shot & Phasing Options |         | Gun Lengths |        | Gun End to Center of First Scallop @ 0° |       | Distance Shot to Shot |       | Shipping Assembly Weight |       |
|------------------------------|------------------------|---------|-------------|--------|---|-------|-----------------------|-------|--------------------------|-------|
|                              | # Shots                | Phasing | (in)        | (cm)   | (in)                                    | (mm)  | (in)                  | (mm)  | (lbs)                    | (kgs) |
| GLB27-G003                   | 3                      | 120°    | 18          | 45.72  | 6.0                                     | 152.4 | 3.0                   | 76.20 | 15.0                     | 8.0   |
| GLB27-G004                   | 4                      |         | 18          | 45.72  |   |       | 2.0                   | 50.80 | 15.0                     | 8.0   |
| GLB27-G007                   | 7                      |         | 24          | 60.96  |   |       |                       |       | 21.0                     | 10.0  |
| GLB27-G010                   | 10                     |         | 30          | 76.20  |   |       |                       |       | 27.0                     | 12.0  |
| GLB27-G013                   | 13                     |         | 36          | 91.44  |   |       |                       |       | 30.0                     | 14.0  |
| GLB27-G016                   | 16                     |         | 42          | 106.68 |   |       |                       |       | 35.0                     | 16.0  |
| GLB27-G019                   | 19                     |         | 48          | 121.92 |   |       |                       |       | 39.0                     | 18.0  |

### CONSTANT ENTRY HOLE AND PENETRATION

| Carrier O.D.   | Shaped Charge | Part Number | Perforating Condition | Explosive  | Shot Density / Phasing | API 19B Targeted Pipe* | Performance in Stressed Berea (API RP19B Sec. 2) |                             |              |
|----------------|---------------|-------------|-----------------------|------------|------------------------|------------------------|--|-----------------------------|--------------|
|                |               |             |                       |            |                        |                        | EHD <sup>^</sup> (in)[cm]                        | EHD Variation Decentralized | TTP (in)[cm] |
| 2-3/4" 11g-15g | FracIQ 30     | EC2-27A1171 | Fluid                 | 11.0g, RDX | 6 spf / 60°            | 4.5" OD P110           | 0.30 [0.76]                                      | 2.7 %                       | 5.0 [12.70]  |
|                | FracIQ 35     | EC2-27A1271 |                       | 12.0g, RDX |                        |                        | 0.35 [0.89]                                      | 5.9 %                       |              |
|                | FracIQ 40     | EC2-27A1571 |                       | 15.0g, RDX |                        |                        | 0.40 [1.02]                                      | 6.3 %                       |              |

### DEEP PENETRATING/EXTREME DEEP PENETRATING

| Carrier O.D. | Shaped Charge   | Part Number    | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D. Application | Performance in Concrete |               | Performance in Stressed Berea |               |
|--------------|-----------------|----------------|-----------------------|------------|------------------------|--------------------------|-------------------------|---------------|-------------------------------|---------------|
|              |                 |                |                       |            |                        |                          | EHD (in)[cm]            | TTP (in)[cm]  | EHD <sup>^</sup> (in)[cm]     | TTP (in)[cm]  |
| 2-3/4" 15g   | 2715 Connex SDP | EC2-27A1521-RC | In Fluid or Dry       | 15.0g, RDX | 6 spf / 60°            | 4-1/2" L-80              |                         |               | 0.30 [0.76]                   | 11.70 [29.72] |
|              |                 | EC2-27A1522-RC |                       | 15.0g, HMX |                        |                          |                         |               | 0.31 [0.79]                   | 12.18 [30.94] |
|              | 2715 Razor XDP  | EC2-27A1521    |                       | 15.0g, RDX |                        |                          | 0.39 [0.99]             | 37.45 [95.12] |                               |               |
|              |                 | EC2-27A1522    |                       | 15.0g, HMX |                        |                          | 0.39 [0.99]             | 37.45 [95.12] |                               |               |
|              |                 | EC2-27A1523    |                       | 15.0g, HNS |                        |                          |                         |               | 0.31 [0.79]                   | 10.50 [26.67] |
|              |                 | EC2-27A1521-E  |                       | 15.0g, RDX |                        |                          | 0.39 [0.99]             | 31.78 [80.72] | 0.32 (0.81)                   | 9.40 [23.88]  |
|              | 2715 Basix XDP  | EC2-27A1522-E  |                       | 15.0g, HMX |                        |                          | 0.38 [0.97]             | 32.75 [83.19] | 0.35 [0.89]                   | 10.60 [26.92] |
|              |                 |                |                       |            |                        |                          |                         |               |                               |               |
|              |                 |                |                       |            |                        |                          |                         |               |                               |               |
|              |                 |                |                       |            |                        |                          |                         |               |                               |               |

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

<sup>^</sup>EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

FLUID: Qualified for shooting in FLUID only with perforating systems qualified by GEODynamics.

IN FLUID or DRY: Qualified for shooting in FLUID or DRY GAS with perforating systems qualified by GEODynamics.

Revised: August 31, 2023 3:25 PM

# Conventional Short Guns

## 2-3/4 in (70 mm), GLB Spiral

### DUAL CASING

| Carrier O.D. | Shaped Charge | Part Number   | Perforating Condition | Explosive  | Shot Density / Phasing | Inner Casing  |                       | Outer Casing  |                       |
|--------------|---------------|---------------|-----------------------|------------|------------------------|---------------|-----------------------|---------------|-----------------------|
|              |               |               |                       |            |                        | O.D./Material | EHD (in)[cm]          | O.D./Material | EHD (in)[cm]          |
| 2-3/4"       | 2711 Refrax   | EC2-27A1171-R | Fluid                 | 11.0g, RDX | 6 spf / 60°            | 4.0" P110     | 0.29-0.30 [0.74-0.76] | 5.5" P110     | 0.37-0.41 [0.94-1.04] |
| 11g-15g      | 2715 Refrax   | EC2-27A1571-R |                       | 15.0g, RDX |                        |               | 0.34-0.36 [0.86-0.91] |               | 0.34-0.42 [0.86-1.07] |

### HARDWARE

|                                      |  |
|--------------------------------------|--|
| Gun Body Configuration/Material      | Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel |
| Charge Tube Type & Retention         | Round steel tube strip; bend tab retention                                 |
| Type of Tandem Connection            | Booster to booster (no splice)   |
| Nominal OD / Wall Thickness (in)[mm] | 2.75" [69.85] / 0.313 [7.95]   |
| Upper/Lower Thread Connections       | 2.375" - 6P ACME 2G  |

### COMPONENTS AND ACCESSORIES

| Description  | Part Number(s)  |                |
|--|-----------------|----------------|
| <b>Top Subs, 2-3/4"</b>                                    |                 |                |
| Top Sub, TCP   | GN-R27-0020     |                |
| Top Sub, Wireline  | GN-R27-0035     |                |
| <b>Top Sub Lift Sub Assembly, 2-3/4" and 2-7/8"</b>        | TC-QC27-000     |                |
| <b>Tandem Subs, 2-3/4"</b>                                 |                 |                |
| Tandem Sub, TCP  | GN-R27-0021     |                |
| Switch Tandem Sub, Wireline, Ported, 3" make-up length     | GN-R27-T100-A   |                |
| Aligning Switch Sub, LH Lock Ring                          | GN-R27-T125-A   |                |
| <b>TCP Transfer Kit (2-3/4" through 4")</b>                | GN-000-0025     |                |
| <b>O-Ring Materials and Size</b>                           | Top Connection  | Gun Connection |
| Nitrile (standard option)                                  | OR-N569-225     | OR-N569-227    |
| Viton (with back-up rings required for > 325°F)            | OR-V95G-225     | OR-V95G-227    |
| Back-up rings for > 325°F                                  | OR-B225-2160    | OR-B227-2405   |
| <b>Thread Protectors</b>                                   |                 |                |
| Top Sub (Top Pin)  | GN-THD-QC27-020 |                |
| Carrier (Gun) Protector                                    | GN-THD-275-030  |                |
| Tandem Sub & Bull Plug Protector                           | GN-THD-275-040  |                |
| <b>Bull Plugs</b>  |                 |                |
| 2-3/4" Standard  | GN-R27-0022     |                |
| 2-3/4" with 2-3/8" EUE Pin                                 | GN-R27-0023     |                |
| 2-3/4" Shoot-Thru  | GN-R27-ST27     |                |
| 2-3/4" Shoot-Thru Assembly (GN-R27-T150-A and GN-R27-ST27) | GN-R27-ST30     |                |

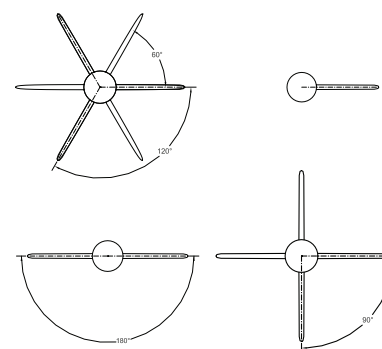
# Conventional Short Guns

## 3-1/8 in (79 mm), GLB Spiral

GEODynamics' perforating systems use bi-directional boosters, non-lead azide explosives, customized connectors and inserts, and high-velocity, low-shrink detonating cord. Additionally, all GEODynamics gun assemblies are scalloped to optimize charge performance and prevent casing damage from perforating exit hole burrs. Shot phasing is designed to maintain the integrity and collapse resistance of the casing after perforating. These attributes, along with premium quality gun material and gun connectors, allow GEODynamics to deliver safe, efficient, and reliable perforating gun solutions to our customers.

## APPLICATION SPECIFICATIONS

|                                  |   |
|----------------------------------|---|
| Shot Density and Phasing Options | Multiple <a href="#">Shot &amp; Phasing Options</a> , one (1) to 14 shots per carrier |
| Initiation Point                 | Bottom-fired, wireline, slickline, or tubing  |
| Mode of Fire                     | Mechanical or addressable, select fire  |
| Detonating Cord                  | 80-grain round  |
| Compatible Perforating Charges   | FracIQ®, Connex®, Razor®, Basix™, Basix Frac, Refrax™                                 |
| Maximum Gun Swell (in)[mm]       | 3.46 [87.88] @ 22.7g In Fluid; 3.60 [91.44] @ 19.0g Dry                               |



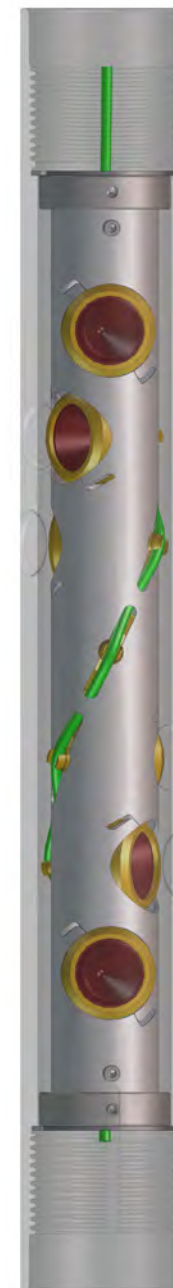
## ENVIRONMENTAL

|                             |   |
|-----------------------------|---|
| Maximum Pressure (psi)[MPa] | 22,500 [155.13]                                   |
| Maximum Tensile* (lbf)[kN]  | 202,300 [900] *Hardware Calculated Breaking Point |

## CARRIER SPECIFICATIONS

| Carrier Assembly Part Number | Shot & Phasing Options |           | Gun Lengths |       | Gun End to Center of First Scallop @ 0° |       | Distance Shot to Shot |       | Shipping Assembly Weight |       |
|------------------------------|------------------------|-----------|-------------|-------|---|-------|-----------------------|-------|--------------------------|-------|
|                              | # Shots                | Phasing   | (in)        | (cm)  | (in)                                    | (mm)  | (in)                  | (mm)  | (lbs)                    | (kgs) |
| GLB31-O002                   | 2                      | 0°        | 15          | 38.1  | 6.0                                     | 152.4 | 3.0                   | 76.20 | 15.0                     | 6.8   |
| GLB31-J002                   |                        | 180°      | 15          | 38.1  |   |       |                       |       |                          |       |
| GLB31-O003                   | 3                      | 0°        | 18          | 45.72 |   |       | 2.0                   | 50.80 | 18.0                     | 8.2   |
| GLB31-G003                   |                        | 120°      | 18          | 45.72 |   |       |                       |       |                          |       |
| GLB31-B004                   | 4                      | 90°       | 18          | 45.72 |   |       |                       |       |                          |       |
| GLB31-P005S                  | 5                      | 72°       | 20          | 50.80 |   |       |                       |       | 20.0                     | 9.0   |
| GLB31-A005                   |                        | 60°       | 20          | 50.80 |   |       |                       |       |                          |       |
| GLB31-A006                   | 6                      | 60°       | 22          | 55.88 |   |       |                       |       | 22.0                     | 10.0  |
| GLB31-O006                   |                        | 0°        | 22          | 55.88 |   |       |                       |       |                          |       |
| GLB31-A007T                  | 7                      | 60°       | 24          | 60.96 |   |       |                       |       | 24.0                     | 10.9  |
| GLB31-R008                   | 8                      | 90° + 45° | 26          | 66.04 |   |       |                       |       | 26.0                     | 11.8  |
| GLB31-A010                   | 10                     | 60°       | 30          | 76.20 |   |       |                       |       | 30.0                     | 13.5  |
| GLB31-R010                   |                        | 72°       | 30          | 76.20 |   |       |                       |       |                          |       |
| GLB31-A013                   | 13                     | 60°       | 36          | 91.44 |   |       |                       |       | 36.0                     | 16.0  |

Refer to [Components and Accessories](#) for ancillary equipment.



# Conventional Short Guns

## 3-1/8 in (79 mm), GLB Spiral

### BIG HOLE

| Carrier O.D. | Shaped Charge | Part Number | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |              | Performance in Stressed Berea |              |
|--------------|---------------|-------------|-----------------------|------------|------------------------|--------------|-------------------------|--------------|-------------------------------|--------------|
|              |               |             |                       |            |                        | Application  | EHD (in)[cm]            | TTP (in)[cm] | EHD^ (in)[cm]                 | TTP (in)[cm] |
| 3-1/8" 23g   | 3323 Basix BH | EC2-33A2331 | Fluid                 | 22.7g, RDX | 6 spf / 60°            | 4-1/2" L-80  | 0.78 [1.98]             | 7.60 [19.30] |                               |              |
|              |               | EC2-33A2332 |                       | 22.7g, HMX |                        |              | 0.79 [2.01]             | 7.80 [19.81] |                               |              |

### CONSTANT ENTRY HOLE AND PENETRATION

| Carrier O.D.   | Shaped Charge    | Part Number                         | Perforating Condition | Explosive  | Shot Density / Phasing | API 19B Targeted Pipe* | Performance in Stressed Berea (API RP19B Sec. 2) |                             |              |
|----------------|------------------|-------------------------------------|-----------------------|------------|------------------------|------------------------|--|-----------------------------|--------------|
|                |                  |                                     |                       |            |                        |                        | EHD^ (in)[cm]                                    | EHD Variation Decentralized | TTP (in)[cm] |
| 3-1/8" 12g-13g | FracIQ 20        | EC2-33A1271                         | Fluid                 | 12.0g, RDX | 6 spf / 60°            | 4.5"-5.5" OD, P110     | 0.22 [0.56]                                      | 5.5 %                       | 5.0 [12.70]  |
|                | Basix Frac 25    | EC2-33A1271-BF                      |                       | 12.0g, RDX |                        |                        | 0.26 [0.66]                                      | 2.4 %                       | 4.0 [10.16]  |
|                | FracIQ 25        | EC2-33A1371                         |                       | 13.0g, RDX |                        |                        | 0.26 [0.66]                                      | 4.1 %                       | 5.0 [12.70]  |
| 3-1/8" 13g-16g | FracIQ Connex 30 | EC2-33A1471-FRX                     | Fluid                 | 14.0g, RDX | 6 spf / 60°            | 4.5"-5.5" OD, P110     | 0.31 [0.79]                                      | 6.0 %                       | 5.0 [12.70]  |
|                | Basix Frac 30    | EC2-33A1471-BF                      |                       | 14.0g, RDX |                        |                        | 0.31 [0.79]                                      | 4.0 %                       | 4.0 [10.16]  |
|                | FracIQ 30        | EC2-33A1671                         |                       | 16.0g, RDX |                        |                        | 0.31 [0.79]                                      | 3.1 %                       | 5.0 [12.70]  |
|                | FracIQ 30        | EC2-33A1672                         |                       | 16.0g, HMX |                        |                        | 0.34 [0.86]                                      | 3.8 %                       |              |
| 3-1/8" 16g-20g | FracIQ Connex 35 | EC2-33A1671-FRX                     | Fluid                 | 16.0g, RDX | 6 spf / 60°            | 4.5"-5.5" OD, P110     | 0.36 [0.91]                                      | 5.0 %                       | 5.0 [12.70]  |
|                | Basix Frac 35    | EC2-33A1871-BF                      |                       | 18.0g, RDX |                        |                        | 0.36 [0.91]                                      | 3.4 %                       | 4.0 [10.16]  |
|                | FracIQ 35        | EC2-33A2071                         |                       | 20.0g, RDX |                        |                        | 0.36 [0.91]                                      | 2.5 %                       | 5.0 [12.70]  |
|                | FracIQ 35        | EC2-33A2072                         |                       | 20.0g, HMX |                        |                        | 0.37 [0.94]                                      | 3.0 %                       |              |
| 3-1/8" 19g-23g | FracIQ Connex 40 | EC2-33A1971-FRX                     | Fluid                 | 19.0g, RDX | 6 spf / 60°            | 4.5"-5.5" OD, P110     | 0.41 [1.04]                                      | 6.5 %                       | 5.0 [12.70]  |
|                | FracIQ 40        | EC2-33A2371                         |                       | 23.0g, RDX |                        |                        | 0.40 [1.02]                                      | 3.3 %                       |              |
|                | FracIQ 40        | EC2-33A2372                         |                       | 23.0g, HMX |                        |                        | 0.41 [1.04]                                      | 3.8 %                       |              |
|                | Basix Frac 40    | EC2-33A2371-BF                      |                       | 23.0g, RDX |                        |                        | 0.40 [1.02]                                      | 6.6 %                       | 4.0 [10.16]  |
|                | Basix Frac 40    | EC2-33A2371-BF                      |                       | 23.0g, RDX |                        | 6.0" OD, P110          | 0.40 [1.02]                                      | 7.5 %                       |              |
| 3-1/8" 20g-23g | FracIQ 45        | EC2-33A2071-45                      | Fluid                 | 20.0g, RDX | 6 spf / 60°            | 4.5"-5.5" OD, P110     | 0.45 [1.14]                                      | 5.6 %                       | 5.0 [12.70]  |
|                | FracIQ Connex 45 | EC2-33A2371-FRX                     |                       | 21.0g, RDX |                        |                        | 0.45 [1.14]                                      | 3.2 %                       |              |
|                | Basix Frac 45    | EC2-33A2371-BF45                    |                       | 23.0g, RDX |                        |                        | 0.45 [1.14]                                      | 5.9 %                       | 4.0 [10.16]  |
| 3-1/8" 23g     | FracIQ 50        | EC2-33A2371-50<br>† EC2-33A2371-50G | Fluid                 | 23.0g, RDX | 6 spf / 60°            | 4.5"-5.5" OD, P110     | 0.50 [1.27]                                      | 1.5 %                       | 5.0 [12.70]  |
|                | FracIQ 50        | EC2-33A2372-RX                      |                       | 23.0g, HMX |                        | 5.5" OD, P110          | 0.50 [1.27]                                      | 4.6 %                       |              |
|                | Basix Frac 50    | EC2-33A2371-BF50                    |                       | 23.0g, RDX |                        | 4.5"-5.5" OD, P110     | 0.50 [1.27]                                      | 4.8 %                       | 4.0 [10.16]  |
|                | FracIQ 55        | EC2-33A2371-55                      |                       | 23.0g, RDX |                        | 4.5" OD, P110          | 0.55 [1.40]                                      | 3.8 %                       | 5.0 [12.70]  |

\*3-1/8" FracIQ charge performance is compatible in 4.5" 11.6-15.1# and 5.5" 17-23# P-110 casing. FRX designates FracIQ® Connex® reactive technology.

†EC2-33A2371-50G has a custom, externally-grooved case (special application).

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

FLUID: Qualified for shooting in FLUID only with perforating systems qualified by GEODynamics.

IN FLUID or DRY: Qualified for shooting in FLUID or DRY GAS with perforating systems qualified by GEODynamics.

Revised: August 31, 2023 3:25 PM

# Conventional Short Guns

## 3-1/8 in (79 mm), GLB Spiral

### DEEP PENETRATING/EXTREME DEEP PENETRATING

| Carrier<br>O.D. | Shaped Charge   | Part Number    | Perforating<br>Condition | Explosive  | Shot Density /<br>Phasing                | ^Casing O.D. | Performance in Concrete |                | Performance in Stressed Berea |               |
|-----------------|-----------------|----------------|--------------------------|------------|--|--------------|-------------------------|----------------|-------------------------------|---------------|
|                 |                 |                |                          |            |  | Application  | EHD (in)[cm]            | TTP (in)[cm]   | EHD^ (in)[cm]                 | TTP (in)[cm]  |
| 3-1/8"<br>19g   | 3319 Connex RX  | EC2-33A1991-RX | ‡ Fluid or Dry           | 19.0g, RDX | 5 spf / 60° (Dry)<br>6 spf / 60° (Fluid) | 4-1/2" L-80  |                         |                | 0.32 [0.81]                   | 11.30 [28.70] |
|                 |                 | EC2-33A1992-RX |                          | 19.0g, HMX |  |              |                         |                | 0.32 [0.81]                   | 11.60 [29.46] |
|                 | 3319 Razor XDP  | EC2-33A1921    | ‡ Fluid or Dry           | 19.0g, RDX |  |              | 0.51 [1.30]             | 42.07 [106.86] |                               |               |
|                 |                 | EC2-33A1922    |                          | 19.0g, HMX |  |              | 0.49 [1.24]             | 41.10 [104.39] | 0.43 [1.09]                   | 14.60 [37.08] |
|                 | 3319 Basix XDP  | EC2-33A1921-E  | ‡ Fluid or Dry           | 19.0g, RDX |  |              | 0.43 [1.09]             | 35.80 [90.93]  |                               |               |
|                 |                 | EC2-33A1922-E  |                          | 19.0g, HMX |  |              |                         |                |                               |               |
|                 | 3319 Basix XDP  | EC2-33A1921-EG | Fluid                    | 19.0g, RDX |  |              | 0.43 [1.09]             | 35.70 [90.68]  |                               |               |
|                 | 3319 Basix DP   | EC2-33A1951    | ‡ Fluid or Dry           | 19.0g, RDX |  |              | 0.54 [1.37]             | 29.20 [74.17]  |                               |               |
| EC2-33A1952     |                 | 19.0g, HMX     |                          |            |  |              |                         |                |                               |               |
| 3-1/8"<br>23g   | 3323 Connex SDP | EC2-33A2321-RC | Fluid                    | 22.7g, RDX | 6 spf / 60°                              | 4-1/2" L-80  |                         |                | 0.40 [1.02]                   | 15.60 [39.62] |
|                 |                 | EC2-33A2322-RC |                          | 22.7g, HMX |  |              |                         |                | 0.46 [1.17]                   | 15.31 [38.89] |
|                 |                 | EC2-33A2323-RC |                          | 22.7g, HNS |  |              |                         |                | 0.36 [0.91]                   | 11.85 [30.10] |
|                 | 3323 Razor XDP  | EC2-33A2321    |                          | 22.7g, RDX |  |              |                         |                | 0.41 [1.04]                   | 16.40 [41.66] |
|                 |                 | EC2-33A2322    |                          | 22.7g, HMX |  |              | 0.42 [1.07]             | 39.02 [99.11]  | 0.44 [1.12]                   | 15.68 [39.83] |
|                 |                 | EC2-33A2323    |                          | 22.7g, HNS |  |              | 0.35 [0.89]             | 26.05 [66.17]  | 0.37 [0.94]                   | 12.12 [30.78] |
|                 | 3323 Basix XDP  | EC2-33A2321-E  |                          | 22.7g, RDX |  |              | 0.42 [1.07]             | 46.01 [116.87] | 0.39 [0.99]                   | 12.30 [31.24] |
|                 |                 | EC2-33A2322-E  |                          | 22.7g, HMX |  |              | 0.43 [1.09]             | 46.37 [117.78] |                               |               |
|                 | 3323 Basix GH   | EC2-33A2321-EG |                          | 22.7g, RDX |  |              |                         |                | 0.41 [1.04]                   | 11.90 [30.23] |
|                 |                 | EC2-33A2322-EG |                          | 22.7g, HMX |  |              | 0.43 [1.09]             | 45.70 [116.08] | 0.40 [1.02]                   | 11.90 [30.23] |

‡ For 3-1/8" 19g in dry gas, maximum shot density is 5 spf or limited to one- (1) and two- (2) shot short guns only.

### DUAL CASING

| Carrier O.D.   | Shaped Charge | Part Number   | Perforating Condition | Explosive  | Shot Density / Phasing | Inner Casing       |                       | Outer Casing  |                       |
|----------------|---------------|---------------|-----------------------|------------|------------------------|--------------------|-----------------------|---------------|-----------------------|
|                |               |               |                       |            |                        | O.D./Material      | EHD (in)[cm]          | O.D./Material | EHD (in)[cm]          |
| 3-1/8" 14g-23g | 3314 Refrax   | EC2-33A1471-D | Fluid                 | 14.0g, RDX | 6 spf / 60°            | Expanded 4.0" P110 | 0.33-0.33 [0.84-0.84] | 5.5" P110     | 0.30-0.30 [0.76-0.76] |
|                | 3316 Refrax   | EC2-33A1671-D |                       | 16.0g, RDX |                        |                    | 0.37-0.38 [0.94-0.95] |               | 0.35-0.35 [0.89-0.89] |
|                | 3320 Refrax   | EC2-33A2071-D |                       | 20.0g, RDX |                        |                    | 0.41-0.42 [1.04-1.07] |               | 0.40-0.40 [1.02-1.02] |
|                | 3316 Refrax   | EC2-33A1671-D |                       | 16.0g, RDX | 6 spf / 60°            | 4.5" P110          | 0.30-0.32 [0.76-0.81] | 7.0" P110     | 0.39-0.41 [0.99-1.04] |
|                | 3323 Refrax   | EC2-33A2371-D |                       | 23.0g, RDX |                        |                    | 0.41-0.42 [1.04-1.07] |               | 0.35-0.35 [0.89-0.89] |
|                |               |               |                       |            |                        |                    |                       |               |                       |

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

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# Conventional Short Guns

## 3-1/8 in (79 mm), GLB Spiral

### GOOD HOLE

| Carrier O.D. | Shaped Charge   | Part Number    | Perforating Condition | Explosive  | Shot Density / Phasing                   | ^Casing O.D. | Performance in Concrete |               | Performance in Stressed Berea |               |
|--------------|-----------------|----------------|-----------------------|------------|--|--------------|-------------------------|---------------|-------------------------------|---------------|
|              |                 |                |                       |            |  | Application  | EHD (in)[cm]            | TTP (in)[cm]  | EHD^ (in)[cm]                 | TTP (in)[cm]  |
| 3-1/8" 19g   | 3319 Connex XEH | EC2-33A1941-RC | ‡ Fluid or Dry        | 19.0g, RDX | 5 spf / 60° (Dry)<br>6 spf / 60° (Fluid) | 4-1/2" L-80  |                         |               | 0.41 [1.04]                   | 14.20 [36.07] |
|              |                 | EC2-33A1942-RC |                       | 19.0g, HMX |  |              |                         |               | 0.42 [1.07]                   | 14.37 [36.50] |
|              | 3319 Basix GH   | EC2-33A1941    |                       | 19.0g, RDX |  |              | 0.60 [1.52]             | 28.55 [72.52] |                               |               |
|              |                 | EC2-33A1942    |                       | 19.0g, HMX |  |              |                         |               |                               |               |
| 3-1/8" 23g   | 3323 Connex XEH | EC2-33A2341-RC | Fluid                 | 22.7g, RDX | 6 spf / 60°                              | 4-1/2"       |                         |               | 0.43 [1.09]                   | 15.60 [39.62] |
|              |                 | EC2-33A2342-RC |                       | 22.7g, HMX |  |              |                         |               | 0.43 [1.09]                   | 15.89 [40.36] |
|              | 3323 Basix GH   | EC2-33A2341-E  |                       | 22.7g, RDX |  | 5-1/2" L-80  | 0.48 [1.22]             | 31.40 [79.76] |                               |               |
|              |                 | EC2-33A2342-E  |                       | 22.7g, HMX |  | 4-1/2"       |                         |               |                               |               |

‡ For 3-1/8" 19g in dry gas, maximum shot density is 5 spf or limited to one- (1) and two- (2) shot short guns only.

### HARDWARE

|                                      |  |
|--------------------------------------|--|
| Gun Body Configuration/Material      | Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel |
| Charge Tube Type & Retention         | Round steel tube strip, bend tab retention                                 |
| Type of Tandem Connection            | Switch tandem sub  |
| Nominal OD / Wall Thickness (in)[mm] | 3.15 [80.01] / 0.315 [8.00] or 3.125 [79.38] / 0.3125 [7.94]               |
| Upper/Lower Thread Connections       | 2.750" 6P ACME-2G  |

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

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Revised: August 31, 2023 3:25 PM

# Conventional Short Guns

## 3-1/8 in (79 mm), GLB Spiral

### COMPONENTS AND ACCESSORIES

| Description   | Part Number(s)   |
|---|--|
| <b>Short Quick Change (SQC) Assembly</b> (one per string, CCL to top sub)<br>Quick Rebuild Kit ( <i>contacts, teflon tubing, screw, spring, insulating retainer</i> )<br>Complete Rebuild Kit with O-Rings ( <i>all required parts</i> )                        | GN-QC31-0001<br>RKQ-GN-QC31-0001<br>RKC-GN-QC31-0001                                   |
| <b>Top Subs, 3-1/8", Ported</b><br>Top Sub Assembly, Ported, SQC Connection ( <i>recommended</i> )<br>Top Sub Assembly, Ported ( <i>connects to industry-standard quick change</i> )  | GN-R31-CQC20-A<br>GN-R31-T080-A  |
| <b>Top Sub, 3-1/8", Conventional and TCP</b><br>Wireline Insert & O-Ring<br>Spring Contact Assembly   | GN-R31-0020<br>GN-E00-0011 (o-ring: OR-N569-211)<br>GN-E00-0020                        |
| <b>Tandem Sub, 3-1/8", Conventional and TCP</b>   | GN-R31-0021  |
| <b>Switch Tandem Subs, 3-1/8", Ported</b><br>Switch Sub Assembly, 12" long, 6.24" make-up length<br>Switch Sub Assembly, 3.25" make-up length   | GN-R31-T150-A<br>GN-R31-T101-A   |
| Aligning Switch Sub, LH Lock Ring, 6.24" make-up length (MUL)<br>Aligning Switch Sub, RH Lock Ring, 6.24" MUL<br>Aligning Short Switch Sub, RH*, <i>*compatible with centralizer rings</i>  | GN-R31-T150L-A<br>GN-R31-T150R-A<br>GN-R31-T109R-A                                     |
| <b>Locking Rings, 3-1/8" Tandem Subs</b><br>Left-Hand Thread, HD<br>Right-Hand Thread, HD   | GN-R31-L001-319<br>GN-R31-R001-319   |
| <b>O-Ring Materials and Size, Nitrile</b> ( <i>standard option</i> )  | OR-N569-230  |
| <b>Port Plug and Port Plug O-Ring</b>   | GN-R00-T001 / OR-N569-217  |
| <b>Plug/Shoot Adapter Assembly, 3-1/8"</b>  | GN-R31-ST30  |
| <b>Bull Plugs</b><br>3-1/8" Standard<br>3-1/8" with 2-3/8" EUE Pin<br>3-1/8" with 2-7/8" EUE Pin  | GN-R31-0022<br>GN-R31-0023<br>GN-R31-0024  |
| <b>Thread Protectors</b><br>Carrier (Gun) Protector, 3-1/8"<br>Carrier (Gun) Plastic Plug Protector, 3-1/8"<br>Top Sub (Top Pin) Protector, 3-1/8"<br>Tandem Sub & Bull Plug Thread Protector, 3-1/8"<br>Bottom Sub Thread Protector (lower connection), 3-1/8" | GN-THD-312-030<br>GN-THD-312-300<br>GN-THD-312-020<br>GN-THD-312-040<br>GN-THD-312-040 |



WIRELINE INSERT  
GN-E00-0011

SPRING CONTACT ASSEMBLY  
GN-E00-0011  
(4-1/2" OD TOP SUB SHOWN FOR  
REFERENCE ONLY)



SHORT QUICK CHANGE ASSEMBLY  
GN-QC31-0001



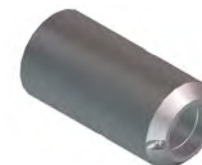
TOP SUB, SQC CONNECTION  
GN-R31-CQC20-A



SWITCH SUB ASSEMBLY  
GN-R31-T150-A



ALIGNING SWITCH SUB, LH LOCK RING  
GN-R31-T150L-A



PLUG/SHOOT ADAPTER  
GN-R31-ST30



BULL PLUG, STANDARD  
GN-R31-0022

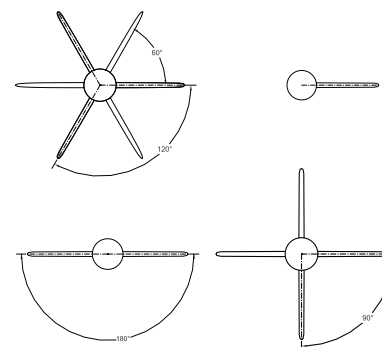
# Conventional Short Guns

## 3-3/8 in (86 mm), GLB Spiral

GEODynamics' perforating systems use bi-directional boosters, non-lead azide explosives, customized connectors and inserts, and high-velocity, low-shrink detonating cord. Additionally, all GEODynamics gun assemblies are scalloped to optimize charge performance and prevent casing damage from perforating exit hole burrs. Shot phasing is designed to maintain the integrity and collapse resistance of the casing after perforating. These attributes, along with premium quality gun material and gun connectors, allow GEODynamics to deliver safe, efficient, and reliable perforating gun solutions to our customers.

## APPLICATION SPECIFICATIONS

|                                  |   |
|----------------------------------|---|
| Shot Density and Phasing Options | Multiple <a href="#">Shot &amp; Phasing Options</a> , two (2) to 14 shots per carrier |
| Initiation Point                 | Bottom-fired, wireline, slickline, or tubing  |
| Mode of Fire                     | Mechanical or addressable, select fire  |
| Detonating Cord                  | 80-grain round  |
| Compatible Perforating Charges   | FracIQ®, Connex®, Razor®, Basix™  |
| Maximum Gun Swell (in)[mm]       | 3.56 [90.42] @ 25.00g In Fluid; 3.63 [92.20] @ 22.7g Dry                              |



## ENVIRONMENTAL

|                             |   |
|-----------------------------|---|
| Maximum Pressure (psi)[MPa] | 22,700 [156.51]                                       |
| Maximum Tensile* (lbf)[kN]  | 331,900 [1476.36] *Hardware Calculated Breaking Point |

## CARRIER SPECIFICATIONS

| Carrier Assembly Part Number | Shot & Phasing Options |               | Gun Lengths |       | Gun End to Center of First Scallop @ 0° |        | Distance Shot to Shot |       | Shipping Assembly Weight |       |
|------------------------------|------------------------|---------------|-------------|-------|---|--------|-----------------------|-------|--------------------------|-------|
|                              | # Shots                | Phasing       | (in)        | (cm)  | (in)                                    | (mm)   | (in)                  | (mm)  | (lbs)                    | (kgs) |
| GLB33-J002                   | 2                      | 180°          | 15          | 38.10 | 6.00                                    | 152.40 | 3.0                   | 76.20 | 21.0                     | 9.5   |
| GLB33-G003                   | 3                      | 120°          | 18          | 45.72 |   |        | 2.0                   | 50.80 | 25.0                     | 11.3  |
| GLB33-B004                   | 4                      | 90°           | 18          | 45.72 |   |        |                       |       | 25.0                     | 11.3  |
| GLB33-P005S                  | 5                      | 72°           | 20          | 50.80 |   |        |                       |       | 28.0                     | 12.6  |
| GLB33-A006                   | 6                      | 60°           | 22          | 55.88 |   |        |                       |       | 31.0                     | 14.0  |
| GLB33-A007T                  | 7                      | 60°           | 24          | 60.96 |   |        |                       |       | 34.0                     | 15.3  |
| GLB33-P007S                  |                        | 51.4°         | 24          | 60.96 |   |        |                       |       | 34.0                     | 15.3  |
| GLB33-R008                   | 8                      | 90° + 45°     | 26          | 66.04 |   |        |                       |       | 36.0                     | 16.2  |
| GLB33-A010                   | 10                     | 60°           | 30          | 76.20 |   |        |                       |       | 42.0                     | 18.9  |
| GLB33-R010                   |                        | 72°           | 30          | 76.20 |   |        |                       |       | 42.0                     | 18.9  |
| GLB33-R012                   | 12                     | 60° + 30°     | 34          | 86.36 |   |        |                       |       | 48.0                     | 21.6  |
| GLB33-R014                   | 14                     | 51.4° + 25.7° | 38          | 96.52 |   |        |                       |       | 53.0                     | 23.9  |

Refer to [Components and Accessories](#) for ancillary equipment.



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# Conventional Short Guns

## 3-3/8 in (86 mm), GLB Spiral

### CONSTANT ENTRY HOLE AND PENETRATION

| Carrier O.D.   | Shaped Charge | Part Number | Perforating Condition | Explosive  | Shot Density / Phasing | API 19B Targeted Pipe* | Performance in Stressed Berea (API RP19B Sec. 2) |                             |              |
|----------------|---------------|-------------|-----------------------|------------|------------------------|------------------------|--|-----------------------------|--------------|
|                |               |             |                       |            |                        |                        | EHD <sup>^</sup> (in)[cm]                        | EHD Variation Decentralized | TTP (in)[cm] |
| 3-3/8" 12g-13g | FracIQ 20     | EC2-33A1271 | Fluid                 | 12.0g, RDX | 6 spf / 60°            | 4.5"-5.5" OD P110      | 0.22 [0.56]                                      | 5.5%                        | 5.0 [12.70]  |
|                | FracIQ 25     | EC2-33A1371 |                       | 13.0g, RDX |                        | 6.0" OD P110           | 0.26 [0.66]                                      | 2.3 %                       |              |

### DEEP PENETRATING/EXTREME DEEP PENETRATING

| Carrier O.D. | Shaped Charge   | Part Number    | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |                | Performance in Stressed Berea |               |
|--------------|-----------------|----------------|-----------------------|------------|------------------------|--------------|-------------------------|----------------|-------------------------------|---------------|
|              |                 |                |                       |            |                        | Application  | EHD (in)[cm]            | TTP (in)[cm]   | EHD <sup>^</sup> (in)[cm]     | TTP (in)[cm]  |
| 3-3/8" 19g   | 3319 Connex RX  | EC2-33A1991-RX | In Fluid or Dry       | 19.0g, RDX | 6 spf / 60°            | 5-1/2"       |                         |                | 0.32 [0.81]                   | 11.30 [28.70] |
|              |                 | EC2-33A1992-RX |                       | 19.0g, HMX |                        |              |                         |                | 0.32 [0.81]                   | 11.60 [29.46] |
|              | 3319 Razor XDP  | EC2-33A1921    |                       | 19.0g, RDX |                        | 4-1/2"       | 0.51 [1.30]             | 42.07 [106.86] |                               |               |
|              |                 | EC2-33A1922    |                       | 19.0g, HMX |                        |              |                         |                | 0.43 [1.09]                   | 14.60 [37.08] |
| 3-3/8" 23g   | 3323 Connex SDP | EC2-33A2321-RC | In Fluid or Dry       | 22.7g, RDX | 6 spf / 60°            | 4-1/2" L-80  |                         |                | 0.40 [1.02]                   | 15.60 [39.62] |
|              |                 | EC2-33A2322-RC |                       | 22.7g, HMX |                        |              |                         |                | 0.46 [1.17]                   | 15.31 [38.89] |
|              |                 | EC2-33A2323-RC |                       | 22.7g, HNS |                        |              |                         |                | 0.36 [0.91]                   | 11.85 [30.10] |
|              | 3323 Razor XDP  | EC2-33A2321    |                       | 22.7g, RDX |                        |              |                         |                | 0.41 [1.04]                   | 16.40 [41.66] |
|              |                 | EC2-33A2322    |                       | 22.7g, HMX |                        |              | 0.45 [1.14]             | 46.32 [117.65] | 0.44 [1.12]                   | 15.68 [39.83] |
|              |                 | EC2-33A2323    |                       | 22.7g, HNS |                        |              |                         |                | 0.37 [0.94]                   | 12.12 [30.78] |
|              | 3323 Basix XDP  | EC2-33A2321-E  | In Fluid or Dry       | 22.7g, RDX |                        |              | 0.45 [1.14]             | 46.32 [117.65] | 0.39 [0.99]                   | 12.30 [31.24] |
|              |                 | EC2-33A2322-E  |                       | 22.7g, HMX |                        |              | 0.44 [1.12]             | 46.90 [119.13] |                               |               |
|              | 3323 Basix GH   | EC2-33A2321-EG | Fluid                 | 22.7g, RDX |                        |              |                         |                | 0.41 [1.04]                   | 11.90 [30.23] |
|              |                 | EC2-33A2322-EG |                       | 22.7g, HMX |                        |              |                         |                | 0.40 [1.02]                   | 11.90 [30.23] |
|              | 3323 Basix DP   | EC2-33A2351    | In Fluid or Dry       | 22.7g, RDX |                        |              | 0.47 [1.19]             | 32.10 [81.53]  |                               |               |
|              |                 | EC2-33A2352    |                       | 22.7g, HMX |                        |              |                         |                |                               |               |
| 3-3/8" 25g   | 3325 Connex SDP | EC2-33B2521-RC | Fluid                 | 25.0g, RDX | 6 spf / 60°            | 4-1/2" L-80  |                         |                | 0.40 [1.02]                   | 15.10 [38.35] |
|              |                 | EC2-33B2522-RC |                       | 25.0g, HMX |                        |              |                         |                | 0.48 [1.22]                   | 15.45 [39.24] |
|              |                 | EC2-33B2523-RC |                       | 25.0g, HNS |                        |              |                         |                | 0.35 [0.89]                   | 12.30 [31.24] |
|              | 3325 Razor XDP  | EC2-33B2521    |                       | 25.0g, RDX |                        |              | 0.45 [1.14]             | 44.58 [113.23] | 0.39 [0.99]                   | 17.10 [43.43] |
|              |                 | EC2-33B2522    |                       | 25.0g, HMX |                        |              | 0.53 [1.35]             | 47.30 [120.14] | 0.50 [1.27]                   | 16.27 [41.33] |
|              |                 | EC2-33B2523    |                       | 25.0g, HNS |                        |              | 0.37 [0.94]             | 30.20 [76.71]  | 0.36 [0.91]                   | 13.20 [33.53] |
|              | 3325 Basix XDP  | EC2-33B2521-E  |                       | 25.0g, RDX |                        |              | 0.45 [1.14]             | 50.08 [127.20] | 0.40 [1.02]                   | 12.30 [31.24] |
|              |                 | EC2-33B2522-E  |                       | 25.0g, HMX |                        |              | 0.47 [1.19]             | 47.42 [120.45] |                               |               |
|              |                 |                |                       |            |                        |              |                         |                |                               |               |
|              |                 |                |                       |            |                        |              |                         |                |                               |               |

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

<sup>^</sup>EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

FLUID: Qualified for shooting in FLUID only with perforating systems qualified by GEODynamics.

IN FLUID or DRY: Qualified for shooting in FLUID or DRY GAS with perforating systems qualified by GEODynamics.

Revised: August 31, 2023 9:46 PM

# Conventional Short Guns

## 3-3/8 in (86 mm), GLB Spiral

### BIG HOLE

| Carrier O.D. | Shaped Charge | Part Number | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |              | Performance in Stressed Berea |              |
|--------------|---------------|-------------|-----------------------|------------|------------------------|--------------|-------------------------|--------------|-------------------------------|--------------|
|              |               |             |                       |            |                        | Application  | EHD (in)[cm]            | TTP (in)[cm] | EHD^ (in)[cm]                 | TTP (in)[cm] |
| 3-3/8" 23g   | 3323 Basix BH | EC2-33A2331 | Fluid                 | 22.7g, RDX | 6 spf / 60°            | 5-1/2" L-80  | 0.70 [1.78]             | 5.79 [14.71] | 0.69 [1.75]                   | 4.05 [10.29] |
|              |               | EC2-33A2332 |                       | 22.7g, HMX |                        |              |                         |              |                               |              |

### GOOD HOLE

| Carrier O.D. | Shaped Charge   | Part Number    | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |               | Performance in Stressed Berea |               |  |  |  |
|--------------|-----------------|----------------|-----------------------|------------|------------------------|--------------|-------------------------|---------------|-------------------------------|---------------|--|--|--|
|              |                 |                |                       |            |                        | Application  | EHD (in)[cm]            | TTP (in)[cm]  | EHD^ (in)[cm]                 | TTP (in)[cm]  |  |  |  |
| 3-3/8" 19g   | 3319 Connex XEH | EC2-33A1941-RC | In Fluid or Dry       | 19.0g, RDX | 6 spf / 60°            | 4-1/2" L-80  |                         |               | 0.41 [1.04]                   | 14.20 [36.07] |  |  |  |
|              |                 | EC2-33A1942-RC |                       | 19.0g, HMX |                        |              |                         |               | 0.42 [1.07]                   | 14.37 [36.50] |  |  |  |
| 3-3/8" 23g   | 3323 Connex XEH | EC2-33A2341-RC | In Fluid or Dry       | 22.7g, RDX |                        |              |                         |               | 0.43 [1.09]                   | 15.60 [39.62] |  |  |  |
|              |                 | EC2-33A2342-RC |                       | 22.7g, HMX |                        |              |                         |               | 0.43 [1.09]                   | 15.89 [40.36] |  |  |  |
|              | 3323 Basix GH   | EC2-33A2341    |                       | 22.7g, RDX |                        |              | 0.52 [1.32]             | 33.58 [85.29] |                               |               |  |  |  |
|              |                 | EC2-33A2342    |                       | 22.7g, HMX |                        |              |                         |               |                               |               |  |  |  |
| 3-3/8" 25g   | 3325 Connex XEH | EC2-33B2541-RC | Fluid                 | 25.0g, RDX |                        |              |                         |               |                               |               |  |  |  |
|              |                 | EC2-33B2542-RC |                       | 25.0g, HMX |                        |              |                         |               | 0.40 [1.02]                   | 14.92 [37.90] |  |  |  |
|              | 3325 Basix GH   | EC2-33B2541    |                       | 25.0g, RDX |                        |              | 0.57 [1.45]             | 25.91 [65.81] | 0.50 [1.27]                   | 16.50 [41.91] |  |  |  |
|              |                 |                |                       |            |                        |              |                         |               |                               |               |  |  |  |

### HARDWARE

|                                      |  |
|--------------------------------------|--|
| Gun Body Configuration/Material      | Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel |
| Charge Tube Type & Retention         | Round steel tube strip; bend tab retention                                 |
| Type of Tandem Connection            | Switch tandem sub  |
| Nominal OD / Wall Thickness (in)[mm] | 3.375 [85.73] / 0.3775 [9.59]  |
| Upper/Lower Thread Connections       | 2.8125" 6P ACME-2G   |

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

FLUID: Qualified for shooting in FLUID only with perforating systems qualified by GEODynamics.

IN FLUID or DRY: Qualified for shooting in FLUID or DRY GAS with perforating systems qualified by GEODynamics.

Revised: August 31, 2023 9:46 PM



# Conventional Short Guns

## 3-3/8 in (86 mm), GLB Spiral

### COMPONENTS AND ACCESSORIES

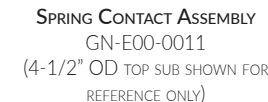
| Description  | Part Number(s)   |  |
|--|--|--|
| <b>Short Quick Change (SQC) Assembly</b> (one per string, CCL to top sub)<br>Quick Rebuild Kit ( <i>contacts, teflon tubing, screw, spring, insulating retainer</i> )<br>Complete Rebuild Kit with O-Rings ( <i>all required parts</i> ) | GN-QC31-0001<br>RKQ-GN-QC31-0001<br>RKC-GN-QC31-0001   |  |
| <b>TCP Transfer Kit</b> (2-3/4" through 4")  | GN-000-0025  |  |
| <b>Top Sub, 3-3/8", Conventional and TCP</b><br>Wireline Insert & O-Ring<br>Spring Contact Assembly<br>Top Sub, Wireline<br>Top Sub, Ported, SQC Connection  | GN-R33-0020<br>GN-E00-0011 (o-ring: OR-N569-211)<br>GN-E00-0020<br>GN-R33-0035<br>GN-R33-CQC20-A |  |
| <b>Top Sub Lift Sub Assembly, 3-3/8"</b>   | TC-LT33-000  |  |
| <b>Tandem Sub, 3-3/8", Conventional and TCP</b>  | GN-R33-0021  |  |
| Ported Switch Tandem Sub Assembly, 12" long, 6.24" make-up length<br>Ported Switch Tandem Sub Assembly, 3.25" make-up length   | GN-R33-T150-A<br>GN-R33-T100-A   |  |
| Aligning Switch Sub, LH Lock Ring, 6.24" make-up length (MUL)<br>Aligning Switch Sub, RH Lock Ring, 6.24" MUL<br>Aligning Short Switch Sub, RH*, *compatible with centralizer rings  | GN-R33-T150L-A<br>GN-R33-T150R-A<br>GN-R33-T109R-A   |  |
| Locking Ring, Left-Hand Thread<br>Locking Ring, Right-Hand Thread  | GN-R33-L001<br>GN-R33-R001   |  |
| <b>O-Ring Materials and Size</b><br>Nitrile (standard option)<br>Viton (with back-up rings required for > 325°F)<br>Back-up rings for > 325°F  | Top Connection<br>OR-N569-230<br>OR-V95G-230<br>OR-B230-2813                                     | Gun Connection<br>OR-N569-231<br>OR-V95G-231<br>OR-B231-2870 |
| <b>Port Plug and Port Plug O-Ring</b>  | GN-R00-T001 / OR-N569-217  |  |
| 3-3/8" Bull Plug, Standard<br>3-3/8" Bull Plug, with 2-3/8" EUE Pin<br>3-3/8" Bull Plug, with 2-7/8" EUE Pin   | GN-R33-0022<br>GN-R33-0023<br>GN-R33-0024  |  |
| <b>Plug/Shoot Adapter Assembly, 3-3/8"</b>   | GN-R33-ST30  |  |
| <b>Thread Protectors, 3-3/8"</b><br>Top Sub (Top Pin)<br>Carrier (Gun) Plastic Plug Protector<br>Carrier (Gun) Protector<br>Tandem Sub & Bull Plug Protector   | GN-THD-312-020<br>GN-THD-338-100<br>GN-THD-338-030<br>GN-THD-338-040                             |  |



WIRELINE INSERT  
GN-E00-0011



SHORT QUICK CHANGE ASSEMBLY  
GN-QC31-0001



SPRING CONTACT ASSEMBLY  
GN-E00-0011  
(4-1/2" OD TOP SUB SHOWN FOR REFERENCE ONLY)



TOP SUB, SQC CONNECTION  
GN-R33-CQC20-A



TOP SUB  
GN-R33-0020



TANDEM SUB  
GN-R33-0021



TOP SUB, WIRELINE  
GN-R33-0035



SWITCH TANDEM SUB ASSY  
GN-R33-T100-A



SWITCH TANDEM SUB  
GN-R33-T150



ALIGNING SWITCH SUB,  
LH LOCK RING  
GN-R33-T150L-A



BULL PLUG, STANDARD  
GN-R33-0022



PLUG/SHOOT ADAPTER  
GN-R33-ST30

# Conventional Long Guns

## 1-9/16 in (40 mm), RTG, 4 and 6 SPF, DP

GEODynamics' perforating systems use bi-directional boosters, non-lead azide explosives, customized connectors and inserts, and high-velocity, low-shrink detonating cord. Additionally, all GEODynamics gun assemblies are scalloped to optimize charge performance and prevent casing damage from perforating exit hole burrs. Shot phasing is designed to maintain the integrity and collapse resistance of the casing after perforating. These attributes, along with premium quality gun material and gun connectors, allow GEODynamics to deliver safe, efficient, and reliable perforating gun solutions to our customers.

## APPLICATION SPECIFICATIONS

### Shot Density and Phasing Options

Multiple [Shot Density & Phasing](#) options; [Available Gun Lengths](#) range from 2' to 21'

### Initiation Point

Top- or bottom-fired options available; conventional wireline and TCP

### Mode of Fire

Simultaneous or selective fire

### Detonating Cord

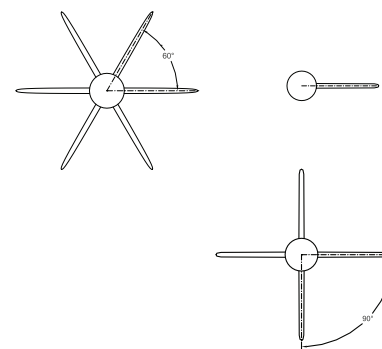
40-grain ribbon

### Compatible Perforating Charges

Razor® and Circulating Charges

### Maximum Gun Swell (in)[mm]

1.69" [43] @ 3.2g (In Fluid); 1.69" [43] @ 2.9g (Dry)



## ENVIRONMENTAL

### Maximum Pressure (psi)[MPa]

20,000 [138]

### Maximum Tensile\* (lbf)[kN]

88,100 [392] \*Hardware Calculated Breaking Point

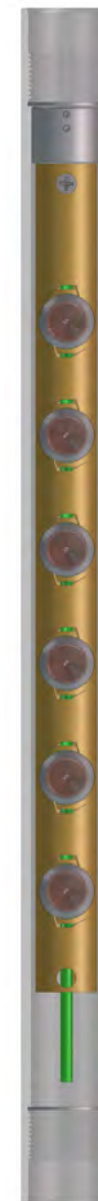
## CARRIER SPECIFICATIONS

| Carrier Assembly Part Number | Shot Density & Phasing Options |         | Gun End to Center of First Scallop |        | Distance Shot to Shot |       | Approximate Weights |                    |
|------------------------------|--------------------------------|---------|------------------------------------|--------|-----------------------|-------|---------------------|--------------------|
|                              | (spf) [spm]                    | Phasing | (in)                               | (mm)   | (in)                  | (mm)  | Fully Loaded        | Blank Gun          |
| GA1604-7915A-O***            | 4 spf [13 spm]                 | 0°      | 6.00                               | 152.40 | 3.00                  | 76.20 |                     |                    |
| GA1604-7915A-A***            |                                | 60°     |                                    |        |                       |       |                     |                    |
| GA1604-7915A-B***            |                                | 90°     |                                    |        |                       |       |                     |                    |
| GA1606-7915A-O***            | 6 spf [20 spm]                 | 0°      | 5.50                               | 139.70 | 2.00                  | 50.80 | 4.25 lb/ft (w/sub)  | 3.62 lb/ft (w/sub) |
| GA1606-7915A-A***            |                                | 60°     |                                    |        |                       |       |                     |                    |

\*\*\* Total number of shots (e.g., 15' 6 SPF, 60° gun is GA1606-7915A-A084. See [Available Gun Lengths](#).

| Available Gun Lengths                    | 21'          | 15'          | 11'          | 7'          | 4'          | 3'          | 2'          |
|--|--------------|--------------|--------------|-------------|-------------|-------------|-------------|
| Typical Gun Length (ft) [m]              | 20.75 [6.32] | 14.75 [4.50] | 10.75 [3.28] | 6.75 [2.06] | 3.75 [1.14] | 2.75 [0.84] | 1.75 [0.53] |
| *** 4 SPF Total Number of Loadable Shots | 080          | 056          | 040          | 024         | 012         | 008         | 004         |
| *** 6 SPF Total Number of Loadable Shots | 120          | 084          | 060          | 036         | 018         | 012         | 006         |

Contact your local GEODynamics representative for availability of metric part numbers and additional gun lengths.



# Conventional Long Guns

## 1-9/16 in (40 mm), RTG, 4 and 6 SPF, DP

### DEEP PENETRATING/EXTREME DEEP PENETRATING

| Carrier O.D. | Shaped Charge     | Part Number    | Perforating Condition | Explosive | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |               | Performance in Stressed Berea |              |
|--------------|-------------------|----------------|-----------------------|-----------|------------------------|--------------|-------------------------|---------------|-------------------------------|--------------|
|              |                   |                |                       |           |                        | Application  | EHD (in)[cm]            | TTP (in)[cm]  | EHD^ (in)[cm]                 | TTP (in)[cm] |
| 1-9/16" 3.2g | 1503 Connex SDP   | EC1-15A0321-RC | Fluid                 | 3.2g, RDX | 6 spf / 60°            | 2-7/8" L-80  |                         |               | 0.17 [0.43]                   | 4.90 [12.45] |
|              |                   | EC1-15A0322-RC |                       | 3.2g, HMX |                        |              |                         |               | 0.17 [0.43]                   | 6.80 [17.27] |
|              | 1503 Razor XDP    | EC1-15A0321    | Fluid                 | 3.2g, RDX | 6 spf / 60°            |              | 0.17 [0.43]             | 12.13 [30.81] | 0.13 [0.33]                   | 5.30 [13.46] |
|              |                   | EC1-15A0322    | In Fluid or Dry       | 3.2g, HMX | 4 spf / 0°             |              | 0.19 [0.48]             | 13.09 [33.25] |                               |              |
|              |                   |                | Fluid                 | 3.2g, HNS | 6 spf / 60°            |              | 0.19 [0.48]             | 13.09 [33.25] | 0.13 [0.33]                   | 5.23 [13.28] |
|              |                   | EC1-15A0323    |                       |           |                        |              |                         |               |                               | 0.11 [0.28]  |
| 1-9/16" 2.9g | 1503 Razor XDP LS | EC1-15A0321-L  | Dry                   | 2.9g, RDX | 6 spf / 0°             |              |                         |               |                               |              |
|              |                   | EC1-15A0322-L  |                       | 2.9g, HMX |                        |              | 0.19 [0.48]             | 12.80 [32.51] | 0.18 [0.46]                   | 6.50 [16.51] |

### CIRCULATING CHARGES (TUBING PUNCHERS)

| Circulating Charges (Tubing Punchers) |             | Explosive (g), load | Tubing/Drill Pipe Wall Thickness (in)[cm] | Entrance Hole (in)[cm] | Penetration (in)[cm] |
|---------------------------------------|-------------|---------------------|---|------------------------|----------------------|
| Carrier O.D.                          | Part Number |                     |   |                        |                      |
| 1-9/16"                               | TG39CS2     | 2.7g, HMX           | 0.190 [0.4826]                            | 0.45 [1.1430]          | <=0.100 [0.254]      |
|                                       |             |                     | 0.375 [0.9525]                            | 0.31 [0.7874]          |                      |
|                                       | TG39CM2     | 3.4g, HMX           | 0.375 [0.9525]                            | 0.43 [1.0922]          | <=0.100 [0.254]      |
|                                       |             |                     | 0.500 [1.2700]                            | 0.24 [0.6096]          |                      |
|                                       | TG39CL2     | 3.4g, HMX           | 0.500 [1.2700]                            | 0.21 [0.5334]          | <=0.100 [0.254]      |
|                                       |             |                     | 0.580 [1.4732]                            | 0.18 [0.4572]          |                      |
|                                       | TG39CM2-78  | 3.4g, HMX           | 0.625 [1.5875]                            | 0.28 [0.7112]          | <=0.100 [0.254]      |
|                                       |             |                     | 0.785 [1.9939]                            | 0.17 [0.4318]          |                      |
|                                       | TG39CL2-88  | 3.4g, HMX           | 0.750 [1.9050]                            | 0.20 [0.5080]          | <=0.100 [0.254]      |
|                                       |             |                     | 0.885 [2.2479]                            | 0.17 [0.4318]          |                      |

Contact GEODynamics Engineering for recommendations and phasing options.

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

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Revised: August 31, 2023 9:10 PM

# Conventional Long Guns

## 1-9/16 in (40 mm), RTG, 4 and 6 SPF, DP

### HARDWARE

|                                      |  |
|--------------------------------------|--|
| Gun Body Configuration/Material      | Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel |
| Charge Tube Type & Retention         | Round steel tube strip; bend tab retention                                 |
| Type of Tandem Connection            | Booster to booster (no splice)   |
| Nominal OD / Wall Thickness (in)[mm] | 1.56 [39.7] / 0.172 [4.37]   |
| Upper/Lower Thread Connections       | 1-9/32" - 12 Stub ACME   |

### COMPONENTS AND ACCESSORIES

| Description  | Part Number(s)                                     |
|--|--|
| Top Sub Lift Sub Assembly, 1-9/16" and 2"  | TC-QC15-000  |
| Top Subs, 1-9/16"<br>Top Sub, TCP<br>Top Sub, Wireline   | GN-R16-0020<br>GN-R16-0035                         |
| Tandem Sub, 1-9/16"  | GN-R16-0021  |
| O-Ring Materials and Size, Nitrile (standard option)<br>Viton (with back-up rings required for > 325°F)<br>Back-up rings for > 325°F | OR-N569-215<br>OR-V95G-215<br>OR-B215-1308         |
| TCP Transfer Kit (1-9/16" through 2-1/2")  | GN-020-0100  |
| Thread Protectors<br>Top Sub (Top Pin)<br>Carrier (Gun) Protector<br>Tandem Sub & Bull Plug Protector                                | GN-THD-156-020<br>GN-THD-156-000<br>GN-THD-156-020 |
| Bull Plug, 1-9/16"   | GN-R16-0022  |

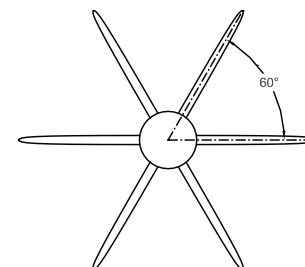
# Conventional Long Guns

## 1-3/4 in (44 mm), RTG, 6 SPF, DP

GEODynamics' perforating systems use bi-directional boosters, non-lead azide explosives, customized connectors and inserts, and high-velocity, low-shrink detonating cord. Additionally, all GEODynamics gun assemblies are scalloped to optimize charge performance and prevent casing damage from perforating exit hole burrs. Shot phasing is designed to maintain the integrity and collapse resistance of the casing after perforating. These attributes, along with premium quality gun material and gun connectors, allow GEODynamics to deliver safe, efficient, and reliable perforating gun solutions to our customers.

## APPLICATION SPECIFICATIONS

|                                  |   |
|----------------------------------|---|
| Shot Density and Phasing Options | Multiple <a href="#">Shot Density &amp; Phasing</a> options; <a href="#">Available Gun Lengths</a> range from 4' to 21' |
| Initiation Point                 | Top- or bottom-fired options available; conventional wireline and TCP   |
| Mode of Fire                     | Simultaneous or selective fire  |
| Detonating Cord                  | 40-grain ribbon   |
| Compatible Perforating Charges   | Connex®, Razor®, Basix™   |
| Maximum Gun Swell (in)[mm]       | 1.91 [48.51] @ 5.1g (In Fluid)  |



## ENVIRONMENTAL

|                             |  |
|-----------------------------|--|
| Maximum Pressure (psi)[MPa] | 20,000 [138]                                     |
| Maximum Tensile* (lbf)[kN]  | 88,100 [392] *Hardware Calculated Breaking Point |

## CARRIER SPECIFICATIONS

| Carrier Assembly<br>Part Number | Shot Density & Phasing Options |         | Gun End to Center of<br>First Scallop |        | Distance<br>Shot to Shot |       | Approximate Weights     |                         |
|---------------------------------|--------------------------------|---------|---------------------------------------|--------|--------------------------|-------|-------------------------|-------------------------|
|                                 | (spf) [spm]                    | Phasing | (in)                                  | (mm)   | (in)                     | (mm)  | Fully<br>Loaded         | Blank Gun               |
| GA17506-7517A-O***              | 6 spf [20 spm]                 | 0°      | 5.50                                  | 139.70 | 2.00                     | 50.80 | 4.6 lb/ft<br>(with sub) | 3.6 lb/ft<br>(with sub) |
| GA17506-7517A-A***              |                                | 60°     |                                       |        |                          |       |                         |                         |

\*\*\* Total number of shots (e.g., 15' 6 SPF, 60° gun is GA17506-7517A-A084. See [Available Gun Lengths](#).

| Available Gun Lengths                    | 21'          | 19'          | 15'          | 11'          | 7'          | 4'          |
|--|--------------|--------------|--------------|--------------|-------------|-------------|
| Typical Gun Length (ft) [m]              | 20.75 [6.32] | 18.75 [5.72] | 14.75 [4.50] | 10.75 [3.28] | 6.75 [2.06] | 3.75 [1.14] |
| *** 6 SPF Total Number of Loadable Shots | 120          | 108          | 084          | 060          | 036         | 018         |

Contact your local GEODynamics representative for metric part numbers and availability.



# Conventional Long Guns

## 1-3/4 in (44 mm), RTG, 6 SPF, DP

### DEEP PENETRATING/EXTREME DEEP PENETRATING

| Carrier O.D.   | Shaped Charge   | Part Number    | Perforating Condition | Explosive | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |               | Performance in Stressed Berea |              |  |
|----------------|-----------------|----------------|-----------------------|-----------|------------------------|--------------|-------------------------|---------------|-------------------------------|--------------|--|
|                |                 |                |                       |           |                        | Application  | EHD (in)[cm]            | TTP (in)[cm]  | EHD^ (in)[cm]                 | TTP (in)[cm] |  |
| 1-3/4"<br>5.1g | 1705 Connex SDP | EC1-17A0521-RC | Fluid                 | 5.1g, RDX | 6 spf / 60°            | 4-1/2" L-80  |                         |               | 0.21 [0.53]                   | 7.40 [18.80] |  |
|                |                 | EC1-17A0522-RC |                       | 5.1g, HMX |                        |              |                         |               | 0.21 [0.53]                   | 8.70 [22.10] |  |
|                | 1705 Razor XDP  | EC1-17A0521    |                       | 5.1g, RDX | 6 spf / 0°             |              |                         |               |                               |              |  |
|                |                 | EC1-17A0522    |                       | 5.1g, HMX |                        |              | 0.26 [0.66]             | 21.63 [54.94] | 0.20 [0.51]                   | 7.70 [19.56] |  |
|                |                 | EC1-17A0523    |                       | 5.1g, HNS |                        |              |                         |               | 0.19 [0.48]                   | 6.20 [15.75] |  |
|                | 1705E Basix XDP | EC1-17A0521-E  |                       | 5.1g, RDX | 6 spf / 60°            |              |                         |               |                               |              |  |
|                |                 | EC1-17A0522-E  |                       | 5.1g, HMX |                        |              |                         |               |                               |              |  |
|                |                 |                |                       |           |                        |              |                         |               |                               |              |  |

Performance in concrete represents API RP43 or API RP19B Section 1 testing results with the shot density/phasing, casing OD, and casing grade specified.

^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

### HARDWARE

|                                      |  |
|--------------------------------------|--|
| Gun Body Configuration/Material      | Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel |
| Charge Tube Type & Retention         | Round steel tube strip; bend tab retention                                 |
| Type of Tandem Connection            | Booster to booster (no splice)   |
| Nominal OD / Wall Thickness (in)[mm] | 1.765 [44.83] / 0.1875 [4.76]  |
| Upper/Lower Thread Connections       | 1-7/16" - 12P Stub ACME  |

### COMPONENTS AND ACCESSORIES

| Description                                     | Part Number(s) |                |
|---|----------------|----------------|
| Top Sub Lift Sub Assembly, 1-9/16" and 2"       | TC-QC15-000    |                |
| Top Sub, TCP, 1-3/4"                            | GN-R175-0020   |                |
| Top Sub, Wireline, 1-3/4"                       | GN-R175-0035   |                |
| Tandem Sub, 1-3/4"                              | GN-R175-0021   |                |
| O-Ring Materials and Size                       | Top Connection | Gun Connection |
| Nitrile (standard option)                       | OR-N569-215    | OR-N569-218    |
| Viton (with back-up rings required for > 325°F) | OR-V95G-215    | OR-V95G-218    |
| Back-up rings for > 325°F                       | OR-B215-1308   | OR-B217-1468   |
| TCP Transfer Kit (1-9/16" through 2-1/2")       | GN-020-0100    |                |
| Thread Protectors                               |                |                |
| Top Sub (Top Pin)                               | GN-THD-156-020 |                |
| Carrier (Gun) Protector                         | GN-THD-175-000 |                |
| Tandem Sub & Bull Plug Protector                | GN-THD-175-020 |                |
| Bull Plug, 1-3/4"                               | GN-R175-0022   |                |



# Conventional Long Guns

## 2 in (51 mm), RTG, 4-6 SPF, GH and DP

GEODynamics' perforating systems use bi-directional boosters, non-lead azide explosives, customized connectors and inserts, and high-velocity, low-shrink detonating cord. Additionally, all GEODynamics gun assemblies are scalloped to optimize charge performance and prevent casing damage from perforating exit hole burrs. Shot phasing is designed to maintain the integrity and collapse resistance of the casing after perforating. These attributes, along with premium quality gun material and gun connectors, allow GEODynamics to deliver safe, efficient, and reliable perforating gun solutions to our customers.

## APPLICATION SPECIFICATIONS

### Shot Density and Phasing Options

Multiple [Shot Density & Phasing](#) options; [Available Gun Lengths](#) range from 2' to 21'

### Initiation Point

Top- or bottom-fired options available; conventional wireline and TCP

### Mode of Fire

Simultaneous or selective fire

### Detonating Cord

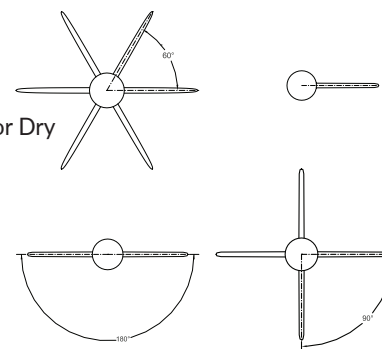
40-grain ribbon

### Compatible Perforating Charges

Connex®, Razor®, Basix™

### Maximum Gun Swell (in)[mm]

2.29" [58.16] @ 6.5g, (Connex XLS (extra low swell)) In Fluid or Dry



## ENVIRONMENTAL

### Maximum Pressure (psi)[MPa]

20,000 [138]

### Maximum Tensile\* (lbf)[kN]

153,100 [681] \*Hardware Calculated Breaking Point

## CARRIER SPECIFICATIONS

| Carrier Assembly<br>Part Number | Shot Density & Phasing Options |         | Gun End to Center of<br>First Scallop |        | Distance<br>Shot to Shot |       | Approximate Weights     |                         |
|---------------------------------|--------------------------------|---------|---------------------------------------|--------|--------------------------|-------|-------------------------|-------------------------|
|                                 | (spf) [spm]                    | Phasing | (in)                                  | (mm)   | (in)                     | (mm)  | Fully<br>Loaded         | Blank Gun               |
| GA2004-7320A-O***               | 4 spf [13 spm]                 | 0°      | 6.00                                  | 152.40 | 3.00                     | 76.20 |                         |                         |
| GA2004-7320A-A***               |                                | 60°     |                                       |        |                          |       |                         |                         |
| GA2004-7320A-B***               |                                | 90°     |                                       |        |                          |       |                         |                         |
| GA2004-7320A-J***               |                                | 180°    |                                       |        |                          |       |                         |                         |
| GA2005-7320A-A***               | 5 spf [16 spm]                 | 60°     | 5.70                                  | 144.78 | 2.40                     | 60.96 |                         |                         |
| GA2006-7320A-O***               | 6 spf [20 spm]                 | 0°      | 5.50                                  | 139.70 | 2.00                     | 50.80 | 6.1 lb/ft<br>(with sub) | 4.9 lb/ft<br>(with sub) |
| GA2006-7320A-A***               |                                | 60°     |                                       |        |                          |       |                         |                         |

\*\*\* Total number of shots (e.g., 15' 6 SPF, 60° gun is GA2006-7320A-A084. Refer to [Available Gun Lengths](#).



# Conventional Long Guns

## 2 in (51 mm), RTG, 4-6 SPF, GH and DP

### GOOD HOLE

| Carrier O.D. | Shaped Charge | Part Number | Perforating Condition | Explosive | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |               | Performance in Stressed Berea |              |
|--------------|---------------|-------------|-----------------------|-----------|------------------------|--------------|-------------------------|---------------|-------------------------------|--------------|
|              |               |             |                       |           |                        | Application  | EHD (in)[cm]            | TTP (in)[cm]  | EHD^ (in)[cm]                 | TTP (in)[cm] |
| 2" 6.8g      | 2007 Basix GH | EC1-20A0742 | In Fluid or Dry       | 6.8g, HMX | 4 spf / 0°             | 3-1/2" L-80  | 0.36 [0.91]             | 20.52 [52.12] |                               |              |

### DEEP PENETRATING/EXTREME DEEP PENETRATING

| Carrier O.D. | Shaped Charge       | Part Number    | Perforating Condition | Explosive | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |               | Performance in Stressed Berea |               |
|--------------|---------------------|----------------|-----------------------|-----------|------------------------|--------------|-------------------------|---------------|-------------------------------|---------------|
|              |                     |                |                       |           |                        | Application  | EHD (in)[cm]            | TTP (in)[cm]  | EHD^ (in)[cm]                 | TTP (in)[cm]  |
| 2" 6.8g      | 2007 Connex SDP     | EC2-20A0721-RC | Fluid                 | 6.8g, RDX | 6 spf / 60°            | 2-7/8"       |                         |               | 0.22 [0.56]                   | 8.94 [22.71]  |
|              |                     | EC2-20A0722-RC |                       | 6.8g, HMX |                        |              |                         |               | 0.22 [0.56]                   | 9.37 [23.80]  |
|              |                     | EC2-20A0723-RC |                       | 6.8g, HNS |                        |              |                         |               | 0.20 [0.51]                   | 7.30 [18.54]  |
|              | 2007 Razor XDP      | EC1-20A0721    | Fluid                 | 6.8g, RDX | 6 spf / 60°            | 3-1/2" L-80  | 0.25 [0.64]             | 21.83 [55.45] | 0.22 [0.56]                   | 9.55 [24.26]  |
|              |                     | EC1-20A0722    |                       | 6.8g, HMX |                        | 2-7/8" L-80  | 0.25 [0.64]             | 22.30 [56.64] |                               |               |
|              |                     | EC1-20A0722    |                       | 6.8g, HMX |                        | 3-1/2" L-80  | 0.24 [0.61]             | 24.40 [61.98] |                               |               |
|              | 2007E Basix XDP     | EC1-20A0721-E  | Fluid                 | 6.8g, RDX | 6 spf / 60°            | 3-1/2" L-80  | 0.25 [0.64]             | 16.42 [41.71] |                               |               |
|              |                     | EC1-20A0722-E  |                       | 6.8g, HMX |                        |              | 0.25 [0.64]             | 20.70 [52.58] | 0.24 [0.61]                   | 8.40 [21.34]  |
|              |                     |                |                       |           |                        |              |                         |               |                               |               |
| 2" 6.5g      | 2007 Connex SDP XLS | EC2-20B0721-RC | In Fluid or Dry       | 6.5g, RDX | 6 spf / 60°            | 2-7/8" L-80  |                         |               | 0.23 [0.58]                   | 8.70 [22.10]  |
|              |                     | EC2-20B0722-RC |                       | 6.5g, HMX |                        |              |                         |               | 0.21 [0.53]                   | 9.80 [24.89]  |
|              | 2007 Razor XLS XDP  | EC1-20B0721    |                       | 6.5g, RDX |                        |              |                         |               |                               |               |
|              |                     | EC1-20B0722    |                       | 6.5g, HMX |                        |              |                         |               |                               |               |
|              |                     |                |                       |           |                        |              | 0.25 [0.64]             | 22.30 [56.64] | 0.19 [0.48]                   | 10.80 [27.43] |

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

FLUID: Qualified for shooting in FLUID only with perforating systems qualified by GEODynamics.

IN FLUID or DRY: Qualified for shooting in FLUID or DRY GAS with perforating systems qualified by GEODynamics.

Revised: August 31, 2023 9:15 PM

# Conventional Long Guns

## 2 in (51 mm), RTG, 4-6 SPF, GH and DP

### HARDWARE

|                                      |  |
|--------------------------------------|--|
| Gun Body Configuration/Material      | Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel |
| Charge Tube Type & Retention         | Round steel tube strip; bend tab retention                                 |
| Type of Tandem Connection            | Booster to booster (no splice)   |
| Nominal OD / Wall Thickness (in)[mm] | 2.03" [52] / 0.210 [5.33]  |
| Upper/Lower Thread Connections       | 1-11/16" - 8P Stub ACME  |

### COMPONENTS AND ACCESSORIES

| Description                                     | Part Number(s) |                |
|---|----------------|----------------|
| Top Sub Lift Sub Assembly, 1-9/16" and 2"       | TC-QC15-000    |                |
| Top Subs, 2"                                    |                |                |
| Top Sub, TCP                                    | GN-R20-0020    |                |
| Top Sub, Wireline                               | GN-R20-0035    |                |
| Tandem Subs, 2"                                 |                |                |
| Tandem Sub, TCP                                 | GN-R20-0021    |                |
| Switch Tandem Sub, Wireline                     | GN-R20-T100-A  |                |
| O-Ring Materials and Size                       | Top Connection | Gun Connection |
| Nitrile (standard option)                       | OR-N569-215    | OR-N569-221    |
| Viton (with back-up rings required for > 325°F) | OR-V95G-215    | OR-V95G-221    |
| Back-up rings for > 325°F                       | OR-B215-1308   | OR-B221-1715   |
| TCP Transfer Kit (1-9/16" through 2-1/2")       | GN-020-0100    |                |
| Thread Protectors                               |                |                |
| Top Sub (Top Pin)                               | GN-THD-156-020 |                |
| Carrier (Gun) Protector                         | GN-THD-200-000 |                |
| Tandem Sub & Bull Plug Protector                | GN-THD-200-020 |                |
| Bull Plug, 2"                                   | GN-R20-0022    |                |
| Charge Clips                                    |                |                |
| Det Cord Clip                                   | MS-1000-004    |                |
| Low Profile Clip                                | MS-1000-115    |                |



GN-R20-0020



GN-R20-0035



GN-R20-0021



GN-R20-T100-A



GN-R20-0022

| Available Gun Lengths                    | 21'          | 15'          | 11'          | 7'          | 4'          | 3'          | 2'          |
|--|--------------|--------------|--------------|-------------|-------------|-------------|-------------|
| Typical Gun Length (ft) [m]              | 20.75 [6.32] | 14.75 [4.50] | 10.75 [3.28] | 6.75 [2.06] | 3.75 [1.14] | 2.75 [0.84] | 1.75 [0.53] |
| *** 4 SPF Total Number of Loadable Shots | 080          | 056          | 040          | 024         | 012         | 008         | 004         |
| *** 5 SPF Total Number of Loadable Shots | 100          | 070          | 050          | 030         | 015         | 010         | 005         |
| *** 6 SPF Total Number of Loadable Shots | 120          | 084          | 060          | 036         | 018         | 012         | 006         |

Contact your local GEODynamics representative for availability of metric part numbers and additional gun lengths.

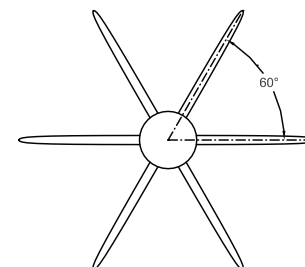
# Conventional Long Guns

## 2-3/8 in (60 mm), RTG, 5 and 6 SPF, XDP

GEODynamics' perforating systems use bi-directional boosters, non-lead azide explosives, customized connectors and inserts, and high-velocity, low-shrink detonating cord. Additionally, all GEODynamics gun assemblies are scalloped to optimize charge performance and prevent casing damage from perforating exit hole burrs. Shot phasing is designed to maintain the integrity and collapse resistance of the casing after perforating. These attributes, along with premium quality gun material and gun connectors, allow GEODynamics to deliver safe, efficient, and reliable perforating gun solutions to our customers.

## APPLICATION SPECIFICATIONS

|                                  |   |
|----------------------------------|---|
| Shot Density and Phasing Options | Multiple <a href="#">Shot Density &amp; Phasing</a> options; <a href="#">Available Gun Lengths</a> range from 2' to 21' |
| Initiation Point                 | Top- or bottom-fired options available; conventional wireline and TCP   |
| Mode of Fire                     | Simultaneous or selective fire  |
| Detonating Cord                  | 60-grain cord; DET-60H212   |
| Compatible Perforating Charges   | Connex®, Razor®, Basix™, Refrax™  |
| Maximum Gun Swell (in)[mm]       | 2.56" [6.50] @ 11.0g (In Fluid); 2.62" [66.55] @ 10.5g (Dry)  |



## ENVIRONMENTAL

|                             |   |
|-----------------------------|---|
| Maximum Pressure (psi)[MPa] | 20,000 [138]                                      |
| Maximum Tensile* (lbf)[kN]  | 153,100 [681] *Hardware Calculated Breaking Point |

## CARRIER SPECIFICATIONS

| Carrier Assembly<br>Part Number | Shot Density & Phasing Options |         | Gun End to Center of<br>First Scalloped |        | Distance<br>Shot to Shot |       | Approximate Weights     |                         |
|---------------------------------|--------------------------------|---------|---|--------|--------------------------|-------|-------------------------|-------------------------|
|                                 | (spf) [spm]                    | Phasing | (in)                                    | (mm)   | (in)                     | (mm)  | Fully<br>Loaded         | Blank Gun               |
| GA2305-6823A-A***               | 5 spf [16 spm]                 | 60°     | 7.20                                    | 182.88 | 2.40                     | 60.96 |                         |                         |
| GA2306-6823A-A***               | 6 spf [20 spm]                 | 60°     | 7.00                                    | 177.80 | 2.00                     | 50.80 | 9.5 lb/ft<br>(with sub) | 7.5 lb/ft<br>(with sub) |

\*\*\* Total number of shots (e.g., 15' 6 SPF, 60° gun is GA2306-6823A-A084. Refer to [Available Gun Lengths](#).

| Available Gun Lengths                    | 21'          | 15'          | 11'          | 7'          | 4'          | 3'          | 2'          |
|--|--------------|--------------|--------------|-------------|-------------|-------------|-------------|
| Typical Gun Length (ft) [m]              | 20.75 [6.32] | 14.75 [4.50] | 10.75 [3.28] | 6.75 [2.06] | 3.75 [1.14] | 2.75 [0.84] | 1.75 [0.53] |
| *** 5 SPF Total Number of Loadable Shots | 100          | 070          | 050          | 030         | 015         | 010         | 005         |
| *** 6 SPF Total Number of Loadable Shots | 120          | 084          | 060          | 036         | 018         | 012         | 006         |

Contact your local GEODynamics representative for availability of metric part numbers and additional gun lengths.



# Conventional Long Guns

## 2-3/8 in (60 mm), RTG, 5 and 6 SPF, XDP

### DEEP PENETRATING/EXTREME DEEP PENETRATING

| Carrier<br>O.D. | Shaped Charge       | Part Number       | Perforating<br>Condition | Explosive  | Shot Density /<br>Phasing | ^Casing O.D. | Performance in Concrete |               | Performance in Stressed Berea |               |  |
|-----------------|---------------------|-------------------|--------------------------|------------|---------------------------|--------------|-------------------------|---------------|-------------------------------|---------------|--|
|                 |                     |                   |                          |            |                           | Application  | EHD (in)[cm]            | TTP (in)[cm]  | EHD^ (in)[cm]                 | TTP (in)[cm]  |  |
| 2-3/8"<br>11g   | 2311 Connex SDP     | EC2-23A1121-RC    | Fluid                    | 11.0g, RDX | 6 spf / 60°               | 3-1/2" L-80  |                         |               | 0.25 [0.64]                   | 11.40 [28.96] |  |
|                 |                     | EC2-23A1122-RC    |                          | 11.0g, HMX |                           |              |                         |               | 0.31 [0.79]                   | 11.35 [28.83] |  |
|                 |                     | EC2-23A1123-RC    |                          | 11.0g, HNS |                           |              |                         |               | 0.23 [0.58]                   | 8.70 [22.10]  |  |
|                 | 2311 Razor XDP      | EC2-23A1121       |                          | 11.0g, RDX |                           |              |                         |               | 0.25 [0.64]                   | 12.70 [32.26] |  |
|                 |                     | EC2-23A1122       |                          | 11.0g, HMX |                           |              | 0.31 [0.79]             | 30.11 [76.48] | 0.24 [0.61]                   | 11.40 [28.96] |  |
|                 |                     | EC2-23A1123       |                          | 11.0g, HNS |                           |              | 0.25 [0.64]             | 22.70 [57.68] | 0.23 [0.58]                   | 9.20 [23.37]  |  |
|                 | 2311 Basix XDP      | EC2-23A1121-E     |                          | 11.0g, RDX |                           |              |                         |               | 0.30 [0.76]                   | 9.00 [22.86]  |  |
|                 |                     | EC2-23A1122-E     |                          | 11.0g, HMX |                           |              |                         |               |                               |               |  |
| 2-3/8"<br>11g   | 2311 Razor XDP LS   | EC2-23A1121-LS    | Dry                      | 11.0g, RDX | ‡ 5 spf / 0°              | 3-1/2" L-80  |                         |               |                               |               |  |
|                 |                     | EC2-23A1122-LS    | Fluid                    | 11.0g, HMX | 6 spf / 0°                |              | 0.31 [0.79]             | 30.11 [76.48] |                               |               |  |
|                 |                     | EC2-23A1121-LS    |                          | 11.0g, RDX |                           |              |                         |               |                               |               |  |
|                 |                     | EC2-23A1122-LS    |                          | 11.0g, HMX |                           |              | 0.31 [0.79]             | 30.11 [76.48] |                               |               |  |
| 2-3/8"<br>10.5g | 2311 Connex SDP XLS | EC2-23A1121-RC-LS | Dry                      | 10.5g, RDX | ‡ 5 spf / 60°             | 3-1/2"       |                         |               | 0.25 [0.64]                   | 11.40 [28.96] |  |
|                 |                     | EC2-23A1122-RC-LS | Fluid                    | 10.5g, HMX | 6 spf / 60°               |              |                         |               | 0.31 [0.79]                   | 11.35 [28.83] |  |
|                 |                     | EC2-23A1121-RC-LS |                          | 10.5g, RDX |                           |              |                         |               | 0.25 [0.64]                   | 11.40 [28.96] |  |
|                 |                     | EC2-23A1122-RC-LS |                          | 10.5g, HMX |                           |              |                         |               | 0.31 [0.79]                   | 11.35 [28.83] |  |

‡ For 2-3/8" in dry gas, maximum shot density is 5 spf and limited to low-swell (LS) charges only.

### 2-3/8" - DRY GAS CONDITIONS

For 2-3/8" perforating in dry gas:

- Maximum shot density is 5 spf.
- Low-swell (LS) charges only.
- Only the following 23A charges are rated for dry gas conditions.

| Part Number       | Explosive  |
|-------------------|------------|
| EC2-23A1121-LS    | 11.0g, RDX |
| EC2-23A1122-LS    | 11.0g, HMX |
| EC2-23A1121-RC-LS | 10.5g, RDX |
| EC2-23A1122-RC-LS | 10.5g, HMX |

### 2-3/8" - FLUID CONDITIONS

For 2-3/8" perforating in fluid:

- Maximum shot density is 6 spf.
- All of the following 23A charges are rated for perforating in fluid conditions.

| Part Number    | Explosive  | Part Number       | Explosive  |
|----------------|------------|-------------------|------------|
| EC2-23A1121-RC | 11.0g, RDX | EC2-23A1121-LS    | 11.0g, RDX |
| EC2-23A1122-RC | 11.0g, HMX | EC2-23A1122-LS    | 11.0g, HMX |
| EC2-23A1121    | 11.0g, RDX | EC2-23A1121-RC-LS | 10.5g, RDX |
| EC2-23A1122    | 11.0g, HMX | EC2-23A1122-RC-LS | 10.5g, HMX |
| EC2-23A1121-E  | 11.0g, RDX | EC2-23A1171-R     | 11.0g, RDX |
| EC2-23A1122-E  | 11.0g, HMX |                   |            |

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

FLUID: Qualified for shooting in FLUID only with perforating systems qualified by GEODynamics.

IN FLUID or DRY: Qualified for shooting in FLUID or DRY GAS with perforating systems qualified by GEODynamics.

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# Conventional Long Guns

## 2-3/8 in (60 mm), RTG, 5 and 6 SPF, XDP

### DUAL CASING

| Carrier O.D. | Shaped Charge | Part Number   | Perforating Condition | Explosive  | Shot Density / Phasing | Inner Casing  |                       | Outer Casing  |                       |
|--------------|---------------|---------------|-----------------------|------------|------------------------|---------------|-----------------------|---------------|-----------------------|
|              |               |               |                       |            |                        | O.D./Material | EHD (in)[cm]          | O.D./Material | EHD (in)[cm]          |
| 2-3/8"       | 2311 Refrax   | EC2-23A1171-R | Fluid                 | 11.0g, RDX | 6 spf / 60°            | 3.5" P110     | 0.33-0.38 [0.84-0.95] | 4.5" P110     | 0.33-0.35 [0.84-0.89] |

### HARDWARE

|                                      |  |
|--------------------------------------|--|
| Gun Body Configuration/Material      | Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel |
| Charge Tube Type & Retention         | Round steel tube strip; bend tab retention                                 |
| Type of Tandem Connection            | Booster to booster (no splice)   |
| Nominal OD / Wall Thickness (in)[mm] | 2.39" [60.71] / 0.230 [5.84]   |
| Upper/Lower Thread Connections       | 2-1/32"-8P Stub ACME 2G  |

### COMPONENTS AND ACCESSORIES

| Description   | Part Number(s) |                |
|---|----------------|----------------|
| <b>Top Subs, 2-3/8"</b>                                 |                |                |
| Top Sub, TCP  | GN-R23-0020    |                |
| Top Sub, Wireline                                       | GN-R23-0035    |                |
| <b>Top Sub Lift Sub Assembly, 1-9/16" and 2"</b>        | TC-QC15-000    |                |
| <b>Tandem Subs, 2-3/8"</b>                              |                |                |
| Tandem Sub, TCP   | GN-R23-0021    |                |
| Switch Tandem Sub, Wireline, 5.00" make-up length (MUL) | GN-R23-T100-A  |                |
| Switch Tandem Sub, Wireline, 7.00" MUL                  | RN-R23-T104-A  |                |
| <b>TCP Transfer Kit (1-9/16" through 2-1/2")</b>        | GN-020-0100    |                |
| <b>O-Ring Materials and Size</b>                        | Top Connection | Gun Connection |
| Nitrile (standard option)                               | OR-N569-215    | OR-N569-225    |
| Viton (with back-up rings required for > 325°F)         | OR-V95G-215    | OR-V95G-225    |
| Back-up rings for > 325°F                               | OR-B215-1308   | OR-B225-2126   |
| <b>Thread Protectors</b>                                |                |                |
| Top Sub (Top Pin)                                       | GN-THD-156-020 |                |
| Carrier (Gun) Protector                                 | GN-THD-239-030 |                |
| Tandem Sub & Bull Plug Protector                        | GN-THD-239-040 |                |
| <b>Bull Plugs</b>                                       |                |                |
| 2-3/8" Standard   | GN-R23-0022    |                |
| 2-3/8" with Sucker Rod Box Connection                   | GN-R23S-0022   |                |
| <b>Setting Tool Adapter Sub</b>                         | GN-R23-ST50    |                |

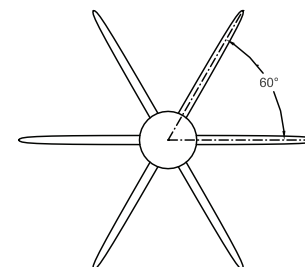
# Conventional Long Guns

## 2-1/2 in (64 mm), RTG, 4 and 6 SPF, XDP

GEODynamics' perforating systems use bi-directional boosters, non-lead azide explosives, customized connectors and inserts, and high-velocity, low-shrink detonating cord. Additionally, all GEODynamics gun assemblies are scalloped to optimize charge performance and prevent casing damage from perforating exit hole burrs. Shot phasing is designed to maintain the integrity and collapse resistance of the casing after perforating. These attributes, along with premium quality gun material and gun connectors, allow GEODynamics to deliver safe, efficient, and reliable perforating gun solutions to our customers.

## APPLICATION SPECIFICATIONS

|                                  |   |
|----------------------------------|---|
| Shot Density and Phasing Options | Multiple <a href="#">Shot Density &amp; Phasing</a> options; <a href="#">Available Gun Lengths</a> range from 2' to 21' |
| Initiation Point                 | Top- or bottom-fired options available; conventional wireline and TCP   |
| Mode of Fire                     | Simultaneous or selective fire  |
| Detonating Cord                  | 40-grain ribbon   |
| Compatible Perforating Charges   | Connex®, Razor®, Basix™, Refrax™  |
| Maximum Gun Swell (in)[mm]       | 2.66" [67.56] @ 11.5g (In Fluid)  |



## ENVIRONMENTAL

|                             |  |
|-----------------------------|--|
| Maximum Pressure (psi)[MPa] | 20,000 [137.90]                                      |
| Maximum Tensile* (lbf)[kN]  | 137,500 [611.63] *Hardware Calculated Breaking Point |

## CARRIER SPECIFICATIONS

| Carrier Assembly<br>Part Number | Shot Density & Phasing Options |         | Gun End to Center of<br>First Scallop |        | Distance<br>Shot to Shot |       | Approximate Weights     |                         |
|---------------------------------|--------------------------------|---------|---------------------------------------|--------|--------------------------|-------|-------------------------|-------------------------|
|                                 | (spf) [spm]                    | Phasing | (in)                                  | (mm)   | (in)                     | (mm)  | Fully<br>Loaded         | Blank Gun               |
| GA2504-6825A-A***               | 4 spf [13 spm]                 | 60°     | 7.50                                  | 190.50 | 3.00                     | 76.20 |                         |                         |
| GA2506-6825A-A***               | 6 spf [20 spm]                 | 60°     | 7.00                                  | 177.80 | 2.00                     | 50.80 | 9.3 lb/ft<br>(with sub) | 7.3 lb/ft<br>(with sub) |

\*\*\* Total number of shots (e.g., 15' 6 SPF, 60° gun is GA2506-6825A-A084. Refer to [Available Gun Lengths](#).

| Available Gun Lengths                    | 21'          | 15'          | 11'          | 7'          | 4'          | 3'          | 2'          |
|--|--------------|--------------|--------------|-------------|-------------|-------------|-------------|
| Typical Gun Length (ft) [m]              | 20.75 [6.32] | 14.75 [4.50] | 10.75 [3.28] | 6.75 [2.06] | 3.75 [1.14] | 2.75 [0.84] | 1.75 [0.53] |
| *** 4 SPF Total Number of Loadable Shots | 080          | 056          | 040          | 024         | 012         | 008         | 004         |
| *** 6 SPF Total Number of Loadable Shots | 120          | 084          | 060          | 036         | 018         | 012         | 006         |

Contact your local GEODynamics representative for availability of metric part numbers and additional gun lengths.



# Conventional Long Guns

## 2-1/2 in (64 mm), RTG, 4 and 6 SPF, XDP

### DEEP PENETRATING/EXTREME DEEP PENETRATING

| Carrier O.D.    | Shaped Charge   | Part Number    | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |               | Performance in Stressed Berea |               |
|-----------------|-----------------|----------------|-----------------------|------------|------------------------|--------------|-------------------------|---------------|-------------------------------|---------------|
|                 |                 |                |                       |            |                        | Application  | EHD (in)[cm]            | TTP (in)[cm]  | EHD^ (in)[cm]                 | TTP (in)[cm]  |
| 2-1/2"<br>11.5g | 2511 Connex SDP | EC2-25A1121-RC | Fluid                 | 11.5g, RDX | 6 spf / 60°            | 3-1/2" L-80  |                         |               | 0.28 [0.71]                   | 11.50 [29.21] |
|                 |                 | EC2-25A1122-RC |                       | 11.5g, HMX |                        |              |                         |               | 0.29 [0.74]                   | 12.00 [30.48] |
|                 | 2511 Razor XDP  | EC1-25A1121    |                       | 11.5g, RDX |                        |              |                         |               | 0.26 [0.66]                   | 13.00 [33.02] |
|                 |                 | EC1-25A1122    |                       | 11.5g, HMX |                        |              | 0.32 [0.81]             | 31.10 [78.99] | 0.24 [0.61]                   | 12.23 [31.06] |
|                 | 2511 Basix XDP  | EC2-25A1121-E  |                       | 11.5g, RDX |                        |              |                         |               | 0.30 [0.76]                   | 9.10 [23.11]  |
|                 |                 | EC2-25A1122-E  |                       | 11.5g, HMX |                        |              |                         |               |                               |               |

### DUAL CASING

| Carrier O.D. | Shaped Charge | Part Number   | Perforating Condition | Explosive  | Shot Density / Phasing | Inner Casing  |                       | Outer Casing  |                       |
|--------------|---------------|---------------|-----------------------|------------|------------------------|---------------|-----------------------|---------------|-----------------------|
|              |               |               |                       |            |                        | O.D./Material | EHD (in)[cm]          | O.D./Material | EHD (in)[cm]          |
| 2-1/2"       | 2511 Refrax   | EC2-25A1171-R | Fluid                 | 11.0g, RDX | 6 spf / 60°            | 3.5" P110     | 0.38-0.42 [0.97-1.07] | 5.5" P110     | 0.33-0.35 [0.84-0.89] |

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

FLUID: Qualified for shooting in FLUID only with perforating systems qualified by GEODynamics.

IN FLUID or DRY: Qualified for shooting in FLUID or DRY GAS with perforating systems qualified by GEODynamics.

Revised: August 31, 2023 9:46 PM

# Conventional Long Guns

## 2-1/2 in (64 mm), RTG, 4 and 6 SPF, XDP

### HARDWARE

|                                      |  |
|--------------------------------------|--|
| Gun Body Configuration/Material      | Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel |
| Charge Tube Type & Retention         | Round steel tube strip; bend tab retention                                 |
| Type of Tandem Connection            | Booster to booster (no splice)   |
| Nominal OD / Wall Thickness (in)[mm] | 2.50" [63.50] / 0.250 [6.35]   |
| Upper/Lower Thread Connections       | 2-1/8" - 8P ACME 2G  |

### COMPONENTS AND ACCESSORIES

| Description   | Part Number(s) |                |
|---|----------------|----------------|
| Top Sub Lift Sub Assembly, 1-9/16" and 2"               | TC-QC15-000    |                |
| Top Subs, 2-1/2"  |                |                |
| Top Sub, TCP  | GN-R25-0020    |                |
| Top Sub, Wireline                                       | GN-R25-0035    |                |
| Tandem Subs, 2-1/2"                                     |                |                |
| Tandem Sub, TCP   | GN-R25-0021    |                |
| Switch Tandem Sub, Wireline, 5.50" make-up length (MUL) | GN-R25-T100-A  |                |
| Switch Tandem Sub, Wireline, 7.00" MUL                  | GN-R25-T104-A  |                |
| TCP Transfer Kit (1-9/16" through 2-1/2")               | GN-020-0100    |                |
| O-Ring Materials and Size                               | Top Connection | Gun Connection |
| Nitrile (standard option)                               | OR-N569-215    | OR-N569-225    |
| Viton (with back-up rings required for > 325°F)         | OR-V95G-215    | OR-V95G-225    |
| Back-up rings for > 325°F                               | OR-B215-1308   | OR-B225-2160   |
| Thread Protectors                                       |                |                |
| Top Sub (Top Pin)                                       | GN-THD-156-020 |                |
| Carrier (Gun) Protector                                 | GN-THD-250-030 |                |
| Tandem Sub & Bull Plug Protector                        | GN-THD-250-040 |                |
| Bull Plug, 2-1/2"                                       | GN-R25-0022    |                |

# Conventional Long Guns

## 2-3/4 in (70 mm), 4 and 6 SPF

GEODynamics' perforating systems use bi-directional boosters, non-lead azide explosives, customized connectors and inserts, and high-velocity, low-shrink detonating cord. Additionally, all GEODynamics gun assemblies are scalloped to optimize charge performance and prevent casing damage from perforating exit hole burrs. Shot phasing is designed to maintain the integrity and collapse resistance of the casing after perforating. These attributes, along with premium quality gun material and gun connectors, allow GEODynamics to deliver safe, efficient, and reliable perforating gun solutions to our customers.

## APPLICATION SPECIFICATIONS

### Shot Density and Phasing Options

Multiple [Shot Density & Phasing](#) options; [Available Gun Lengths](#) range from 2' to 21'

### Initiation Point

Top- or bottom-fired options available; conventional wireline and TCP

### Mode of Fire

Simultaneous or selective fire

### Detonating Cord

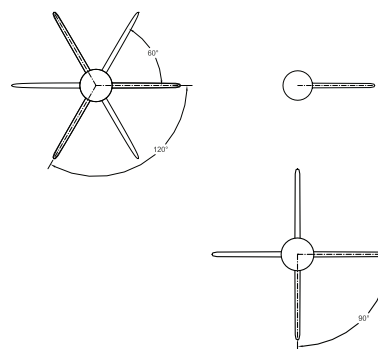
80-grain round

### Compatible Perforating Charges

FracIQ®, Connex®, Razor®, Basix™, Refrax™, GEOPunch™

### Maximum Gun Swell (in)[mm]

2.91 [73.91] @ 15.0g In Fluid; 3.02 [76.20] @ 15.0g Dry



## ENVIRONMENTAL

### Maximum Pressure (psi)[MPa]

25,000 [172.37]

### Maximum Tensile\* (lbf)[kN]

176,600 [785.56] \*Hardware Calculated Breaking Point

## CARRIER SPECIFICATIONS

| Carrier Assembly<br>Part Number | Shot Density & Phasing Options |         | Gun End to Center of<br>First Scalloped |        | Distance<br>Shot to Shot |       | Approximate Weights       |                          |
|---------------------------------|--------------------------------|---------|---|--------|--------------------------|-------|---------------------------|--------------------------|
|                                 | (spf) [spm]                    | Phasing | (in)                                    | (mm)   | (in)                     | (mm)  | Fully<br>Loaded           | Blank Gun                |
| GA2704-6827TI-A***              | 4 spf [13 spm]                 | 60°     | 7.50                                    | 190.50 | 3.00                     | 76.20 |                           |                          |
| GA2704-6827A-B***               |                                | 90°     | 7.50                                    | 190.50 | 3.00                     | 76.20 |                           |                          |
| GA2704-6827TI-B***              |                                | 90°     | 7.50                                    | 190.50 | 3.00                     | 76.20 |                           |                          |
| GA2704-6827A-B***T              |                                | 90°     | 6.00                                    | 152.40 | 3.00                     | 76.20 |                           |                          |
| GA2704-6827TI-B***E             |                                | 90°     | 7.50                                    | 190.50 | 3.00                     | 76.20 |                           |                          |
| GA2704-6827A-G***               |                                | 120°    | 7.50                                    | 190.50 | 3.00                     | 76.20 |                           |                          |
| GA2706-6827A-O***               | 6 spf [20 spm]                 | 0°      | 7.00                                    | 177.80 | 2.00                     | 50.80 | 11.82 lb/ft<br>(with sub) | 9.82 lb/ft<br>(with sub) |
| GA2706-6827A-A***               |                                | 60°     | 7.00                                    | 177.80 | 2.00                     | 50.80 |                           |                          |
| GA2706-6827A-A***T              |                                | 60°     | 6.00                                    | 152.40 | 2.00                     | 50.80 |                           |                          |
| GA2706-6827TI-A***              |                                | 60°     | 7.00                                    | 177.80 | 2.00                     | 50.80 |                           |                          |
| GA2706-6827TI-A***T             |                                | 60°     | 6.00                                    | 152.40 | 2.00                     | 50.80 |                           |                          |

\*\*\* Total number of shots (e.g., 15' 6 SPF, 60° gun is GA2706-6827A-A084. Refer to [Available Gun Lengths](#).



# Conventional Long Guns

## 2-3/4 in (70 mm), 4 and 6 SPF



### CONSTANT ENTRY HOLE AND PENETRATION

| Carrier O.D.      | Shaped Charge | Part Number | Perforating Condition | Explosive  | Shot Density / Phasing | API 19B Targeted Pipe* | Performance in Stressed Berea (API RP19B Sec. 2) |                             |              |
|-------------------|---------------|-------------|-----------------------|------------|------------------------|------------------------|--|-----------------------------|--------------|
|                   |               |             |                       |            |                        |                        | EHD <sup>^</sup> (in)[cm]                        | EHD Variation Decentralized | TTP (in)[cm] |
| 2-3/4"<br>11g-15g | FracIQ 30     | EC2-27A1171 | Fluid                 | 11.0g, RDX | 6 spf / 60°            | 4.5" OD P110           | 0.30 [0.76]                                      | 2.7 %                       | 5.0 [12.70]  |
|                   | FracIQ 35     | EC2-27A1271 |                       | 12.0g, RDX |                        |                        | 0.35 [0.89]                                      | 5.9 %                       |              |
|                   | FracIQ 40     | EC2-27A1571 |                       | 15.0g, RDX |                        |                        | 0.40 [1.02]                                      | 6.3 %                       |              |

### DEEP PENETRATING/EXTREME DEEP PENETRATING

| Carrier O.D.  | Shaped Charge   | Part Number    | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |               | Performance in Stressed Berea |               |
|---------------|-----------------|----------------|-----------------------|------------|------------------------|--------------|-------------------------|---------------|-------------------------------|---------------|
|               |                 |                |                       |            |                        | Application  | EHD (in)[cm]            | TTP (in)[cm]  | EHD <sup>^</sup> (in)[cm]     | TTP (in)[cm]  |
| 2-3/4"<br>15g | 2715 Connex SDP | EC2-27A1521-RC | In Fluid or Dry       | 15.0g, RDX | 6 spf / 60°            | 4-1/2" L-80  |                         |               | 0.30 [0.76]                   | 11.70 [29.72] |
|               |                 | EC2-27A1522-RC |                       | 15.0g, HMX |                        |              |                         |               | 0.31 [0.79]                   | 12.18 [30.94] |
|               | 2715 Razor XDP  | EC2-27A1521    |                       | 15.0g, RDX |                        |              | 0.39 [0.99]             | 37.45 [95.12] |                               |               |
|               |                 | EC2-27A1522    |                       | 15.0g, HMX |                        |              | 0.39 [0.99]             | 37.45 [95.12] |                               |               |
|               |                 | EC2-27A1523    |                       | 15.0g, HNS |                        |              |                         |               | 0.31 [0.79]                   | 10.50 [26.67] |
|               | 2715 Basix XDP  | EC2-27A1521-E  |                       | 15.0g, RDX |                        |              | 0.39 [0.99]             | 31.78 [80.72] | 0.32 (0.81)                   | 9.40 [23.88]  |
|               |                 | EC2-27A1522-E  |                       | 15.0g, HMX |                        |              | 0.38 [0.97]             | 32.75 [83.19] | 0.35 [0.89]                   | 10.60 [26.92] |
|               |                 |                |                       |            |                        |              |                         |               |                               |               |

### DUAL CASING

| Carrier O.D.      | Shaped Charge | Part Number   | Perforating Condition | Explosive  | Shot Density / Phasing | Inner Casing  |                       | Outer Casing  |                       |
|-------------------|---------------|---------------|-----------------------|------------|------------------------|---------------|-----------------------|---------------|-----------------------|
|                   |               |               |                       |            |                        | O.D./Material | EHD (in)[cm]          | O.D./Material | EHD (in)[cm]          |
| 2-3/4"<br>11g-15g | 2711 Refrax   | EC2-27A1171-R | Fluid                 | 11.0g, RDX | 6 spf / 60°            | 4.0" P110     | 0.29-0.30 [0.74-0.76] | 5.5" P110     | 0.37-0.41 [0.94-1.04] |
|                   | 2715 Refrax   | EC2-27A1571-R |                       | 15.0g, RDX |                        |               | 0.34-0.36 [0.86-0.91] |               | 0.34-0.42 [0.86-1.07] |

### DYNAMIC UNDERBALANCE PUNCHERS

| Carrier O.D. | Product Name      | Part Number | Explosive | Exit Hole (in)[cm] |
|--------------|-------------------|-------------|-----------|--------------------|
| 2-3/4"       | 2708 GEOPunch RDX | EC2-27A0861 | 8.0g, RDX | 1.05 [2.67]        |
|              | 2708 GEOPunch HMX | EC2-27A0862 | 8.0g, HMX |                    |
|              | 2708 GEOPunch HNS | EC2-27A0863 | 8.0g, HNS |                    |

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

<sup>^</sup>EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

FLUID: Qualified for shooting in FLUID only with perforating systems qualified by GEODynamics.

IN FLUID or DRY: Qualified for shooting in FLUID or DRY GAS with perforating systems qualified by GEODynamics.

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# Conventional Long Guns

## 2-3/4 in (70 mm), 4 and 6 SPF

### HARDWARE

|                                      |  |
|--------------------------------------|--|
| Gun Body Configuration/Material      | Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel |
| Charge Tube Type & Retention         | Round steel tube strip; bend tab retention                                 |
| Type of Tandem Connection            | Booster to booster (no splice)   |
| Nominal OD / Wall Thickness (in)[mm] | 2.75" [69.85] / 0.313 [7.95]   |
| Upper/Lower Thread Connections       | 2.375" - 6P ACME 2G  |

### COMPONENTS AND ACCESSORIES

| Description  | Part Number(s)  |                |
|--|-----------------|----------------|
| <b>Top Subs, 2-3/4"</b>                                    |                 |                |
| Top Sub, TCP   | GN-R27-0020     |                |
| Top Sub, Wireline  | GN-R27-0035     |                |
| <b>Top Sub Lift Sub Assembly, 2-3/4" and 2-7/8"</b>        | TC-QC27-000     |                |
| <b>Tandem Subs, 2-3/4"</b>                                 |                 |                |
| Tandem Sub, TCP  | GN-R27-0021     |                |
| Switch Tandem Sub, Wireline, Ported, 3" make-up length     | GN-R27-T100-A   |                |
| Aligning Switch Sub, LH Lock Ring                          | GN-R27-T125-A   |                |
| <b>TCP Transfer Kit (2-3/4" through 4")</b>                | GN-000-0025     |                |
| <b>O-Ring Materials and Size</b>                           | Top Connection  | Gun Connection |
| Nitrile (standard option)                                  | OR-N569-225     | OR-N569-227    |
| Viton (with back-up rings required for > 325°F)            | OR-V95G-225     | OR-V95G-227    |
| Back-up rings for > 325°F                                  | OR-B225-2160    | OR-B227-2405   |
| <b>Thread Protectors</b>                                   |                 |                |
| Top Sub (Top Pin)  | GN-THD-QC27-020 |                |
| Carrier (Gun) Protector                                    | GN-THD-275-030  |                |
| Tandem Sub & Bull Plug Protector                           | GN-THD-275-040  |                |
| <b>Bull Plugs</b>  |                 |                |
| 2-3/4" Standard  | GN-R27-0022     |                |
| 2-3/4" with 2-3/8" EUE Pin                                 | GN-R27-0023     |                |
| 2-3/4" Shoot-Thru  | GN-R27-ST27     |                |
| 2-3/4" Shoot-Thru Assembly (GN-R27-T150-A and GN-R27-ST27) | GN-R27-ST30     |                |

| Available Gun Lengths                    | 21'          | 15'          | 11'          | 7'          | 4'          | 3'          | 2'          |
|--|--------------|--------------|--------------|-------------|-------------|-------------|-------------|
| Typical Gun Length (ft) [m]              | 20.75 [6.32] | 14.75 [4.50] | 10.75 [3.28] | 6.75 [2.06] | 3.75 [1.14] | 2.75 [0.84] | 1.75 [0.53] |
| *** 4 SPF Total Number of Loadable Shots | 080          | 056          | 040          | 024         | 012         | 008         | 004         |
| *** 6 SPF Total Number of Loadable Shots | 120          | 084          | 060          | 036         | 018         | 012         | 006         |

Contact your local GEODynamics representative for availability of metric part numbers and additional gun lengths.

# Conventional Long Guns

## 2-7/8 in (73 mm), 4 and 6 SPF

GEODynamics' perforating systems use bi-directional boosters, non-lead azide explosives, customized connectors and inserts, and high-velocity, low-shrink detonating cord. Additionally, all GEODynamics gun assemblies are scalloped to optimize charge performance and prevent casing damage from perforating exit hole burrs. Shot phasing is designed to maintain the integrity and collapse resistance of the casing after perforating. These attributes, along with premium quality gun material and gun connectors, allow GEODynamics to deliver safe, efficient, and reliable perforating gun solutions to our customers.

## APPLICATION SPECIFICATIONS

### Shot Density and Phasing Options

Multiple [Shot Density & Phasing](#) options; [Available Gun Lengths](#) range from 2' to 21'

### Initiation Point

Top- or bottom-fired options available; conventional wireline and TCP

### Mode of Fire

Simultaneous or selective fire

### Detonating Cord

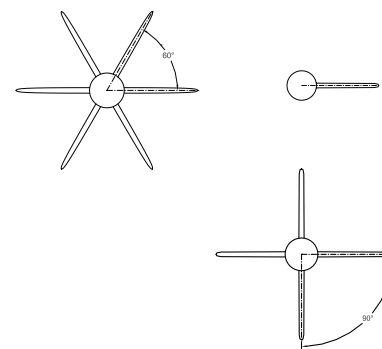
80-grain round

### Compatible Perforating Charges

FracIQ®, Connex®, Razor®, Basix™

### Maximum Gun Swell (in)[mm]

3.07 [77.98] @ 18.0g In Fluid; 3.13 [79.50] @ 15.0g Dry



## ENVIRONMENTAL

### Maximum Pressure (psi)[MPa]

#### Standard

20,000 [138]

#### High Pressure

25,000 [172]

### Maximum Tensile\* (lbf)[kN]

213,700 [950]

213,700 [950]

\*Hardware Calculated Breaking Point

## CARRIER SPECIFICATIONS

| Carrier Assembly<br>Part Number |                      | Shot Density & Phasing Options |         | Gun End to Center of<br>First Scallop |        | Distance<br>Shot to Shot |       | Approximate Weights       |                           |
|---------------------------------|----------------------|--------------------------------|---------|---------------------------------------|--------|--------------------------|-------|---------------------------|---------------------------|
|                                 |                      | (spf) [spm]                    | Phasing | (in)                                  | (mm)   | (in)                     | (mm)  | Fully<br>Loaded           | Blank Gun                 |
| 27A<br>Charge<br>Case           | GA2804-6827A-A***    | 4 spf [13 spm]                 | 60°     | 7.50                                  | 190.50 | 3.00                     | 76.20 |                           |                           |
|                                 | GA2804-6827A-B***    |                                | 90°     |                                       |        |                          |       |                           |                           |
|                                 | GA2804-6827A-O***    |                                | 0°      |                                       |        |                          |       |                           |                           |
|                                 | GA2806-6827A-A***    | 6 spf [20 spm]                 | 60°     | 7.00                                  | 177.80 | 2.00                     | 50.80 | 12.04 lb/ft<br>(with sub) | 10.17 lb/ft<br>(with sub) |
|                                 | GA2806-6827A-K***    |                                | 100°    |                                       |        |                          |       |                           |                           |
|                                 | † GA28H06-6827A-A*** |                                | 60°     |                                       |        |                          |       |                           |                           |
| 28A<br>Charge<br>Case           | GA2804-6528A-A***    | 4 spf [13 spm]                 | 60°     | 7.50                                  | 190.50 | 3.00                     | 76.20 |                           |                           |
|                                 | GA2806-6528A-A***    | 6 spf [20 spm]                 | 60°     | 7.00                                  | 177.80 | 2.00                     | 50.80 | 12.04 lb/ft<br>(with sub) | 10.17 lb/ft<br>(with sub) |
|                                 | GA2806-6528A-K***    |                                | 100°    |                                       |        |                          |       |                           |                           |
|                                 | GA2806-6528A-A***T   |                                | 60°     | 6.00                                  | 152.40 | 2.00                     | 50.80 |                           |                           |

\*\*\* Total number of shots (e.g., 15' 6 SPF, 60° gun is GA2806-6827A-A084. Refer to [Available Gun Lengths](#). † GA28H = high-pressure system. A\*\*\*T = True Shot interval



# Conventional Long Guns

## 2-7/8 in (73 mm), 4 and 6 SPF

### CONSTANT ENTRY HOLE AND PENETRATION

| Carrier O.D.   | Shaped Charge | Part Number | Perforating Condition | Explosive  | Shot Density / Phasing | API 19B Targeted Pipe* | Performance in Stressed Berea (API RP19B Sec. 2) |                             |              |
|----------------|---------------|-------------|-----------------------|------------|------------------------|------------------------|--|-----------------------------|--------------|
|                |               |             |                       |            |                        |                        | EHD <sup>^</sup> (in)[cm]                        | EHD Variation Decentralized | TTP (in)[cm] |
| 2-7/8" 11g-15g | FracIQ 30     | EC2-27A1171 | Fluid                 | 11.0g, RDX | 6 spf / 60°            | 4.5" OD P110           | 0.30 [0.76]                                      | 2.7 %                       | 5.0 [12.70]  |
|                | FracIQ 35     | EC2-27A1271 |                       | 12.0g, RDX |                        |                        | 0.35 [0.89]                                      | 5.9 %                       |              |
|                | FracIQ 40     | EC2-27A1571 |                       | 15.0g, RDX |                        |                        | 0.40 [1.02]                                      | 6.3 %                       |              |
| 2-7/8" 11g-16g | FracIQ 35     | EC2-28A1171 | Fluid                 | 11.0g, RDX | 6 spf / 60°            | 4.5" OD P110           | 0.36 [0.91]                                      | 3.3 %                       | 5.0 [12.70]  |
|                |               | EC2-28A1172 |                       | 11.0g, HMX |                        |                        | 0.36 [0.91]                                      | 2.1 %                       |              |
|                | FracIQ 40     | EC2-28A1671 |                       | 16.0g, RDX |                        |                        | 0.40 [1.02]                                      | 2.7 %                       |              |
|                |               | EC2-28A1672 |                       | 16.0g, HMX |                        |                        | 0.40 [1.02]                                      | 2.7 %                       |              |
|                |               |             |                       |            |                        |                        |  |                             |              |

### DEEP PENETRATING/EXTREME DEEP PENETRATING

| Carrier O.D. | Shaped Charge   | Part Number    | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D. Application | Performance in Concrete |                | Performance in Stressed Berea |               |
|--------------|-----------------|----------------|-----------------------|------------|------------------------|--------------------------|-------------------------|----------------|-------------------------------|---------------|
|              |                 |                |                       |            |                        |                          | EHD (in)[cm]            | TTP (in)[cm]   | EHD <sup>^</sup> (in)[cm]     | TTP (in)[cm]  |
| 2-7/8" 15g   | 2715 Connex SDP | EC2-27A1521-RC | In Fluid or Dry       | 15.0g, RDX | 6 spf / 60°            | 4-1/2" L-80              |                         |                | 0.30 [0.76]                   | 11.70 [29.72] |
|              |                 | EC2-27A1522-RC |                       | 15.0g, HMX |                        |                          |                         |                | 0.31 [0.79]                   | 12.18 [30.94] |
|              |                 | EC2-27A1523-RC |                       | 15.0g, HNS |                        |                          |                         |                | 0.25 [0.64]                   | 9.90 [25.15]  |
|              | 2715 Razor XDP  | EC2-27A1521    |                       | 15.0g, RDX |                        |                          |                         |                | 0.26 [0.66]                   | 13.50 [34.29] |
|              |                 | EC2-27A1522    |                       | 15.0g, HMX |                        |                          | 0.34 [0.86]             | 42.46 [107.85] | 0.30 [0.76]                   | 13.13 [33.35] |
|              |                 | EC2-27A1523    |                       | 15.0g, HNS |                        |                          |                         |                | 0.31 [0.79]                   | 10.50 [26.67] |
|              | 2715 Basix XDP  | EC2-27A1521-E  |                       | 15.0g, RDX |                        |                          |                         |                | 0.32 (0.81)                   | 9.40 [23.88]  |
|              |                 | EC2-27A1522-E  |                       | 15.0g, HMX |                        |                          |                         |                |                               |               |
|              |                 |                |                       |            |                        |                          |                         |                |                               |               |
| 2-7/8" 18g   | 2818 Connex SDP | EC2-28A1821-RC | Fluid                 | 18.0g, RDX | 6 spf / 60°            | 4-1/2" L-80              |                         |                | 0.42 [1.07]                   | 13.00 [33.02] |
|              |                 | EC2-28A1822-RC |                       | 18.0g, HMX |                        |                          |                         |                | 0.40 [1.02]                   | 14.02 [35.61] |
|              |                 | EC2-28A1823-RC |                       | 18.0g, HNS |                        |                          |                         |                | 0.33 [0.84]                   | 10.55 [26.80] |
|              | 2818 Razor XDP  | EC2-28A1821    |                       | 18.0g, RDX |                        |                          | 0.43 [1.09]             | 40.05 [101.73] | 0.41 [1.04]                   | 14.10 [35.81] |
|              |                 | EC2-28A1822    |                       | 18.0g, HMX |                        |                          | 0.43 [1.09]             | 40.05 [101.73] | 0.37 [0.94]                   | 15.33 [38.94] |
|              |                 | EC2-28A1823    |                       | 18.0g, HNS |                        |                          | 0.32 [0.81]             | 32.38 [82.25]  | 0.33 [0.84]                   | 10.95 [27.81] |
|              | 2818 Basix XDP  | EC2-28A1821-E  |                       | 18.0g, RDX |                        |                          |                         |                | 0.47 [1.19]                   | 10.70 [27.18] |
|              |                 | EC2-28A1822-E  |                       | 18.0g, HMX |                        |                          |                         |                |                               |               |
|              |                 |                |                       |            |                        |                          |                         |                |                               |               |
|              |                 |                |                       |            |                        |                          |                         |                |                               |               |

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

<sup>^</sup>EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

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# Conventional Long Guns

## 2-7/8 in (73 mm), 4 and 6 SPF

### GOOD HOLE

| Carrier O.D. | Shaped Charge   | Part Number    | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |              | Performance in Stressed Berea |               |
|--------------|-----------------|----------------|-----------------------|------------|------------------------|--------------|-------------------------|--------------|-------------------------------|---------------|
|              |                 |                |                       |            |                        | Application  | EHD (in)[cm]            | TTP (in)[cm] | EHD^ (in)[cm]                 | TTP (in)[cm]  |
| 2-7/8" 15g   | 2715 Connex XEH | EC2-27A1541-RC | In Fluid or Dry       | 15.0g, RDX | 6 spf / 60°            | 4-1/2"       |                         |              | 0.30 [0.76]                   | 12.30 [31.24] |
|              |                 | EC2-27A1542-RC |                       | 15.0g, HMX |                        |              |                         |              | 0.35 [0.89]                   | 11.60 [29.46] |

### DYNAMIC UNDERBALANCE PUNCHERS

| Carrier O.D. | Product Name      | Part Number | Explosive | Exit Hole (in)[cm] |
|--------------|-------------------|-------------|-----------|--------------------|
| 2-7/8"       | 2708 GEOPunch RDX | EC2-27A0861 | 8.0g, RDX | 1.05 [2.67]        |
|              | 2708 GEOPunch HMX | EC2-27A0862 | 8.0g, HMX |                    |
|              | 2708 GEOPunch HNS | EC2-27A0863 | 8.0g, HNS |                    |
| 2-7/8"       | 2808 GEOPunch RDX | EC2-28A0861 | 8.0g, RDX | 1.05 [2.67]        |
|              | 2808 GEOPunch HMX | EC2-28A0862 | 8.0g, HMX |                    |
|              | 2808 GEOPunch HNS | EC2-28A0863 | 8.0g, HNS |                    |

### HARDWARE

|  |  |
|--|--|
| Gun Body Configuration/Material        | Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel |
| Charge Tube Type & Retention           | Round steel tube strip; bend tab retention                                 |
| Type of Tandem Connection              | Booster to booster (no splice)   |
| Nominal OD / Wall Thickness** (in)[mm] | 2.875" [73.03] / 0.313 [7.95]; **GA28H06 wall thickness: 0.363 [9.22]      |
| Upper/Lower Thread Connections         | 2.500" - 6P ACME 2G  |

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

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# Conventional Long Guns

## 2-7/8 in (73 mm), 4 and 6 SPF

### COMPONENTS AND ACCESSORIES

| Description   | Part Number(s)   |  |
|---|--|--|
| <b>Top Subs, 2-7/8"</b><br>Top Sub, TCP<br>Top Sub, 2-7/8" with 3-1/8" QC<br>Top Sub, Wireline  | GN-R28-0020<br>GN-R28-0020QC<br>GN-R28-0035                  |  |
| <b>Top Sub Lift Sub Assembly, 2-3/4" and 2-7/8"</b>   | TC-QC27-000  |  |
| <b>Tandem Subs, 2-7/8"</b><br>Tandem Sub, TCP<br>Switch Tandem Sub, Wireline, Ported (6.25" make-up length)                                   | GN-R28-0021<br>GN-R28-T150-A                                 |  |
| <b>TCP Transfer Kit (2-3/4" through 4")</b>   | GN-000-0025  |  |
| <b>O-Ring Materials and Size</b><br>Nitrile (standard option)<br>Viton (with back-up rings required for > 325°F)<br>Back-up rings for > 325°F | Top Connection<br>OR-N569-225<br>OR-V95G-225<br>OR-B225-2160 | Gun Connection<br>OR-N569-228<br>OR-V95G-228<br>OR-B228-2560 |
| <b>Thread Protectors</b><br>Top Sub (Top Pin)<br>Carrier (Gun) Protector<br>Tandem Sub & Bull Plug Protector                                  | GN-THD-QC27-020<br>GN-THD-288-030<br>GN-THD-288-040          |  |
| <b>Bull Plugs</b><br>2-7/8" Standard<br>2-7/8" with 2-3/8" EUE Pin<br>2-7/8 Shoot-Thru  | GN-R28-0022<br>GN-R28-0023<br>GN-R28-ST27                    |  |

| Available Gun Lengths                    | 21'          | 15'          | 11'          | 7'          | 4'          | 3'          | 2'          |
|--|--------------|--------------|--------------|-------------|-------------|-------------|-------------|
| Typical Gun Length (ft) [m]              | 20.75 [6.32] | 14.75 [4.50] | 10.75 [3.28] | 6.75 [2.06] | 3.75 [1.14] | 2.75 [0.84] | 1.75 [0.53] |
| *** 4 SPF Total Number of Loadable Shots | 080          | 056          | 040          | 024         | 012         | 008         | 004         |
| *** 6 SPF Total Number of Loadable Shots | 120          | 084          | 060          | 036         | 018         | 012         | 006         |

Contact your local GEODynamics representative for availability of metric part numbers and additional gun lengths.

# Conventional Long Guns

## 3-1/8 in (79 mm), 4-6 SPF

GEODynamics' perforating systems use bi-directional boosters, non-lead azide explosives, customized connectors and inserts, and high-velocity, low-shrink detonating cord. Additionally, all GEODynamics gun assemblies are scalloped to optimize charge performance and prevent casing damage from perforating exit hole burrs. Shot phasing is designed to maintain the integrity and collapse resistance of the casing after perforating. These attributes, along with premium quality gun material and gun connectors, allow GEODynamics to deliver safe, efficient, and reliable perforating gun solutions to our customers.

## APPLICATION SPECIFICATIONS

### Shot Density and Phasing Options

### Initiation Point

### Mode of Fire

### Detonating Cord

### Compatible Perforating Charges

### Maximum Gun Swell (in)[mm]

Multiple [Shot Density & Phasing](#) options, [Available Gun Lengths](#) range from 2' to 21'

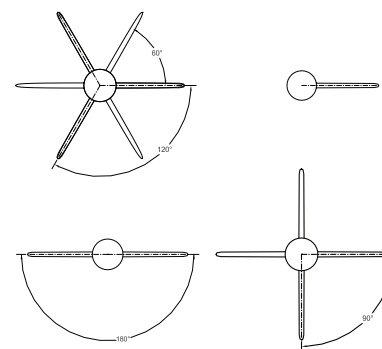
Top- or bottom-fired options available; conventional wireline and TCP

Simultaneous or selective fire

80-grain round

FracIQ®, Connex®, Razor®, Basix™, Basix™ Frac, Refrax™

3.46 [87.88] @ 22.7g In Fluid; 3.60 [91.44] @ 19.0g Dry



## ENVIRONMENTAL

### Maximum Pressure (psi)[MPa]

### Maximum Tensile\* (lbf)[kN]

22,500 [155.13]

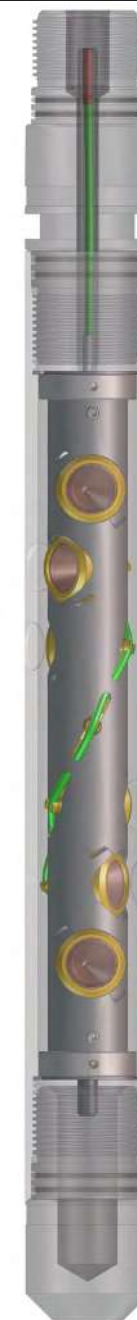
202,300 [900] \*Hardware Calculated Breaking Point

## CARRIER SPECIFICATIONS

| Carrier Assembly<br>Part Number | Shot Density & Phasing Options |         | Gun End to Center of<br>First Scallop @ 0 |        | Distance<br>Shot to Shot |       | Approximate Weights |             |
|---------------------------------|--------------------------------|---------|---|--------|--------------------------|-------|---------------------|-------------|
|                                 | (spf) [spm]                    | Phasing | (in)                                      | (mm)   | (in)                     | (mm)  | Fully<br>Loaded     | Blank Gun   |
| GA3104-6033A-O***               | 4 spf [13 spm]                 | 0°      | 7.50                                      | 190.50 | 3.00                     | 76.20 |                     |             |
| GA3104-6033A-A***               |                                | 60°     |   |        |                          |       |                     |             |
| GA3104-6033A-B***               |                                | 90°     |   |        |                          |       |                     |             |
| GA3104-6033A-G***               |                                | 120°    |   |        |                          |       |                     |             |
| GA3105-6033A-A***               | 5 spf [16 spm]                 | 60°     | 7.20                                      | 182.88 | 2.40                     | 60.96 |                     |             |
| GA3105-6033A-J***               |                                | 180°    |   |        |                          |       |                     |             |
| GA3106-6033A-O***               | 6 spf [20 spm]                 | 0°      | 7.00                                      | 177.80 | 2.00                     | 50.80 | 14.25 lb/ft         | 11.37 lb/ft |
| GA3106-6033A-A***               |                                | 60°     |   |        |                          |       |                     |             |
| GA3106-6033A-A***T              |                                | 60°     | 6.00                                      | 152.40 | 2.00                     | 50.80 |                     |             |

\*\*\* Total number of shots (e.g., 15' 6 SPF, 60° gun is GA3106-6033A-A084. Refer to [Available Gun Lengths](#).

A\*\*\*T = True Shot interval; refer to [Components and Accessories](#) for ancillary equipment.



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# Conventional Long Guns

## 3-1/8 in (79 mm), 4-6 SPF



### BIG HOLE

| Carrier O.D. | Shaped Charge | Part Number | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |              | Performance in Stressed Berea |              |
|--------------|---------------|-------------|-----------------------|------------|------------------------|--------------|-------------------------|--------------|-------------------------------|--------------|
|              |               |             |                       |            |                        | Application  | EHD (in)[cm]            | TTP (in)[cm] | EHD^ (in)[cm]                 | TTP (in)[cm] |
| 3-1/8" 23g   | 3323 Basix BH | EC2-33A2331 | Fluid                 | 22.7g, RDX | 6 spf / 60°            | 4-1/2" L-80  | 0.78 [1.98]             | 7.60 [19.30] |                               |              |
|              |               | EC2-33A2332 |                       | 22.7g, HMX |                        |              | 0.79 [2.01]             | 7.80 [19.81] |                               |              |

### CONSTANT ENTRY HOLE AND PENETRATION

| Carrier O.D.   | Shaped Charge    | Part Number                         | Perforating Condition | Explosive  | Shot Density / Phasing | API 19B Targeted Pipe* | Performance in Stressed Berea (API RP19B Sec. 2) |                             |              |
|----------------|------------------|-------------------------------------|-----------------------|------------|------------------------|------------------------|--|-----------------------------|--------------|
|                |                  |                                     |                       |            |                        |                        | EHD^ (in)[cm]                                    | EHD Variation Decentralized | TTP (in)[cm] |
| 3-1/8" 12g-13g | FracIQ 20        | EC2-33A1271                         | Fluid                 | 12.0g, RDX | 6 spf / 60°            | 4.5"-5.5" OD, P110     | 0.22 [0.56]                                      | 5.5 %                       | 5.0 [12.70]  |
|                | Basix Frac 25    | EC2-33A1271-BF                      |                       | 12.0g, RDX |                        |                        | 0.26 [0.66]                                      | 2.4 %                       | 4.0 [10.16]  |
|                | FracIQ 25        | EC2-33A1371                         |                       | 13.0g, RDX |                        |                        | 0.26 [0.66]                                      | 4.1 %                       | 5.0 [12.70]  |
| 3-1/8" 13g-16g | FracIQ Connex 30 | EC2-33A1471-FRX                     | Fluid                 | 14.0g, RDX | 6 spf / 60°            | 4.5"-5.5" OD, P110     | 0.31 [0.79]                                      | 6.0 %                       | 5.0 [12.70]  |
|                | Basix Frac 30    | EC2-33A1471-BF                      |                       | 14.0g, RDX |                        |                        | 0.31 [0.79]                                      | 4.0 %                       | 4.0 [10.16]  |
|                | FracIQ 30        | EC2-33A1671                         |                       | 16.0g, RDX |                        |                        | 0.31 [0.79]                                      | 3.1 %                       | 5.0 [12.70]  |
|                | FracIQ 30        | EC2-33A1672                         |                       | 16.0g, HMX |                        |                        | 0.34 [0.86]                                      | 3.8 %                       |              |
| 3-1/8" 16g-20g | FracIQ Connex 35 | EC2-33A1671-FRX                     | Fluid                 | 16.0g, RDX | 6 spf / 60°            | 4.5"-5.5" OD, P110     | 0.36 [0.91]                                      | 5.0 %                       | 5.0 [12.70]  |
|                | Basix Frac 35    | EC2-33A1871-BF                      |                       | 18.0g, RDX |                        |                        | 0.36 [0.91]                                      | 3.4 %                       | 4.0 [10.16]  |
|                | FracIQ 35        | EC2-33A2071                         |                       | 20.0g, RDX |                        |                        | 0.36 [0.91]                                      | 2.5 %                       | 5.0 [12.70]  |
|                | FracIQ 35        | EC2-33A2072                         |                       | 20.0g, HMX |                        |                        | 0.37 [0.94]                                      | 3.0 %                       |              |
| 3-1/8" 19g-23g | FracIQ Connex 40 | EC2-33A1971-FRX                     | Fluid                 | 19.0g, RDX | 6 spf / 60°            | 4.5"-5.5" OD, P110     | 0.41 [1.04]                                      | 6.5 %                       | 5.0 [12.70]  |
|                | FracIQ 40        | EC2-33A2371                         |                       | 23.0g, RDX |                        |                        | 0.40 [1.02]                                      | 3.3 %                       |              |
|                | FracIQ 40        | EC2-33A2372                         |                       | 23.0g, HMX |                        |                        | 0.41 [1.04]                                      | 3.8 %                       |              |
|                | Basix Frac 40    | EC2-33A2371-BF                      |                       | 23.0g, RDX |                        |                        | 0.40 [1.02]                                      | 6.6 %                       | 4.0 [10.16]  |
|                | Basix Frac 40    | EC2-33A2371-BF                      |                       | 23.0g, RDX |                        | 6.0" OD, P110          | 0.40 [1.02]                                      | 7.5 %                       |              |
| 3-1/8" 20g-23g | FracIQ 45        | EC2-33A2071-45                      | Fluid                 | 20.0g, RDX | 6 spf / 60°            | 4.5"-5.5" OD, P110     | 0.45 [1.14]                                      | 5.6 %                       | 5.0 [12.70]  |
|                | FracIQ Connex 45 | EC2-33A2371-FRX                     |                       | 21.0g, RDX |                        |                        | 0.45 [1.14]                                      | 3.2 %                       |              |
|                | Basix Frac 45    | EC2-33A2371-BF45                    |                       | 23.0g, RDX |                        |                        | 0.45 [1.14]                                      | 5.9 %                       | 4.0 [10.16]  |
| 3-1/8" 23g     | FracIQ 50        | EC2-33A2371-50<br>† EC2-33A2371-50G | Fluid                 | 23.0g, RDX | 6 spf / 60°            | 4.5"-5.5" OD, P110     | 0.50 [1.27]                                      | 1.5 %                       | 5.0 [12.70]  |
|                | FracIQ 50        | EC2-33A2372-RX                      |                       | 23.0g, HMX |                        | 5.5" OD, P110          | 0.50 [1.27]                                      | 4.6 %                       |              |
|                | Basix Frac 50    | EC2-33A2371-BF50                    |                       | 23.0g, RDX |                        | 4.5"-5.5" OD, P110     | 0.50 [1.27]                                      | 4.8 %                       | 4.0 [10.16]  |
|                | FracIQ 55        | EC2-33A2371-55                      |                       | 23.0g, RDX |                        | 4.5" OD, P110          | 0.55 [1.40]                                      | 3.8 %                       | 5.0 [12.70]  |

\*3-1/8" FracIQ charge performance is compatible in 4.5" 11.6-15.1# and 5.5" 17-23# P-110 casing. FRX designates FracIQ® Connex® reactive technology.

†EC2-33A2371-50G has a custom, externally-grooved case (special application).

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# Conventional Long Guns

## 3-1/8 in (79 mm), 4-6 SPF

### DEEP PENETRATING/EXTREME DEEP PENETRATING

| Carrier O.D. | Shaped Charge   | Part Number    | Perforating Condition | Explosive  | Shot Density / Phasing                   | ^Casing O.D. | Performance in Concrete |                | Performance in Stressed Berea |               |
|--------------|-----------------|----------------|-----------------------|------------|--|--------------|-------------------------|----------------|-------------------------------|---------------|
|              |                 |                |                       |            |  | Application  | EHD (in)[cm]            | TTP (in)[cm]   | EHD^ (in)[cm]                 | TTP (in)[cm]  |
| 3-1/8" 19g   | 3319 Connex RX  | EC2-33A1991-RX | ‡ Fluid or Dry        | 19.0g, RDX | 5 spf / 60° (Dry)<br>6 spf / 60° (Fluid) | 4-1/2" L-80  |                         |                | 0.32 [0.81]                   | 11.30 [28.70] |
|              |                 | EC2-33A1992-RX |                       | 19.0g, HMX |  |              |                         |                | 0.32 [0.81]                   | 11.60 [29.46] |
|              | 3319 Razor XDP  | EC2-33A1921    | ‡ Fluid or Dry        | 19.0g, RDX |  |              | 0.51 [1.30]             | 42.07 [106.86] |                               |               |
|              |                 | EC2-33A1922    |                       | 19.0g, HMX |  |              | 0.49 [1.24]             | 41.10 [104.39] | 0.43 [1.09]                   | 14.60 [37.08] |
|              | 3319 Basix XDP  | EC2-33A1921-E  | ‡ Fluid or Dry        | 19.0g, RDX |  |              | 0.43 [1.09]             | 35.80 [90.93]  |                               |               |
|              |                 | EC2-33A1922-E  |                       | 19.0g, HMX |  |              |                         |                |                               |               |
|              | 3319 Basix XDP  | EC2-33A1921-EG | Fluid                 | 19.0g, RDX |  |              | 0.43 [1.09]             | 35.70 [90.68]  |                               |               |
|              | 3319 Basix DP   | EC2-33A1951    | ‡ Fluid or Dry        | 19.0g, RDX |  |              | 0.54 [1.37]             | 29.20 [74.17]  |                               |               |
|              |                 | EC2-33A1952    |                       | 19.0g, HMX |  |              |                         |                |                               |               |
| 3-1/8" 23g   | 3323 Connex SDP | EC2-33A2321-RC | Fluid                 | 22.7g, RDX | 6 spf / 60°                              | 4-1/2" L-80  |                         |                | 0.40 [1.02]                   | 15.60 [39.62] |
|              |                 | EC2-33A2322-RC |                       | 22.7g, HMX |  |              |                         |                | 0.46 [1.17]                   | 15.31 [38.89] |
|              |                 | EC2-33A2323-RC |                       | 22.7g, HNS |  |              |                         |                | 0.36 [0.91]                   | 11.85 [30.10] |
|              | 3323 Razor XDP  | EC2-33A2321    |                       | 22.7g, RDX |  |              |                         |                | 0.41 [1.04]                   | 16.40 [41.66] |
|              |                 | EC2-33A2322    |                       | 22.7g, HMX |  |              | 0.42 [1.07]             | 39.02 [99.11]  | 0.44 [1.12]                   | 15.68 [39.83] |
|              |                 | EC2-33A2323    |                       | 22.7g, HNS |  |              | 0.35 [0.89]             | 26.05 [66.17]  | 0.37 [0.94]                   | 12.12 [30.78] |
|              | 3323 Basix XDP  | EC2-33A2321-E  |                       | 22.7g, RDX |  |              | 0.42 [1.07]             | 46.01 [116.87] | 0.39 [0.99]                   | 12.30 [31.24] |
|              |                 | EC2-33A2322-E  |                       | 22.7g, HMX |  |              | 0.43 [1.09]             | 46.37 [117.78] |                               |               |
|              |                 | EC2-33A2321-EG |                       | 22.7g, RDX |  |              |                         |                | 0.41 [1.04]                   | 11.90 [30.23] |
|              | 3323 Basix GH   | EC2-33A2322-EG |                       | 22.7g, HMX |  |              | 0.43 [1.09]             | 45.70 [116.08] | 0.40 [1.02]                   | 11.90 [30.23] |
|              |                 |                |                       |            |  |              |                         |                |                               |               |
|              |                 |                |                       |            |  |              |                         |                |                               |               |

‡ For 3-1/8" 19g in dry gas, maximum shot density is 5 spf or limited to one- (1) and two- (2) shot short guns only.

### DUAL CASING

| Carrier<br>O.D.   | Shaped Charge | Part Number   | Perforating<br>Condition | Explosive  | Shot Density /<br>Phasing | Inner Casing          |                       | Outer Casing  |                       |
|-------------------|---------------|---------------|--------------------------|------------|---------------------------|-----------------------|-----------------------|---------------|-----------------------|
|                   |               |               |                          |            |                           | O.D./Material         | EHD (in)[cm]          | O.D./Material | EHD (in)[cm]          |
| 3-1/8"<br>14g-23g | 3314 Refrax   | EC2-33A1471-D | Fluid                    | 14.0g, RDX | 6 spf / 60°               | Expanded 4.0"<br>P110 | 0.33-0.33 [0.84-0.84] | 5.5" P110     | 0.30-0.30 [0.76-0.76] |
|                   | 3316 Refrax   | EC2-33A1671-D |                          | 16.0g, RDX |                           |                       | 0.37-0.38 [0.94-0.95] |               | 0.35-0.35 [0.89-0.89] |
|                   | 3320 Refrax   | EC2-33A2071-D |                          | 20.0g, RDX |                           |                       | 0.41-0.42 [1.04-1.07] |               | 0.40-0.40 [1.02-1.02] |
|                   | 3316 Refrax   | EC2-33A1671-D |                          | 16.0g, RDX | 6 spf / 60°               | 4.5" P110             | 0.30-0.32 [0.76-0.81] | 7.0" P110     | 0.39-0.41 [0.99-1.04] |
|                   | 3323 Refrax   | EC2-33A2371-D |                          | 23.0g, RDX |                           |                       | 0.41-0.42 [1.04-1.07] |               | 0.35-0.35 [0.89-0.89] |
|                   |               |               |                          |            |                           |                       |                       |               |                       |

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

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Revised: August 31, 2023 9:46 PM

# Conventional Long Guns

## 3-1/8 in (79 mm), 4-6 SPF

### GOOD HOLE

| Carrier O.D. | Shaped Charge   | Part Number    | Perforating Condition | Explosive  | Shot Density / Phasing                   | ^Casing O.D. | Performance in Concrete |               | Performance in Stressed Berea |               |
|--------------|-----------------|----------------|-----------------------|------------|--|--------------|-------------------------|---------------|-------------------------------|---------------|
|              |                 |                |                       |            |  | Application  | EHD (in)[cm]            | TTP (in)[cm]  | EHD^ (in)[cm]                 | TTP (in)[cm]  |
| 3-1/8" 19g   | 3319 Connex XEH | EC2-33A1941-RC | ‡ Fluid or Dry        | 19.0g, RDX | 5 spf / 60° (Dry)<br>6 spf / 60° (Fluid) | 4-1/2" L-80  |                         |               | 0.41 [1.04]                   | 14.20 [36.07] |
|              |                 | EC2-33A1942-RC |                       | 19.0g, HMX |  |              |                         |               | 0.42 [1.07]                   | 14.37 [36.50] |
|              | 3319 Basix GH   | EC2-33A1941    |                       | 19.0g, RDX |  |              | 0.60 [1.52]             | 28.55 [72.52] |                               |               |
|              |                 | EC2-33A1942    |                       | 19.0g, HMX |  |              |                         |               |                               |               |
| 3-1/8" 23g   | 3323 Connex XEH | EC2-33A2341-RC | Fluid                 | 22.7g, RDX | 6 spf / 60°                              | 4-1/2"       |                         |               | 0.43 [1.09]                   | 15.60 [39.62] |
|              |                 | EC2-33A2342-RC |                       | 22.7g, HMX |  |              |                         |               | 0.43 [1.09]                   | 15.89 [40.36] |
|              | 3323 Basix GH   | EC2-33A2341-E  |                       | 22.7g, RDX |  | 5-1/2" L-80  | 0.48 [1.22]             | 31.40 [79.76] |                               |               |
|              |                 | EC2-33A2342-E  |                       | 22.7g, HMX |  | 4-1/2"       |                         |               |                               |               |

‡ For 3-1/8" 19g in dry gas, maximum shot density is 5 spf or limited to one- (1) and two- (2) shot short guns only.

### HARDWARE

|                                      |  |
|--------------------------------------|--|
| Gun Body Configuration/Material      | Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel |
| Charge Tube Type & Retention         | Round steel tube strip, bend tab retention                                 |
| Type of Tandem Connection            | Switch tandem sub  |
| Nominal OD / Wall Thickness (in)[mm] | 3.15 [80.01] / 0.315 [8.00] or 3.125 [79.38] / 0.3125 [7.94]               |
| Upper/Lower Thread Connections       | 2.750" 6P ACME-2G  |

| Available Gun Lengths                     | 21'          | 15'          | 11'          | 7'          | 4'          | 3'          | 2'          |
|---|--------------|--------------|--------------|-------------|-------------|-------------|-------------|
| Typical Gun Length (ft) [m]               | 20.75 [6.32] | 14.75 [4.50] | 10.75 [3.28] | 6.75 [2.06] | 3.75 [1.14] | 2.75 [0.84] | 1.75 [0.53] |
| *** 4 SPF Total Number of Loadable Shots  | 080          | 056          | 040          | 024         | 012         | 008         | 004         |
| *** 5 SPF Total Number of Loadable Shots  | 100          | 070          | 050          | 030         | 015         | 010         | 005         |
| *** 6 SPF Total Number of Loadable Shots  | 120          | 084          | 060          | 036         | 018         | 012         | 006         |
| *** 6 SPF True Shot, Total Loadable Shots | 121          | 085          | 061          | 037         | 019         | 013         | 007         |

Contact your local GEODynamics representative for availability of metric part numbers and additional gun lengths.

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

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Revised: August 31, 2023 9:46 PM

# Conventional Long Guns

## 3-1/8 in (79 mm), 4-6 SPF

### COMPONENTS AND ACCESSORIES

| Description   | Part Number(s)   |
|---|--|
| <b>Short Quick Change (SQC) Assembly</b> (one per string, CCL to top sub)<br>Quick Rebuild Kit ( <i>contacts, teflon tubing, screw, spring, insulating retainer</i> )<br>Complete Rebuild Kit with O-Rings ( <i>all required parts</i> )                        | GN-QC31-0001<br>RKQ-GN-QC31-0001<br>RKC-GN-QC31-0001                                   |
| <b>Top Subs, 3-1/8", Ported</b><br>Top Sub Assembly, Ported, SQC Connection ( <i>recommended</i> )<br>Top Sub Assembly, Ported ( <i>connects to industry-standard quick change</i> )  | GN-R31-CQC20-A<br>GN-R31-T080-A  |
| <b>Top Sub, 3-1/8", Conventional and TCP</b><br>Wireline Insert & O-Ring<br>Spring Contact Assembly   | GN-R31-0020<br>GN-E00-0011 (o-ring: OR-N569-211)<br>GN-E00-0020                        |
| <b>Tandem Sub, 3-1/8", Conventional and TCP</b>   | GN-R31-0021  |
| <b>Switch Tandem Subs, 3-1/8", Ported</b><br>Switch Sub Assembly, 12" long, 6.24" make-up length<br>Switch Sub Assembly, 3.25" make-up length   | GN-R31-T150-A<br>GN-R31-T101-A   |
| Aligning Switch Sub, LH Lock Ring, 6.24" make-up length (MUL)<br>Aligning Switch Sub, RH Lock Ring, 6.24" MUL<br>Aligning Short Switch Sub, RH*, <i>*compatible with centralizer rings</i>  | GN-R31-T150L-A<br>GN-R31-T150R-A<br>GN-R31-T109R-A                                     |
| <b>Locking Rings, 3-1/8" Tandem Subs</b><br>Left-Hand Thread, HD<br>Right-Hand Thread, HD   | GN-R31-L001-319<br>GN-R31-R001-319   |
| <b>O-Ring Materials and Size, Nitrile</b> ( <i>standard option</i> )  | OR-N569-230  |
| <b>Port Plug and Port Plug O-Ring</b>   | GN-R00-T001 / OR-N569-217  |
| <b>Plug/Shoot Adapter Assembly, 3-1/8"</b>  | GN-R31-ST30  |
| <b>Bull Plugs</b><br>3-1/8" Standard<br>3-1/8" with 2-3/8" EUE Pin<br>3-1/8" with 2-7/8" EUE Pin  | GN-R31-0022<br>GN-R31-0023<br>GN-R31-0024  |
| <b>Thread Protectors</b><br>Carrier (Gun) Protector, 3-1/8"<br>Carrier (Gun) Plastic Plug Protector, 3-1/8"<br>Top Sub (Top Pin) Protector, 3-1/8"<br>Tandem Sub & Bull Plug Thread Protector, 3-1/8"<br>Bottom Sub Thread Protector (lower connection), 3-1/8" | GN-THD-312-030<br>GN-THD-312-300<br>GN-THD-312-020<br>GN-THD-312-040<br>GN-THD-312-040 |



WIRELINE INSERT  
GN-E00-0011

SPRING CONTACT ASSEMBLY  
GN-E00-0011  
(4-1/2" OD TOP SUB SHOWN FOR  
REFERENCE ONLY)



SHORT QUICK CHANGE ASSEMBLY  
GN-QC31-0001



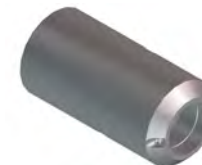
TOP SUB, SQC CONNECTION  
GN-R31-CQC20-A



SWITCH SUB ASSEMBLY  
GN-R31-T150-A



ALIGNING SWITCH SUB, LH LOCK RING  
GN-R31-T150L-A



PLUG/SHOOT ADAPTER  
GN-R31-ST30



BULL PLUG, STANDARD  
GN-R31-0022

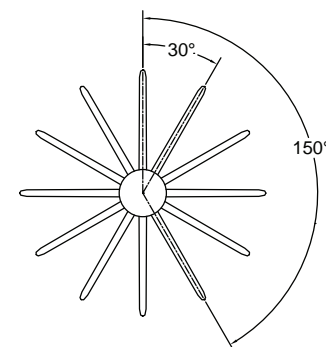
# Conventional Long Guns

## 3-1/8 in (79 mm), 12 SPF, SBH

GEODynamics' perforating systems use bi-directional boosters, non-lead azide explosives, customized connectors and inserts, and high-velocity, low-shrink detonating cord. Additionally, all GEODynamics gun assemblies are scalloped to optimize charge performance and prevent casing damage from perforating exit hole burrs. Shot phasing is designed to maintain the integrity and collapse resistance of the casing after perforating. These attributes, along with premium quality gun material and gun connectors, allow GEODynamics to deliver safe, efficient, and reliable perforating gun solutions to our customers.

## APPLICATION SPECIFICATIONS

|                                  |   |
|----------------------------------|---|
| Shot Density and Phasing Options | 12 SPF (150° - 30°); <a href="#">Available Gun Lengths</a> range from 2' to 21' |
| Initiation Point                 | Top- or bottom-fired options available; conventional wireline and TCP           |
| Mode of Fire                     | Simultaneous or selective fire  |
| Detonating Cord                  | 80-grain round  |
| Compatible Perforating Charges   | Basix™  |
| Maximum Gun Swell (in)[mm]       | 3.46 [87.88] @ 12.00g In Fluid  |



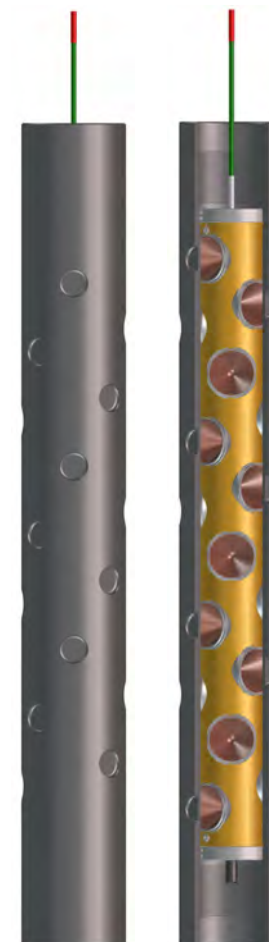
## ENVIRONMENTAL

|                             |   |
|-----------------------------|---|
| Maximum Pressure (psi)[MPa] | 20,000 [138]                                      |
| Maximum Tensile* (lbf)[kN]  | 202,300 [900] *Hardware Calculated Breaking Point |

## CARRIER SPECIFICATIONS

| Carrier Assembly<br>Part Number | Shot Density & Phasing |          | Gun End to Center of<br>First Scallop |        | Distance Shot to Shot |       | Approximate Weights |             |
|---------------------------------|------------------------|----------|---------------------------------------|--------|-----------------------|-------|---------------------|-------------|
|                                 | (spf) [spm]            | Phasing  | (in)                                  | (mm)   | (in)                  | (mm)  | Fully<br>Loaded     | Blank Gun   |
| GA3112-6031B-J***               | 12 spf [52 spm]        | 150°-30° | 6.00                                  | 152.40 | 1.00                  | 25.40 | 16.0 lb/ft          | 11.37 lb/ft |

\*\*\* Total number of shots (e.g., 15' 12 SPF, 150° gun is GA3112-6031B-J169. Refer to [Available Gun Lengths](#).



| Available Gun Lengths                     | 21'          | 15'          | 11'          | 7'          | 4'          | 3'          | 2'          |
|---|--------------|--------------|--------------|-------------|-------------|-------------|-------------|
| Typical Gun Length (ft) [m]               | 20.75 [6.32] | 14.75 [4.50] | 10.75 [3.28] | 6.75 [2.06] | 3.75 [1.14] | 2.75 [0.84] | 1.75 [0.53] |
| *** 12 SPF Total Number of Loadable Shots | 241          | 169          | 121          | 073         | 037         | 025         | 013         |

Contact your local GEODynamics representative for availability of metric part numbers and additional gun lengths.

# Conventional Long Guns

## 3-1/8 in (79 mm), 12 SPF, SBH

### SUPER BIG HOLE

| Carrier O.D. | Shaped Charge  | Part Number | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |              | Performance in Stressed Berea |              |
|--------------|----------------|-------------|-----------------------|------------|------------------------|--------------|-------------------------|--------------|-------------------------------|--------------|
|              |                |             |                       |            |                        | Application  | EHD (in)[cm]            | TTP (in)[cm] | EHD^ (in)[cm]                 | TTP (in)[cm] |
| 3-1/8" 12g   | 3112 Basix SBH | EC2-31B1231 | Fluid                 | 12.0g, RDX | 12 spf/150°            | 5.0" L-80    | 0.70 [1.78]             | 5.60 [14.22] | 0.65 [1.65]                   | 4.60 [11.68] |
|              |                | EC2-31B1232 |                       | 12.0g, HMX | 12 spf/135°-45°        |              |                         |              |                               |              |

Also available with zinc cases; P/N EC2-31C1231 (RDX) and EC2-31C1232 (HMX). Blank charge cases, 31B, steel: P/N EP-1112-100; 31C, zinc: P/N EP-1208-100-D.

### HARDWARE

|                                      |  |
|--------------------------------------|--|
| Gun Body Configuration/Material      | Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel |
| Charge Tube Type & Retention         | Round steel tube strip; bend tab retention                                 |
| Type of Tandem Connection            | Booster to booster (no splice)   |
| Nominal OD / Wall Thickness (in)[mm] | 3.15 [80.01] / 0.315 [8.00] or 3.125 [79.38] / 0.3125 [7.94]               |
| Upper/Lower Thread Connections       | 2.750" 6P ACME-2G  |

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

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# Conventional Long Guns

## 3-1/8 in (79 mm), 12 SPF, SBH

### COMPONENTS AND ACCESSORIES

| Description   | Part Number(s)   |
|---|--|
| <b>Short Quick Change (SQC) Assembly</b> (one per string, CCL to top sub)<br>Quick Rebuild Kit ( <i>contacts, teflon tubing, screw, spring, insulating retainer</i> )<br>Complete Rebuild Kit with O-Rings ( <i>all required parts</i> )                        | GN-QC31-0001<br>RKQ-GN-QC31-0001<br>RKC-GN-QC31-0001                                   |
| <b>Top Subs, 3-1/8", Ported</b><br>Top Sub Assembly, Ported, SQC Connection ( <i>recommended</i> )<br>Top Sub Assembly, Ported ( <i>connects to industry-standard quick change</i> )  | GN-R31-CQC20-A<br>GN-R31-T080-A  |
| <b>Top Sub, 3-1/8", Conventional and TCP</b><br>Wireline Insert & O-Ring<br>Spring Contact Assembly   | GN-R31-0020<br>GN-E00-0011 (o-ring: OR-N569-211)<br>GN-E00-0020                        |
| <b>Tandem Sub, 3-1/8", Conventional and TCP</b>   | GN-R31-0021  |
| <b>Switch Tandem Subs, 3-1/8", Ported</b><br>Switch Sub Assembly, 12" long, 6.24" make-up length<br>Switch Sub Assembly, 3.25" make-up length   | GN-R31-T150-A<br>GN-R31-T101-A   |
| Aligning Switch Sub, LH Lock Ring, 6.24" make-up length (MUL)<br>Aligning Switch Sub, RH Lock Ring, 6.24" MUL<br>Aligning Short Switch Sub, RH*, <i>*compatible with centralizer rings</i>  | GN-R31-T150L-A<br>GN-R31-T150R-A<br>GN-R31-T109R-A                                     |
| <b>Locking Rings, 3-1/8" Tandem Subs</b><br>Left-Hand Thread, HD<br>Right-Hand Thread, HD   | GN-R31-L001-319<br>GN-R31-R001-319   |
| <b>O-Ring Materials and Size, Nitrile</b> ( <i>standard option</i> )  | OR-N569-230  |
| <b>Port Plug and Port Plug O-Ring</b>   | GN-R00-T001 / OR-N569-217  |
| <b>Plug/Shoot Adapter Assembly, 3-1/8"</b>  | GN-R31-ST30  |
| <b>Bull Plugs</b><br>3-1/8" Standard<br>3-1/8" with 2-3/8" EUE Pin<br>3-1/8" with 2-7/8" EUE Pin  | GN-R31-0022<br>GN-R31-0023<br>GN-R31-0024  |
| <b>Thread Protectors</b><br>Carrier (Gun) Protector, 3-1/8"<br>Carrier (Gun) Plastic Plug Protector, 3-1/8"<br>Top Sub (Top Pin) Protector, 3-1/8"<br>Tandem Sub & Bull Plug Thread Protector, 3-1/8"<br>Bottom Sub Thread Protector (lower connection), 3-1/8" | GN-THD-312-030<br>GN-THD-312-300<br>GN-THD-312-020<br>GN-THD-312-040<br>GN-THD-312-040 |



WIRELINE INSERT  
GN-E00-0011

SPRING CONTACT ASSEMBLY  
GN-E00-0011  
(4-1/2" OD TOP SUB SHOWN FOR  
REFERENCE ONLY)



SHORT QUICK CHANGE ASSEMBLY  
GN-QC31-0001



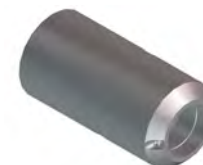
TOP SUB, SQC CONNECTION  
GN-R31-CQC20-A



SWITCH SUB ASSEMBLY  
GN-R31-T150-A



ALIGNING SWITCH SUB, LH LOCK RING  
GN-R31-T150L-A



PLUG/SHOOT ADAPTER  
GN-R31-ST30



BULL PLUG, STANDARD  
GN-R31-0022

# Conventional Long Guns

## 3-3/8 in (86 mm), 4-6 SPF

GEODynamics' perforating systems use bi-directional boosters, non-lead azide explosives, customized connectors and inserts, and high-velocity, low-shrink detonating cord. Additionally, all GEODynamics gun assemblies are scalloped to optimize charge performance and prevent casing damage from perforating exit hole burrs. Shot phasing is designed to maintain the integrity and collapse resistance of the casing after perforating. These attributes, along with premium quality gun material and gun connectors, allow GEODynamics to deliver safe, efficient, and reliable perforating gun solutions to our customers.

## APPLICATION SPECIFICATIONS

### Shot Density and Phasing Options

Multiple [Shot Density & Phasing](#) options; [Available Gun Lengths](#) range from 2' to 21'

### Initiation Point

Top- or bottom-fired options available; conventional wireline and TCP

### Mode of Fire

Simultaneous or selective fire

### Detonating Cord

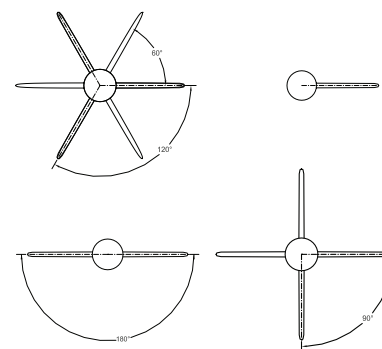
80-grain round

### Compatible Perforating Charges

FracIQ®, Connex®, Razor®, Basix™

### Maximum Gun Swell (in)[mm]

3.56 [90.42] @ 25.00g In Fluid; 3.63 [92.20] @ 22.7g Dry



## ENVIRONMENTAL

### Maximum Pressure (psi)[MPa]

22,700 [156.51]

### Maximum Tensile\* (lbf)[kN]

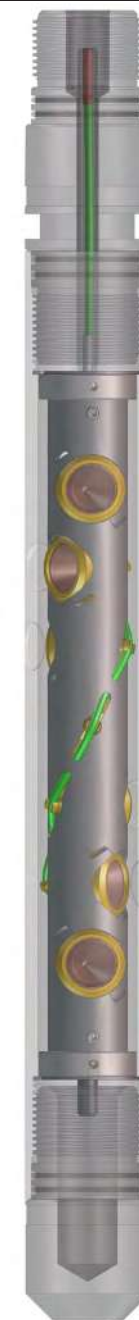
331,900 [1476.36] \*Hardware Calculated Breaking Point

## CARRIER SPECIFICATIONS

| Carrier Assembly<br>Part Number | Shot Density & Phasing Options |           | Gun End to Center of<br>First Scalloped |        | Distance<br>Shot to Shot |       | Approximate Weights       |                           |
|---------------------------------|--------------------------------|-----------|---|--------|--------------------------|-------|---------------------------|---------------------------|
|                                 | (spf) [spm]                    | Phasing   | (in)                                    | (mm)   | (in)                     | (mm)  | Fully<br>Loaded           | Blank Gun                 |
| GA3304-6033A-O***               | 4 spf [13 spm]                 | 0°        | 7.50                                    | 190.50 | 3.00                     | 76.20 |                           |                           |
| GA3304-6033A-A***               |                                | 60°       |   |        |                          |       |                           |                           |
| GA3304-6033A-B***               |                                | 90°       |   |        |                          |       |                           |                           |
| GA3304-6033A-G***               |                                | 120°      |   |        |                          |       |                           |                           |
| GA3305-6033A-J***               | 5 spf [16 spm]                 | 180°      | 7.20                                    | 182.88 | 2.40                     | 60.96 |                           |                           |
| GA3306-6033A-O***               | 6 spf [20 spm]                 | 0°        | 7.00                                    | 177.80 | 2.00                     | 50.80 | 15.25 lb/ft<br>(with sub) | 13.50 lb/ft<br>(with sub) |
| GA3306-6033A-A***               |                                | 60°       |   |        |                          |       |                           |                           |
| GA3306-6033A-L***               |                                | +30°/-30° |   |        |                          |       |                           |                           |
| GA3306-6033A-A***T              |                                | 60°       | 6.00                                    | 152.40 | 2.00                     | 50.80 |                           |                           |

\*\*\* Total number of shots (e.g., 15' 6 SPF, 60° gun is GA3306-6033A-A084. Refer to [Available Gun Lengths](#).

L\*\*\* = Low Side phasing (2 rows, 60° apart); A\*\*\*T = True Shot interval



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# Conventional Long Guns

## 3-3/8 in (86 mm), 4-6 SPF

### CONSTANT ENTRY HOLE AND PENETRATION

| Carrier O.D.   | Shaped Charge | Part Number | Perforating Condition | Explosive  | Shot Density / Phasing | API 19B Targeted Pipe* | Performance in Stressed Berea (API RP19B Sec. 2) |                             |              |
|----------------|---------------|-------------|-----------------------|------------|------------------------|------------------------|--|-----------------------------|--------------|
|                |               |             |                       |            |                        |                        | EHD <sup>^</sup> (in)[cm]                        | EHD Variation Decentralized | TTP (in)[cm] |
| 3-3/8" 12g-13g | FracIQ 20     | EC2-33A1271 | Fluid                 | 12.0g, RDX | 6 spf / 60°            | 4.5"-5.5" OD P110      | 0.22 [0.56]                                      | 5.5%                        | 5.0 [12.70]  |
|                | FracIQ 25     | EC2-33A1371 |                       | 13.0g, RDX |                        | 6.0" OD P110           | 0.26 [0.66]                                      | 2.3 %                       |              |

### DEEP PENETRATING/EXTREME DEEP PENETRATING

| Carrier O.D. | Shaped Charge   | Part Number    | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |                | Performance in Stressed Berea |               |
|--------------|-----------------|----------------|-----------------------|------------|------------------------|--------------|-------------------------|----------------|-------------------------------|---------------|
|              |                 |                |                       |            |                        | Application  | EHD (in)[cm]            | TTP (in)[cm]   | EHD <sup>^</sup> (in)[cm]     | TTP (in)[cm]  |
| 3-3/8" 19g   | 3319 Connex RX  | EC2-33A1991-RX | In Fluid or Dry       | 19.0g, RDX | 6 spf / 60°            | 5-1/2"       |                         |                | 0.32 [0.81]                   | 11.30 [28.70] |
|              |                 | EC2-33A1992-RX |                       | 19.0g, HMX |                        |              |                         |                | 0.32 [0.81]                   | 11.60 [29.46] |
|              | 3319 Razor XDP  | EC2-33A1921    |                       | 19.0g, RDX |                        | 4-1/2"       | 0.51 [1.30]             | 42.07 [106.86] |                               |               |
|              |                 | EC2-33A1922    |                       | 19.0g, HMX |                        |              |                         |                | 0.43 [1.09]                   | 14.60 [37.08] |
| 3-3/8" 23g   | 3323 Connex SDP | EC2-33A2321-RC | In Fluid or Dry       | 22.7g, RDX | 6 spf / 60°            | 4-1/2" L-80  |                         |                | 0.40 [1.02]                   | 15.60 [39.62] |
|              |                 | EC2-33A2322-RC |                       | 22.7g, HMX |                        |              |                         |                | 0.46 [1.17]                   | 15.31 [38.89] |
|              |                 | EC2-33A2323-RC |                       | 22.7g, HNS |                        |              |                         |                | 0.36 [0.91]                   | 11.85 [30.10] |
|              |                 | EC2-33A2321    |                       | 22.7g, RDX |                        |              |                         |                | 0.41 [1.04]                   | 16.40 [41.66] |
|              | 3323 Razor XDP  | EC2-33A2322    | In Fluid or Dry       | 22.7g, HMX |                        |              | 0.45 [1.14]             | 46.32 [117.65] | 0.44 [1.12]                   | 15.68 [39.83] |
|              |                 | EC2-33A2323    |                       | 22.7g, HNS |                        |              |                         |                | 0.37 [0.94]                   | 12.12 [30.78] |
|              |                 | EC2-33A2321-E  |                       | 22.7g, RDX |                        |              | 0.45 [1.14]             | 46.32 [117.65] | 0.39 [0.99]                   | 12.30 [31.24] |
|              | 3323 Basix XDP  | EC2-33A2322-E  | In Fluid or Dry       | 22.7g, HMX |                        |              | 0.44 [1.12]             | 46.90 [119.13] |                               |               |
|              |                 | EC2-33A2321-EG |                       | 22.7g, RDX |                        |              |                         |                | 0.41 [1.04]                   | 11.90 [30.23] |
|              | 3323 Basix GH   | EC2-33A2322-EG | Fluid                 | 22.7g, HMX |                        |              |                         |                | 0.40 [1.02]                   | 11.90 [30.23] |
|              |                 | EC2-33A2351    | In Fluid or Dry       | 22.7g, RDX |                        |              | 0.47 [1.19]             | 32.10 [81.53]  |                               |               |
|              | 3323 Basix DP   | EC2-33A2352    |                       | 22.7g, HMX |                        |              |                         |                |                               |               |
|              | 3325 Connex SDP | EC2-33B2521-RC | Fluid                 | 25.0g, RDX | 6 spf / 60°            | 4-1/2" L-80  |                         |                | 0.40 [1.02]                   | 15.10 [38.35] |
|              |                 | EC2-33B2522-RC |                       | 25.0g, HMX |                        |              |                         |                | 0.48 [1.22]                   | 15.45 [39.24] |
|              |                 | EC2-33B2523-RC |                       | 25.0g, HNS |                        |              |                         |                | 0.35 [0.89]                   | 12.30 [31.24] |
|              | 3325 Razor XDP  | EC2-33B2521    |                       | 25.0g, RDX |                        |              | 0.45 [1.14]             | 44.58 [113.23] | 0.39 [0.99]                   | 17.10 [43.43] |
|              |                 | EC2-33B2522    |                       | 25.0g, HMX |                        |              | 0.53 [1.35]             | 47.30 [120.14] | 0.50 [1.27]                   | 16.27 [41.33] |
|              |                 | EC2-33B2523    |                       | 25.0g, HNS |                        |              | 0.37 [0.94]             | 30.20 [76.71]  | 0.36 [0.91]                   | 13.20 [33.53] |
|              | 3325 Basix XDP  | EC2-33B2521-E  |                       | 25.0g, RDX |                        |              | 0.45 [1.14]             | 50.08 [127.20] | 0.40 [1.02]                   | 12.30 [31.24] |
|              |                 | EC2-33B2522-E  |                       | 25.0g, HMX |                        |              | 0.47 [1.19]             | 47.42 [120.45] |                               |               |

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

<sup>^</sup>EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

FLUID: Qualified for shooting in FLUID only with perforating systems qualified by GEODynamics.

IN FLUID or DRY: Qualified for shooting in FLUID or DRY GAS with perforating systems qualified by GEODynamics.

Revised: August 31, 2023 9:46 PM

# Conventional Long Guns

## 3-3/8 in (86 mm), 4-6 SPF



### BIG HOLE

| Carrier O.D. | Shaped Charge | Part Number | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |              | Performance in Stressed Berea |              |
|--------------|---------------|-------------|-----------------------|------------|------------------------|--------------|-------------------------|--------------|-------------------------------|--------------|
|              |               |             |                       |            |                        | Application  | EHD (in)[cm]            | TTP (in)[cm] | EHD^ (in)[cm]                 | TTP (in)[cm] |
| 3-3/8" 23g   | 3323 Basix BH | EC2-33A2331 | Fluid                 | 22.7g, RDX | 6 spf / 60°            | 5-1/2" L-80  | 0.70 [1.78]             | 5.79 [14.71] | 0.69 [1.75]                   | 4.05 [10.29] |
|              |               | EC2-33A2332 |                       | 22.7g, HMX |                        |              |                         |              |                               |              |

### GOOD HOLE

| Carrier O.D. | Shaped Charge   | Part Number    | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |               | Performance in Stressed Berea |               |  |
|--------------|-----------------|----------------|-----------------------|------------|------------------------|--------------|-------------------------|---------------|-------------------------------|---------------|--|
|              |                 |                |                       |            |                        | Application  | EHD (in)[cm]            | TTP (in)[cm]  | EHD^ (in)[cm]                 | TTP (in)[cm]  |  |
| 3-3/8" 19g   | 3319 Connex XEH | EC2-33A1941-RC | In Fluid or Dry       | 19.0g, RDX | 6 spf / 60°            | 4-1/2" L-80  |                         |               | 0.41 [1.04]                   | 14.20 [36.07] |  |
|              |                 | EC2-33A1942-RC |                       | 19.0g, HMX |                        |              |                         |               | 0.42 [1.07]                   | 14.37 [36.50] |  |
| 3-3/8" 23g   | 3323 Connex XEH | EC2-33A2341-RC | In Fluid or Dry       | 22.7g, RDX |                        |              |                         |               | 0.43 [1.09]                   | 15.60 [39.62] |  |
|              |                 | EC2-33A2342-RC |                       | 22.7g, HMX |                        |              |                         |               | 0.43 [1.09]                   | 15.89 [40.36] |  |
|              | 3323 Basix GH   | EC2-33A2341    |                       | 22.7g, RDX |                        |              | 0.52 [1.32]             | 33.58 [85.29] |                               |               |  |
|              |                 | EC2-33A2342    |                       | 22.7g, HMX |                        |              |                         |               |                               |               |  |
| 3-3/8" 25g   | 3325 Connex XEH | EC2-33B2541-RC | Fluid                 | 25.0g, RDX |                        |              |                         |               |                               |               |  |
|              |                 | EC2-33B2542-RC |                       | 25.0g, HMX |                        |              |                         |               | 0.40 [1.02]                   | 14.92 [37.90] |  |
|              | 3325 Basix GH   | EC2-33B2541    |                       | 25.0g, RDX |                        |              | 0.57 [1.45]             | 25.91 [65.81] | 0.50 [1.27]                   | 16.50 [41.91] |  |
|              |                 |                |                       |            |                        |              |                         |               |                               |               |  |

### HARDWARE

|                                      |  |
|--------------------------------------|--|
| Gun Body Configuration/Material      | Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel |
| Charge Tube Type & Retention         | Round steel tube strip; bend tab retention                                 |
| Type of Tandem Connection            | Booster to booster (no splice)   |
| Nominal OD / Wall Thickness (in)[mm] | 3.375 [85.73] / 0.375 [9.53]   |
| Upper/Lower Thread Connections       | 2.8125" - 6P ACME-2G   |

| Available Gun Lengths                     | 21'          | 15'          | 11'          | 7'          | 4'          | 3'          | 2'          |
|---|--------------|--------------|--------------|-------------|-------------|-------------|-------------|
| Typical Gun Length (ft) [m]               | 20.75 [6.32] | 14.75 [4.50] | 10.75 [3.28] | 6.75 [2.06] | 3.75 [1.14] | 2.75 [0.84] | 1.75 [0.53] |
| *** 4 SPF Total Number of Loadable Shots  | 080          | 056          | 040          | 024         | 012         | 008         | 004         |
| *** 5 SPF Total Number of Loadable Shots  | 100          | 070          | 050          | 030         | 015         | 010         | 005         |
| *** 6 SPF Total Number of Loadable Shots  | 120          | 084          | 060          | 036         | 018         | 012         | 006         |
| *** 6 SPF True Shot, Total Loadable Shots | 121          | 085          | 061          | 037         | 019         | 013         | 007         |

Contact your local GEOdynamics representative for availability of metric part numbers and additional gun lengths.

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

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Revised: August 31, 2023 9:46 PM

# Conventional Long Guns

## 3-3/8 in (86 mm), 4-6 SPF

### COMPONENTS AND ACCESSORIES

| Description  | Part Number(s)                    |                |
|--|-----------------------------------|----------------|
| <b>Short Quick Change (SQC) Assembly</b> (one per string, CCL to top sub)                | GN-QC31-0001                      |                |
| Quick Rebuild Kit ( <i>contacts, teflon tubing, screw, spring, insulating retainer</i> ) | RKQ-GN-QC31-0001                  |                |
| Complete Rebuild Kit with O-Rings ( <i>all required parts</i> )                          | RKC-GN-QC31-0001                  |                |
| <b>TCP Transfer Kit (2-3/4" through 4")</b>  | GN-000-0025                       |                |
| <b>Top Sub, 3-3/8", Conventional and TCP</b>   | GN-R33-0020                       |                |
| Wireline Insert & O-Ring   | GN-E00-0011 (o-ring: OR-N569-211) |                |
| Spring Contact Assembly  | GN-E00-0020                       |                |
| Top Sub, Wireline  | GN-R33-0035                       |                |
| Top Sub, Ported, SQC Connection  | GN-R33-CQC20-A                    |                |
| <b>Top Sub Lift Sub Assembly, 3-3/8"</b>   | TC-LT33-000                       |                |
| <b>Tandem Sub, 3-3/8", Conventional and TCP</b>  | GN-R33-0021                       |                |
| Ported Switch Tandem Sub Assembly, 12" long, 6.24" make-up length                        | GN-R33-T150-A                     |                |
| Ported Switch Tandem Sub Assembly, 3.25" make-up length                                  | GN-R33-T100-A                     |                |
| Aligning Switch Sub, LH Lock Ring, 6.24" make-up length (MUL)                            | GN-R33-T150L-A                    |                |
| Aligning Switch Sub, RH Lock Ring, 6.24" MUL   | GN-R33-T150R-A                    |                |
| Aligning Short Switch Sub, RH*, *compatible with centralizer rings                       | GN-R33-T109R-A                    |                |
| Locking Ring, Left-Hand Thread   | GN-R33-L001                       |                |
| Locking Ring, Right-Hand Thread  | GN-R33-R001                       |                |
| <b>O-Ring Materials and Size</b>   | Top Connection                    | Gun Connection |
| Nitrile (standard option)  | OR-N569-230                       | OR-N569-231    |
| Viton (with back-up rings required for > 325°F)  | OR-V95G-230                       | OR-V95G-231    |
| Back-up rings for > 325°F  | OR-B230-2813                      | OR-B231-2870   |
| <b>Port Plug and Port Plug O-Ring</b>  | GN-R00-T001 / OR-N569-217         |                |
| 3-3/8" Bull Plug, Standard   | GN-R33-0022                       |                |
| 3-3/8" Bull Plug, with 2-3/8" EUE Pin  | GN-R33-0023                       |                |
| 3-3/8" Bull Plug, with 2-7/8" EUE Pin  | GN-R33-0024                       |                |
| <b>Plug/Shoot Adapter Assembly, 3-3/8"</b>   | GN-R33-ST30                       |                |
| <b>Thread Protectors, 3-3/8"</b>   |                                   |                |
| Top Sub (Top Pin)  | GN-THD-312-020                    |                |
| Carrier (Gun) Plastic Plug Protector   | GN-THD-338-100                    |                |
| Carrier (Gun) Protector  | GN-THD-338-030                    |                |
| Tandem Sub & Bull Plug Protector   | GN-THD-338-040                    |                |



WIRELINE INSERT  
GN-E00-0011

SPRING CONTACT ASSEMBLY  
GN-E00-0011  
(4-1/2" OD TOP SUB SHOWN FOR  
REFERENCE ONLY)



TOP SUB  
GN-R33-0020



TANDEM SUB  
GN-R33-0021



SWITCH TANDEM SUB ASSY  
GN-R33-T100-A



ALIGNING SWITCH SUB,  
LH LOCK RING  
GN-R33-T150L-A



SHORT QUICK CHANGE ASSEMBLY  
GN-QC31-0001



TOP SUB, SQC CONNECTION  
GN-R33-CQC20-A



TOP SUB, WIRELINE  
GN-R33-0035



SWITCH TANDEM SUB  
GN-R33-T150



BULL PLUG, STANDARD  
GN-R33-0022



PLUG/SHOOT ADAPTER  
GN-R33-ST30

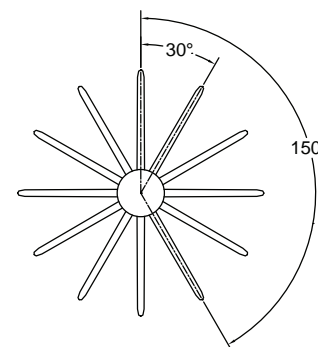
# Conventional Long Guns

## 3-3/8 in (86 mm), 12 SPF, SBH

GEODynamics' perforating systems use bi-directional boosters, non-lead azide explosives, customized connectors and inserts, and high-velocity, low-shrink detonating cord. Additionally, all GEODynamics gun assemblies are scalloped to optimize charge performance and prevent casing damage from perforating exit hole burrs. Shot phasing is designed to maintain the integrity and collapse resistance of the casing after perforating. These attributes, along with premium quality gun material and gun connectors, allow GEODynamics to deliver safe, efficient, and reliable perforating gun solutions to our customers.

## APPLICATION SPECIFICATIONS

|                                  |   |
|----------------------------------|---|
| Shot Density and Phasing Options | 12 SPF (150° - 30°); Available Gun Lengths range from 2' to 21'       |
| Initiation Point                 | Top- or bottom-fired options available; conventional wireline and TCP |
| Mode of Fire                     | Simultaneous or selective fire  |
| Detonating Cord                  | 80-grain round  |
| Compatible Perforating Charges   | Basix™ and IsoLoc™  |
| Maximum Gun Swell (in)[mm]       | 3.46 [87.88] @ 12.00g In Fluid  |



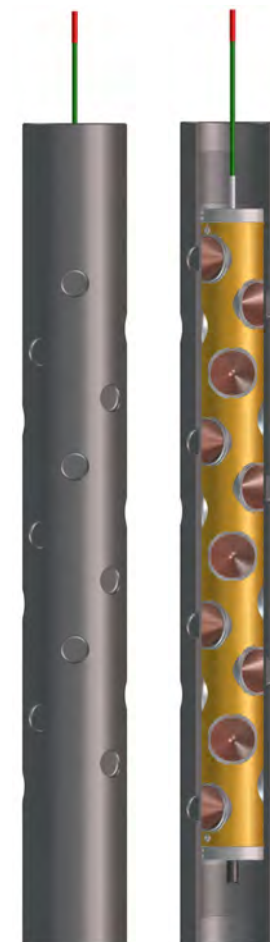
## ENVIRONMENTAL

|                             |   |
|-----------------------------|---|
| Maximum Pressure (psi)[MPa] | 20,000 [138]  |
| Maximum Tensile* (lbf)[kN]  | 331,900 [1476.36] *Hardware Calculated Breaking Point |

## CARRIER SPECIFICATIONS

| Carrier Assembly<br>Part Number | Shot Density & Phasing |          | Gun End to Center of<br>First Scallop |        | Distance Shot to Shot |       | Approximate Weights |             |
|---------------------------------|------------------------|----------|---------------------------------------|--------|-----------------------|-------|---------------------|-------------|
|                                 | (spf) [spm]            | Phasing  | (in)                                  | (mm)   | (in)                  | (mm)  | Fully Loaded        | Blank Gun   |
| GA3312-5831B-J***               | 12 spf [52 spm]        | 150°-30° | 6.00                                  | 152.40 | 1.00                  | 25.40 | 16.0 lb/ft          | 13.50 lb/ft |

\*\*\* Total number of shots (e.g., 15' 12 SPF, 150° gun is GA3312-5381B-J**169**. Refer to Available Gun Lengths.



| Available Gun Lengths                     | 21'          | 15'          | 11'          | 7'          | 4'          | 3'          | 2'          |
|---|--------------|--------------|--------------|-------------|-------------|-------------|-------------|
| Typical Gun Length (ft) [m]               | 20.75 [6.32] | 14.75 [4.50] | 10.75 [3.28] | 6.75 [2.06] | 3.75 [1.14] | 2.75 [0.84] | 1.75 [0.53] |
| *** 12 SPF Total Number of Loadable Shots | 241          | 169          | 121          | 073         | 037         | 025         | 013         |

Contact your local GEODynamics representative for availability of metric part numbers and additional gun lengths.



# Conventional Long Guns

## 3-3/8 in (86 mm), 12 SPF, SBH

### SUPER BIG HOLE

| Carrier O.D. | Shaped Charge  | Part Number | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |              | Performance in Stressed Berea |              |
|--------------|----------------|-------------|-----------------------|------------|------------------------|--------------|-------------------------|--------------|-------------------------------|--------------|
|              |                |             |                       |            |                        | Application  | EHD (in)[cm]            | TTP (in)[cm] | EHD^ (in)[cm]                 | TTP (in)[cm] |
| 3-3/8" 12g   | 3112 Basix SBH | EC2-31B1231 | Fluid                 | 12.0g, RDX | 12 spf/150°            | 5-1/2" L-80  | 0.71 [1.80]             | 5.88 [14.94] | 0.66 [1.68]                   | 4.70 [11.94] |
|              |                | EC2-31B1232 |                       | 12.0g, HMX |                        |              |                         |              |                               |              |

Also available with zinc cases; P/N EC2-31C1231 (RDX) and EC2-31C1232 (HMX). Blank charge cases, 31B, steel: P/N EP-1112-100; 31C, zinc: P/N EP-1208-100-D.

### PLUG AND ABANDON

| Product Name | Part Number | Perforating Condition | Explosive | Shot Density and Phasing | Inner Casing    | Inner Casing EH (in)[cm] | Outer Casing    | Outer Casing EH (in)[cm] |
|--------------|-------------|-----------------------|-----------|--------------------------|-----------------|--------------------------|-----------------|--------------------------|
| 3107 IsoLoc  | EC2-31B0731 | Fluid                 | 7.0g, RDX | 12 spf/150°-30°          | 5.5" 23.5# P110 | 0.51 [1.30]              | 7.625" 39# P110 | No Damage                |

Fluid between gun and innermost casing is water. Data is based on centralized gun position; decentralized data available on request.

### HARDWARE

|                                      |  |
|--------------------------------------|--|
| Gun Body Configuration/Material      | Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel |
| Charge Tube Type & Retention         | Round steel tube strip; bend tab retention                                 |
| Type of Tandem Connection            | Booster to booster (no splice)   |
| Nominal OD / Wall Thickness (in)[mm] | 3.375 [85.73] / 0.375 [9.53]   |
| Upper/Lower Thread Connections       | 2.8125" - 6P ACME-2G   |

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

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Revised: August 31, 2023 9:21 PM

# Conventional Long Guns

## 3-3/8 in (86 mm), 12 SPF, SBH

### COMPONENTS AND ACCESSORIES

| Description  | Part Number(s)   |  |
|--|--|--|
| <b>Short Quick Change (SQC) Assembly</b> (one per string, CCL to top sub)<br>Quick Rebuild Kit ( <i>contacts, teflon tubing, screw, spring, insulating retainer</i> )<br>Complete Rebuild Kit with O-Rings ( <i>all required parts</i> ) | GN-QC31-0001<br>RKQ-GN-QC31-0001<br>RKC-GN-QC31-0001   |  |
| <b>TCP Transfer Kit (2-3/4" through 4")</b>  | GN-000-0025  |  |
| <b>Top Sub, 3-3/8", Conventional and TCP</b><br>Wireline Insert & O-Ring<br>Spring Contact Assembly<br>Top Sub, Wireline<br>Top Sub, Ported, SQC Connection  | GN-R33-0020<br>GN-E00-0011 (o-ring: OR-N569-211)<br>GN-E00-0020<br>GN-R33-0035<br>GN-R33-CQC20-A |  |
| <b>Top Sub Lift Sub Assembly, 3-3/8"</b>   | TC-LT33-000  |  |
| <b>Tandem Sub, 3-3/8", Conventional and TCP</b>  | GN-R33-0021  |  |
| Ported Switch Tandem Sub Assembly, 12" long, 6.24" make-up length<br>Ported Switch Tandem Sub Assembly, 3.25" make-up length   | GN-R33-T150-A<br>GN-R33-T100-A   |  |
| Aligning Switch Sub, LH Lock Ring, 6.24" make-up length (MUL)<br>Aligning Switch Sub, RH Lock Ring, 6.24" MUL<br>Aligning Short Switch Sub, RH*, *compatible with centralizer rings  | GN-R33-T150L-A<br>GN-R33-T150R-A<br>GN-R33-T109R-A   |  |
| Locking Ring, Left-Hand Thread<br>Locking Ring, Right-Hand Thread  | GN-R33-L001<br>GN-R33-R001   |  |
| <b>O-Ring Materials and Size</b><br>Nitrile (standard option)<br>Viton (with back-up rings required for > 325°F)<br>Back-up rings for > 325°F  | Top Connection<br>OR-N569-230<br>OR-V95G-230<br>OR-B230-2813                                     | Gun Connection<br>OR-N569-231<br>OR-V95G-231<br>OR-B231-2870 |
| <b>Port Plug and Port Plug O-Ring</b>  | GN-R00-T001 / OR-N569-217  |  |
| 3-3/8" Bull Plug, Standard<br>3-3/8" Bull Plug, with 2-3/8" EUE Pin<br>3-3/8" Bull Plug, with 2-7/8" EUE Pin   | GN-R33-0022<br>GN-R33-0023<br>GN-R33-0024  |  |
| <b>Plug/Shoot Adapter Assembly, 3-3/8"</b>   | GN-R33-ST30  |  |
| <b>Thread Protectors, 3-3/8"</b><br>Top Sub (Top Pin)<br>Carrier (Gun) Plastic Plug Protector<br>Carrier (Gun) Protector<br>Tandem Sub & Bull Plug Protector   | GN-THD-312-020<br>GN-THD-338-100<br>GN-THD-338-030<br>GN-THD-338-040                             |  |



WIRELINE INSERT  
GN-E00-0011

SPRING CONTACT ASSEMBLY  
GN-E00-0011  
(4-1/2" OD TOP SUB SHOWN FOR  
REFERENCE ONLY)



TOP SUB  
GN-R33-0020



TANDEM SUB  
GN-R33-0021



SWITCH TANDEM SUB ASSY  
GN-R33-T100-A



SHORT QUICK CHANGE ASSEMBLY  
GN-QC31-0001



TOP SUB, SQC CONNECTION  
GN-R33-CQC20-A



TOP SUB, WIRELINE  
GN-R33-0035



SWITCH TANDEM SUB  
GN-R33-T150



PLUG/SHOOT ADAPTER  
GN-R33-ST30



BULL PLUG, STANDARD  
GN-R33-0022

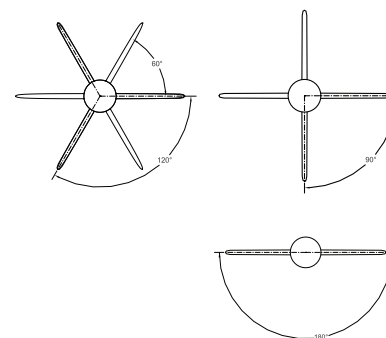
# Conventional Long Guns

## 4 in (102 mm), 4-6 SPF, XDP

GEODynamics' perforating systems use bi-directional boosters, non-lead azide explosives, customized connectors and inserts, and high-velocity, low-shrink detonating cord. Additionally, all GEODynamics gun assemblies are scalloped to optimize charge performance and prevent casing damage from perforating exit hole burrs. Shot phasing is designed to maintain the integrity and collapse resistance of the casing after perforating. These attributes, along with premium quality gun material and gun connectors, allow GEODynamics to deliver safe, efficient, and reliable perforating gun solutions to our customers.

## APPLICATION SPECIFICATIONS

|                                |   |
|--------------------------------|---|
| Shot Density and Phasing       | Multiple <a href="#">Shot Density &amp; Phasing</a> options; Available Gun Lengths range from 2' to 21' |
| Initiation Point               | Top- or bottom-fired options available; conventional wireline and TCP                                   |
| Mode of Fire                   | Simultaneous or selective fire  |
| Detonating Cord                | 80-grain round  |
| Compatible Perforating Charges | Connex®, Razor®, Basix™   |
| Maximum Gun Swell (in)[mm]     | 4.16 [105.66] @ 39.0g, In Fluid   |

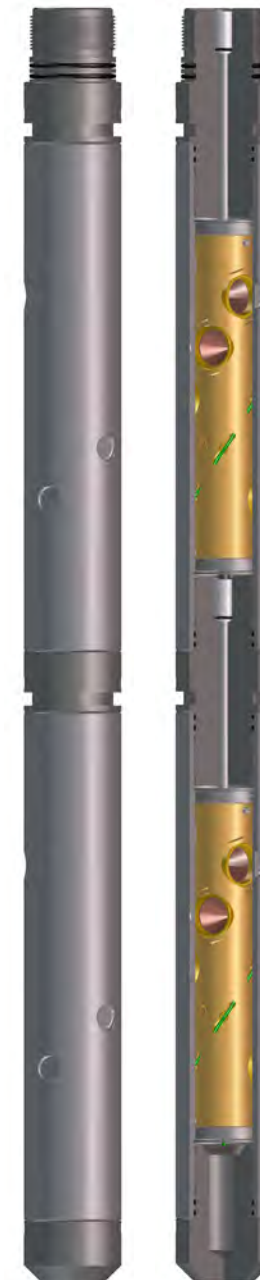


## ENVIRONMENTAL

|                             |  |
|-----------------------------|--|
| Maximum Pressure (psi)[MPa] | 19,700 [135] (4 SPF carrier)                       |
| Maximum Tensile* (lbf)[kN]  | 434,400 [1932] *Hardware Calculated Breaking Point |

## CARRIER SPECIFICATIONS

| Carrier Assembly<br>Part Number |                    | Shot Density & Phasing Options |          | Gun End to Center of<br>First Scalloped |        | Distance<br>Shot to Shot |       | Approximate Weights       |                           |
|---------------------------------|--------------------|--------------------------------|----------|---|--------|--------------------------|-------|---------------------------|---------------------------|
|                                 |                    | (spf) [spm]                    | Phasing  | (in)                                    | (mm)   | (in)                     | (mm)  | Fully<br>Loaded           | Blank Gun                 |
| 40A<br>Charge<br>Case           | GA4004-4540A-A***  | 4 spf [13 spm]                 | 60°      | 7.50                                    | 190.50 | 3.00                     | 76.20 | 22.05 lb/ft<br>(with sub) | 17.69 lb/ft<br>(with sub) |
|                                 | GA4004-4540A-B***  |                                | 90°      |   |        |                          |       |                           |                           |
|                                 | GA4004-4540A-G***  |                                | 120°     |   |        |                          |       |                           |                           |
|                                 | GA4004-4540A-OL*** |                                | 0°/+5/-5 |   |        |                          |       |                           |                           |
| 33A/<br>33B<br>Charge<br>Cases  | GA4005-6033A-A***  | 5 spf [16 spm]                 | 60°      | 7.20                                    | 182.88 | 2.40                     | 60.96 |                           |                           |
|                                 | GA4005-6033A-J***  |                                | 180°     |   |        |                          |       |                           |                           |
|                                 | GA4006-6033A-A***  | 6 spf [20 spm]                 | 60°      | 7.00                                    | 177.80 | 2.00                     | 50.80 |                           |                           |



# Conventional Long Guns

## 4 in (102 mm), 4-6 SPF, XDP

### DEEP PENETRATING/EXTREME DEEP PENETRATING (40A CHARGE CASE)

| Carrier O.D. | Shaped Charge   | Part Number    | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete  |                          | Performance in Stressed Berea |                          |  |
|--------------|-----------------|----------------|-----------------------|------------|------------------------|--------------|--------------------------|--------------------------|-------------------------------|--------------------------|--|
|              |                 |                |                       |            |                        | Application  | EHD <sup>(in)</sup> [cm] | TTP <sup>(in)</sup> [cm] | EHD^ <sup>(in)</sup> [cm]     | TTP <sup>(in)</sup> [cm] |  |
| 4" 39g       | 4039 Connex SDP | EC2-40A3921-RC | Fluid                 | 39.0g, RDX | 4 spf / 60°            | 5-1/2" L-80  |                          |                          | 0.41 [1.04]                   | 17.15 [43.56]            |  |
|              |                 | EC2-40A3922-RC |                       | 39.0g, HMX |                        |              |                          |                          | 0.43 [1.09]                   | 17.80 [45.21]            |  |
|              |                 | EC2-40A3923-RC |                       | 39.0g, HNS |                        |              |                          |                          | 0.36 [0.91]                   | 15.20 [38.61]            |  |
|              | 4039 Razor XDP  | EC2-40A3921    |                       | 39.0g, RDX | 4 spf / 60°            |              | 0.39 [0.99]              | 53.00 [134.62]           | 0.38 [0.97]                   | 18.60 [47.24]            |  |
|              |                 | EC2-40A3922    |                       | 39.0g, HMX | 4 spf / 90°            |              | 0.39 [0.99]              | 53.00 [134.62]           | 0.37 [0.94]                   | 19.10 [48.51]            |  |
|              | 4039 Basix XDP  | EC2-40A3921-E  |                       | 39.0g, RDX | 4 spf / 60°            |              |                          |                          | 0.56 [1.42]                   | 16.10 [40.89]            |  |
|              |                 | EC2-40A3922-E  |                       | 39.0g, HMX |                        |              |                          |                          | 0.44 [1.12]                   | 16.30 [41.40]            |  |
|              |                 |                |                       |            |                        |              |                          |                          |                               |                          |  |

### DYNAMIC UNDERBALANCE PUNCHERS (40A CHARGE CASE)

| Carrier O.D. | Product Name      | Part Number | Explosive | Exit Hole (in)[cm] |
|--------------|-------------------|-------------|-----------|--------------------|
| 4"           | 4008 GEOPunch RDX | EC2-40A0861 | 8.0g, RDX | 1.05 [2.67]        |
|              | 4008 GEOPunch HMX | EC2-40A0862 | 8.0g, HMX |                    |
|              | 4008 GEOPunch HNS | EC2-40A0863 | 8.0g, HNS |                    |

### DEEP PENETRATING/EXTREME DEEP PENETRATING (33A/33B CHARGE CASES)

| Carrier O.D. | Shaped Charge   | Part Number    | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |                | Performance in Stressed Berea |               |
|--------------|-----------------|----------------|-----------------------|------------|------------------------|--------------|-------------------------|----------------|-------------------------------|---------------|
|              |                 |                |                       |            |                        | Application  | EHD (in)[cm]            | TTP (in)[cm]   | EHD^ (in)[cm]                 | TTP (in)[cm]  |
| 4" 23g       | 3323 Connex SDP | EC2-33A2322-RC | Fluid                 | 22.7g, HMX | 6 spf / 60°            | 5-1/2" L-80  |                         |                | 0.46 [1.17]                   | 15.31 [38.89] |
| 4" 25g       | 3325 Razor XDP  | EC2-33B2521    | In Fluid or Dry       | 25.0g, RDX |                        |              |                         |                |                               |               |
|              |                 | EC2-33B2522    |                       | 25.0g, HMX |                        |              | 0.47 [1.19]             | 46.11 [117.12] |                               |               |
|              |                 |                |                       |            |                        |              |                         |                |                               |               |
|              | 3325 Basix XDP  | EC2-33B2521-E  | Fluid                 | 25.0g, RDX |                        |              |                         |                | 0.44 [1.18]                   | 12.50 [31.75] |
|              |                 | EC2-33B2522-E  |                       | 25.0g, HMX |                        |              |                         |                | 0.44 [1.18]                   | 12.70 [32.26] |

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

FLUID: Qualified for shooting in FLUID only with perforating systems qualified by GEODynamics.

IN FLUID or DRY: Qualified for shooting in FLUID or DRY GAS with perforating systems qualified by GEODynamics.

Revised: August 31, 2023 9:46 PM

# Conventional Long Guns

## 4 in (102 mm), 4-6 SPF, XDP

### HARDWARE

|                                      |  |
|--------------------------------------|--|
| Gun Body Configuration/Material      | Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel |
| Charge Tube Type & Retention         | Round steel tube strip; bend tab retention                                 |
| Type of Tandem Connection            | Booster to booster (no splice)   |
| Nominal OD / Wall Thickness (in)[mm] | 4.00 [101.60] / 0.375 [9.53]   |
| Upper/Lower Thread Connections       | 3-7/16" - 6P ACME-2G   |

### COMPONENTS AND ACCESSORIES

| Description                                     | Part Number(s)                    |                |
|---|-----------------------------------|----------------|
| Top Sub Lift Sub Assembly, 4"                   | TC-LT40-000                       |                |
| TCP Transfer Kit (2-3/4" through 4")            | GN-000-0025                       |                |
| Top Sub, 4"                                     | GN-R40-0020                       |                |
| Top Sub Wireline Insert                         | GN-E00-0011 (o-ring: OR-N569-211) |                |
| Spring Contact Assembly                         | GN-E00-0020                       |                |
| Tandem Sub, 4"                                  | GN-R40-0021                       |                |
| O-Ring Materials and Size                       | Top Connection                    | Gun Connection |
| Nitrile (standard option)                       | OR-N569-230                       | OR-N569-236    |
| Viton (with back-up rings required for > 325°F) | OR-V95G-230                       | OR-V95G-236    |
| Back-up rings for > 325°F                       | OR-B230-2813                      | OR-B236-3497   |
| Bull Plug, 4" Standard                          | GN-R40-0022                       |                |
| Bull plug, 4" with 2-3/8" EUE Pin               | GN-R40-0023                       |                |
| Bull plug, 4" with 2-7/8" EUE Pin               | GN-R40-0024                       |                |
| Thread Protectors                               | GN-THD-312-020                    |                |
| Top Sub (Top Pin)                               | GN-THD-450-030                    |                |
| Carrier (Gun) Protector                         | GN-THD-450-040                    |                |
| Tandem Sub & Bull Plug Protector                |                                   |                |



WIRELINE INSERT  
GN-E00-0011

SPRING CONTACT ASSEMBLY  
GN-E00-0011  
(4-1/2" OD TOP SUB SHOWN FOR  
REFERENCE ONLY)

| Available Gun Lengths                    | 21'          | 15'          | 11'          | 7'          | 4'          | 3'          | 2'          |
|--|--------------|--------------|--------------|-------------|-------------|-------------|-------------|
| Typical Gun Length (ft) [m]              | 20.75 [6.32] | 14.75 [4.50] | 10.75 [3.28] | 6.75 [2.06] | 3.75 [1.14] | 2.75 [0.84] | 1.75 [0.53] |
| *** 4 SPF Total Number of Loadable Shots | 080          | 056          | 040          | 024         | 012         | 008         | 004         |
| *** 5 SPF Total Number of Loadable Shots | 100          | 070          | 050          | 030         | 015         | 010         | 005         |
| *** 6 SPF Total Number of Loadable Shots | 120          | 084          | 060          | 036         | 018         | 012         | 006         |

Contact your local GEODynamics representative for availability of metric part numbers and additional gun lengths.

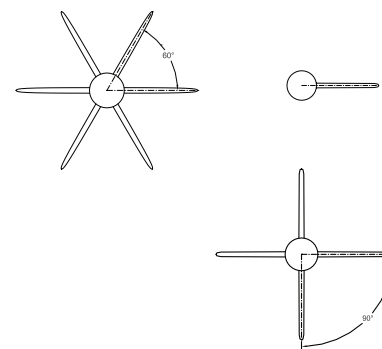
# Conventional Long Guns

## 4-1/2 in (114 mm), 4-6 SPF, BH, GH, XDP

GEODynamics' perforating systems use bi-directional boosters, non-lead azide explosives, customized connectors and inserts, and high-velocity, low-shrink detonating cord. Additionally, all GEODynamics gun assemblies are scalloped to optimize charge performance and prevent casing damage from perforating exit hole burrs. Shot phasing is designed to maintain the integrity and collapse resistance of the casing after perforating. These attributes, along with premium quality gun material and gun connectors, allow GEODynamics to deliver safe, efficient, and reliable perforating gun solutions to our customers.

## APPLICATION SPECIFICATIONS

|                                |   |
|--------------------------------|---|
| Shot Density and Phasing       | Multiple <a href="#">Shot Density &amp; Phasing</a> options; Available Gun Lengths range from 2' to 21' |
| Initiation Point               | Top- or bottom-fired options available; conventional wireline and TCP                                   |
| Mode of Fire                   | Simultaneous or selective fire  |
| Detonating Cord                | 80-grain round  |
| Compatible Perforating Charges | <a href="#">Basix™</a> , <a href="#">Razor®</a> , and <a href="#">Connex®</a>                           |
| Maximum Gun Swell (in)[mm]     | 4.67 [118.62] @ 39.0g, In Fluid   |



## ENVIRONMENTAL

|                             |  |
|-----------------------------|--|
| Maximum Pressure (psi)[MPa] | 17,700 [122]                                       |
| Maximum Tensile* (lbf)[kN]  | 517,800 [2303] *Hardware Calculated Breaking Point |

## CARRIER SPECIFICATIONS

| Carrier Assembly<br>Part Number |                    | Shot Density & Phasing Options |          | Gun End to Center of<br>First Scalloped |        | Distance<br>Shot to Shot |       | Approximate Weights   |                       |
|---------------------------------|--------------------|--------------------------------|----------|---|--------|--------------------------|-------|-----------------------|-----------------------|
|                                 |                    | (spf) [spm]                    | Phasing  | (in)                                    | (mm)   | (in)                     | (mm)  | Fully<br>Loaded       | Blank Gun             |
| 40A<br>Charge<br>Case           | GA4504-4540A-A***  | 4 spf [13 spm]                 | 60°      | 7.50                                    | 190.50 | 3.00                     | 76.20 |                       |                       |
|                                 | GA4504-4540A-B***  |                                | 90°      |   |        |                          |       |                       |                       |
|                                 | GA4505-4540A-A***  | 5 spf [16 spm]                 | 60°      | 7.20                                    | 182.88 | 2.40                     | 60.96 | 28.7 lb/ft<br>(w/sub) | 21.2 lb/ft<br>(w/sub) |
|                                 | GA4505-4540A-O***  |                                | 0°       |   |        |                          |       |                       |                       |
|                                 | GA4505-4540A-LB*** |                                | 0°/+10°  |   |        |                          |       |                       |                       |
|                                 | GA4505-4540A-OL*** |                                | 0°/+5/-5 |   |        |                          |       |                       |                       |
| 33A/<br>33B<br>Charge<br>Cases  | GA4504-6033A-B***  | 4 spf [13 spm]                 | 90°      | 7.50                                    | 190.50 | 3.00                     | 76.20 |                       |                       |
|                                 | GA4505-6033A-A***  | 5 spf [16 spm]                 | 60°      | 7.20                                    | 182.88 | 2.40                     | 60.96 | 23.4 lb/ft<br>(w/sub) | 20.9 lb/ft<br>(w/sub) |
|                                 | GA4506-6033A-A***  | 6 spf [20 spm]                 | 60°      | 7.00                                    | 177.80 | 2.00                     | 50.80 |                       |                       |



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# Conventional Long Guns

## 4-1/2 in (114 mm), 4-6 SPF, BH, GH, XDP



### BIG HOLE (40A CHARGE CASE)

| Carrier O.D. | Shaped Charge | Part Number | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |              | Performance in Stressed Berea |              |
|--------------|---------------|-------------|-----------------------|------------|------------------------|--------------|-------------------------|--------------|-------------------------------|--------------|
|              |               |             |                       |            |                        | Application  | EHD (in)[cm]            | TTP (in)[cm] | EHD^ (in)[cm]                 | TTP (in)[cm] |
| 4-1/2" 39g   | 4039 Basix BH | EC2-40A3931 | Fluid                 | 39.0g, RDX | 5 spf / 60°            | 7.0" L-80    | 0.86 [2.18]             | 6.13 [15.57] |                               |              |
|              |               | EC2-40A3932 |                       | 39.0g, HMX |                        |              |                         |              |                               |              |

### DEEP PENETRATING/EXTREME DEEP PENETRATING (40A CHARGE CASE)

| Carrier O.D. | Shaped Charge   | Part Number    | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |                | Performance in Stressed Berea |               |
|--------------|-----------------|----------------|-----------------------|------------|------------------------|--------------|-------------------------|----------------|-------------------------------|---------------|
|              |                 |                |                       |            |                        | Application  | EHD (in)[cm]            | TTP (in)[cm]   | EHD^ (in)[cm]                 | TTP (in)[cm]  |
| 4-1/2" 39g   | 4039 Connex SDP | EC2-40A3921-RC | Fluid                 | 39.0g, RDX | 5 spf / 60°            | 7.0" L-80    |                         |                | 0.41 [1.04]                   | 17.15 [43.56] |
|              |                 | EC2-40A3922-RC |                       | 39.0g, HMX |                        |              |                         |                | 0.43 [1.09]                   | 17.80 [45.21] |
|              |                 | EC2-40A3923-RC |                       | 39.0g, HNS |                        |              |                         |                | 0.36 [0.91]                   | 15.20 [38.61] |
|              | 4039 Razor XDP  | EC2-40A3921    |                       | 39.0g, RDX |                        |              | 0.44 [1.12]             | 58.59 [148.82] | 0.38 [0.97]                   | 18.60 [47.24] |
|              |                 | EC2-40A3922    |                       | 39.0g, HMX |                        |              | 0.45 [1.14]             | 72.93 [185.24] | 0.37 [0.94]                   | 19.10 [48.51] |
|              | 4039 Basix XDP  | EC2-40A3921-E  |                       | 39.0g, RDX |                        |              |                         |                | 0.56 [1.42]                   | 16.10 [40.89] |
|              |                 | EC2-40A3922-E  |                       | 39.0g, HMX |                        |              | 0.44 [1.12]             | 51.97 [132.00] | 0.44 [1.12]                   | 16.30 [41.40] |
|              |                 |                |                       |            |                        |              |                         |                |                               |               |

### DYNAMIC UNDERBALANCE PUNCHERS (40A CHARGE CASE)

| Carrier O.D. | Product Name      | Part Number | Explosive | Exit Hole (in)[cm] |
|--------------|-------------------|-------------|-----------|--------------------|
| 4-1/2"       | 4008 GEOPunch RDX | EC2-40A0861 | 8.0g, RDX | 1.05 [2.67]        |
|              | 4008 GEOPunch HMX | EC2-40A0862 | 8.0g, HMX |                    |
|              | 4008 GEOPunch HNS | EC2-40A0863 | 8.0g, HNS |                    |

### DEEP PENETRATING/EXTREME DEEP PENETRATING (33A/33B CHARGE CASES)

| Carrier O.D. | Shaped Charge   | Part Number    | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |              | Performance in Stressed Berea |               |
|--------------|-----------------|----------------|-----------------------|------------|------------------------|--------------|-------------------------|--------------|-------------------------------|---------------|
|              |                 |                |                       |            |                        | Application  | EHD (in)[cm]            | TTP (in)[cm] | EHD^ (in)[cm]                 | TTP (in)[cm]  |
| 4-1/2" 23g   | 3323 Connex SDP | EC2-33A2321-RC | Fluid                 | 22.7g, RDX | 6 spf / 60°            | 5-1/2"       |                         |              | 0.34 [0.86]                   | 14.75 [37.47] |
|              |                 | EC2-33A2322-RC |                       | 22.7g, HMX |                        |              |                         |              | 0.46 [1.17]                   | 15.31 [38.89] |
|              |                 | EC2-33A2323-RC |                       | 22.7g, HNS |                        |              |                         |              | 0.36 [0.91]                   | 10.50 [26.67] |
| 4-1/2" 25g   | 3325 Razor XDP  | EC2-33B2521    | In Fluid or Dry       | 25.0g, RDX | 6 spf / 60°            | 7.0"         |                         |              | 0.44 [1.12]                   | 16.30 [41.40] |
|              |                 | EC2-33B2522    |                       | 25.0g, HMX |                        |              |                         |              | 0.34 [0.86]                   | 15.70 [39.88] |

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

FLUID: Qualified for shooting in FLUID only with perforating systems qualified by GEOdynamics.

IN FLUID or DRY: Qualified for shooting in FLUID or DRY GAS with perforating systems qualified by GEOdynamics.

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# Conventional Long Guns

## 4-1/2 in (114 mm), 4-6 SPF, BH, GH, XDP

### GOOD HOLE (33A CHARGE CASES)

| Carrier O.D. | Shaped Charge   | Part Number    | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |              | Performance in Stressed Berea |               |
|--------------|-----------------|----------------|-----------------------|------------|------------------------|--------------|-------------------------|--------------|-------------------------------|---------------|
|              |                 |                |                       |            |                        | Application  | EHD (in)[cm]            | TTP (in)[cm] | EHD^ (in)[cm]                 | TTP (in)[cm]  |
| 4-1/2" 23g   | 3323 Connex XEH | EC2-33A2341-RC | Fluid                 | 22.7g, RDX | 6 spf / 60°            | 7.0"         |                         |              | 0.34 [0.86]                   | 14.72 [37.39] |
|              |                 | EC2-33A2342-RC |                       | 22.7g, HMX |                        |              |                         |              | 0.43 [1.09]                   | 15.89 [40.36] |

### HARDWARE

|                                      |  |
|--------------------------------------|--|
| Gun Body Configuration/Material      | Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel |
| Charge Tube Type & Retention         | Round steel tube strip; bend tab retention                                 |
| Type of Tandem Connection            | Booster to booster (no splice)   |
| Nominal OD / Wall Thickness (in)[mm] | 4.50 [114.30] / 0.375 [9.53]   |
| Upper/Lower Thread Connections       | 3-15/16" - 6P ACME-2G  |

### COMPONENTS AND ACCESSORIES

| Description                                     | Part Number(s)                    |                |
|---|-----------------------------------|----------------|
| Top Sub Lift Sub Assembly, 4-5/8"               | TC-LT45-000H                      |                |
| TCP Transfer Kit (4-1/2" through 7")            | GN-000-0030                       |                |
| Top Sub, 4-1/2"                                 | GN-R45-0020                       |                |
| Top Sub Wireline Insert                         | GN-E00-0011 (o-ring: OR-N569-211) |                |
| Spring Contact Assembly                         | GN-E00-0020                       |                |
| Tandem Sub, 4-1/2"                              | GN-R45-0021                       |                |
| O-Ring Materials and Size                       | Top Connection                    | Gun Connection |
| Nitrile (standard option)                       | OR-N569-230                       | OR-N569-342    |
| Viton (with back-up rings required for > 325°F) | OR-V95G-230                       | OR-V95G-342    |
| Back-up rings for > 325°F                       | OR-B230-2813                      | OR-B342-3997   |
| Bull Plug, 4-1/2" Standard                      | GN-R45-0022                       |                |
| 4-1/2" with 2-7/8" EUE Pin                      | GN-R45-0023                       |                |
| Thread Protectors, Top Sub (Top Pin)            | GN-THD-312-020                    |                |
| Carrier (Gun) Protector                         | GN-THD-450-030                    |                |
| Tandem Sub & Bull Plug Protector                | GN-THD-450-040                    |                |



WIRELINE INSERT  
GN-E00-0011

SPRING CONTACT ASSEMBLY  
GN-E00-0011  
(4-1/2" OD TOP SUB SHOWN FOR  
REFERENCE ONLY)

| Available Gun Lengths                    | 21'          | 15'          | 11'          | 7'          | 4'          | 3'          | 2'          |
|--|--------------|--------------|--------------|-------------|-------------|-------------|-------------|
| Typical Gun Length (ft) [m]              | 20.75 [6.32] | 14.75 [4.50] | 10.75 [3.28] | 6.75 [2.06] | 3.75 [1.14] | 2.75 [0.84] | 1.75 [0.53] |
| *** 4 SPF Total Number of Loadable Shots | 080          | 056          | 040          | 024         | 012         | 008         | 004         |
| *** 5 SPF Total Number of Loadable Shots | 100          | 070          | 050          | 030         | 015         | 010         | 005         |
| *** 6 SPF Total Number of Loadable Shots | 120          | 084          | 060          | 036         | 018         | 012         | 006         |

Contact your local GEODynamics representative for availability of metric part numbers and additional gun lengths.

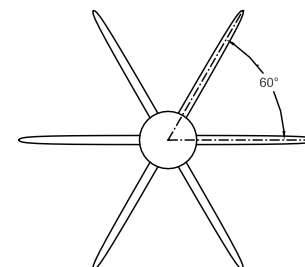
# Conventional Long Guns

## 4-1/2 in (114 mm), 17 SPM

GEODynamics' perforating systems use bi-directional boosters, non-lead azide explosives, customized connectors and inserts, and high-velocity, low-shrink detonating cord. Additionally, all GEODynamics gun assemblies are scalloped to optimize charge performance and prevent casing damage from perforating exit hole burrs. Shot phasing is designed to maintain the integrity and collapse resistance of the casing after perforating. These attributes, along with premium quality gun material and gun connectors, allow GEODynamics to deliver safe, efficient, and reliable perforating gun solutions to our customers.

## APPLICATION SPECIFICATIONS

|                                |   |
|--------------------------------|---|
| Shot Density and Phasing       | 17 SPM (60°); Available Gun Lengths range from 1 to 7 meters          |
| Initiation Point               | Top- or bottom-fired options available; conventional wireline and TCP |
| Mode of Fire                   | Simultaneous or selective fire  |
| Detonating Cord                | 80-grain round  |
| Compatible Perforating Charges | Connex®, Razor®, Basix™   |
| Maximum Gun Swell (in)[mm]     | 4.67 [118.62] @ 39.0g, In Fluid                                       |



## ENVIRONMENTAL

|                             |  |
|-----------------------------|--|
| Maximum Pressure (psi)[MPa] | 17,700 [122]                                       |
| Maximum Tensile* (lbf)[kN]  | 517,800 [2303] *Hardware Calculated Breaking Point |

## CARRIER SPECIFICATIONS

| Carrier Assembly Part Number | # Shots | Shot Density & Phasing |         | Gun End to Center of First Scallop |      | Distance Shot to Shot |         | Gun Lengths | Approximate Weights |       |
|------------------------------|---------|------------------------|---------|------------------------------------|------|-----------------------|---------|-------------|---------------------|-------|
|                              |         | spm                    | Phasing | (mm)                               | (in) | (mm)                  | (in)    | (m)         | (kg)                | (lbs) |
| GM4517-4540A-A017            | 17      | 17 spm                 | 60°     | 190                                | 7.48 | 60.6061               | 2.38606 | 1.35        | 39.6                | 87    |
| GM4517-4540A-A034            | 34      |                        |         | 175                                | 6.89 |                       |         | 2.35        | 67.1                | 148   |
| GM4517-4540A-A050            | 50      |                        |         | 190                                | 7.48 |                       |         | 3.35        | 94.8                | 209   |
| GM4517-4540A-A067            | 67      |                        |         | 175                                | 6.89 |                       |         | 4.35        | 122.4               | 270   |
| GM4517-4540A-A083            | 83      |                        |         | 190                                | 7.48 |                       |         | 5.35        | 150.0               | 331   |
| GM4517-4540A-A100            | 100     |                        |         | 175                                | 6.89 |                       |         | 6.35        | 177.6               | 392   |
| GM4517-4540A-A116            | 116     |                        |         | 190                                | 7.48 |                       |         | 7.35        | 205.3               | 453   |



Revised: August 31, 2023 9:46 PM

# Conventional Long Guns

## 4-1/2 in (114 mm), 17 SPM

### BIG HOLE

| Carrier O.D. | Shaped Charge | Part Number | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |              | Performance in Stressed Berea |              |
|--------------|---------------|-------------|-----------------------|------------|------------------------|--------------|-------------------------|--------------|-------------------------------|--------------|
|              |               |             |                       |            |                        | Application  | EHD (in)[cm]            | TTP (in)[cm] | EHD^ (in)[cm]                 | TTP (in)[cm] |
| 4-1/2" 39g   | 4039 Basix BH | EC2-40A3931 | Fluid                 | 39.0g, RDX | 5 spf / 60°            | 7.0" L-80    | 0.86 [2.18]             | 6.13 [15.57] |                               |              |
|              |               | EC2-40A3932 |                       | 39.0g, HMX |                        |              |                         |              |                               |              |

### DEEP PENETRATING/EXTREME DEEP PENETRATING

| Carrier O.D. | Shaped Charge   | Part Number    | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |                | Performance in Stressed Berea |               |
|--------------|-----------------|----------------|-----------------------|------------|------------------------|--------------|-------------------------|----------------|-------------------------------|---------------|
|              |                 |                |                       |            |                        | Application  | EHD (in)[cm]            | TTP (in)[cm]   | EHD^ (in)[cm]                 | TTP (in)[cm]  |
| 4-1/2" 39g   | 4039 Connex SDP | EC2-40A3921-RC | Fluid                 | 39.0g, RDX | 5 spf / 60°            | 7.0" L-80    |                         |                | 0.41 [1.04]                   | 17.15 [43.56] |
|              |                 | EC2-40A3922-RC |                       | 39.0g, HMX |                        |              |                         |                | 0.43 [1.09]                   | 17.80 [45.21] |
|              |                 | EC2-40A3923-RC |                       | 39.0g, HNS |                        |              |                         |                | 0.36 [0.91]                   | 15.20 [38.61] |
|              | 4039 Razor XDP  | EC2-40A3921    |                       | 39.0g, RDX |                        |              | 0.44 [1.12]             | 58.59 [148.82] | 0.38 [0.97]                   | 18.60 [47.24] |
|              |                 | EC2-40A3922    |                       | 39.0g, HMX |                        |              | 0.45 [1.14]             | 72.93 [185.24] | 0.37 [0.94]                   | 19.10 [48.51] |
|              | 4039 Basix XDP  | EC2-40A3921-E  |                       | 39.0g, RDX |                        |              |                         |                | 0.56 [1.42]                   | 16.10 [40.89] |
|              |                 | EC2-40A3922-E  |                       | 39.0g, HMX |                        |              | 0.44 [1.12]             | 51.97 [132.00] | 0.44 [1.12]                   | 16.30 [41.40] |
|              |                 |                |                       |            |                        |              |                         |                |                               |               |

### DYNAMIC UNDERBALANCE PUNCHERS

| Carrier O.D. | Product Name      | Part Number | Explosive | Exit Hole (in)[cm] |
|--------------|-------------------|-------------|-----------|--------------------|
| 4-1/2"       | 4008 GEOPunch RDX | EC2-40A0861 | 8.0g, RDX | 1.05 [2.67]        |
|              | 4008 GEOPunch HMX | EC2-40A0862 | 8.0g, HMX |                    |
|              | 4008 GEOPunch HNS | EC2-40A0863 | 8.0g, HNS |                    |

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

FLUID: Qualified for shooting in FLUID only with perforating systems qualified by GEODynamics.

IN FLUID or DRY: Qualified for shooting in FLUID or DRY GAS with perforating systems qualified by GEODynamics.

Revised: August 31, 2023 9:46 PM

# Conventional Long Guns

## 4-1/2 in (114 mm), 17 SPM

### HARDWARE

|                                      |  |
|--------------------------------------|--|
| Gun Body Configuration/Material      | Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel |
| Charge Tube Type & Retention         | Round steel tube strip; bend tab retention                                 |
| Type of Tandem Connection            | Booster to booster (no splice)   |
| Nominal OD / Wall Thickness (in)[mm] | 4.50 [114.30] / 0.375 [9.53]   |
| Upper/Lower Thread Connections       | 3-15/16" - 6P ACME-2G  |

### COMPONENTS AND ACCESSORIES

| Description                                     | Part Number(s)                    |                |
|---|-----------------------------------|----------------|
| Top Sub Lift Sub Assembly, 4-5/8"               | TC-LT45-000H                      |                |
| TCP Transfer Kit (4-1/2" through 7")            | GN-000-0030                       |                |
| Top Sub, 4-1/2"                                 | GN-R45-0020                       |                |
| Top Sub Wireline Insert                         | GN-E00-0011 (o-ring: OR-N569-211) |                |
| Spring Contact Assembly                         | GN-E00-0020                       |                |
| Tandem Sub, 4-1/2"                              | GN-R45-0021                       |                |
| O-Ring Materials and Size                       | Top Connection                    | Gun Connection |
| Nitrile (standard option)                       | OR-N569-230                       | OR-N569-342    |
| Viton (with back-up rings required for > 325°F) | OR-V95G-230                       | OR-V95G-342    |
| Back-up rings for > 325°F                       | OR-B230-2813                      | OR-B342-3997   |
| Bull Plug, 4-1/2" Standard                      | GN-R45-0022                       |                |
| 4-1/2" with 2-7/8" EUE Pin                      | GN-R45-0023                       |                |
| Thread Protectors, Top Sub (Top Pin)            | GN-THD-312-020                    |                |
| Carrier (Gun) Protector                         | GN-THD-450-030                    |                |
| Tandem Sub & Bull Plug Protector                | GN-THD-450-040                    |                |



WIRELINE INSERT  
GN-E00-0011

SPRING CONTACT ASSEMBLY  
GN-E00-0011  
(4-1/2" OD TOP SUB SHOWN FOR  
REFERENCE ONLY)

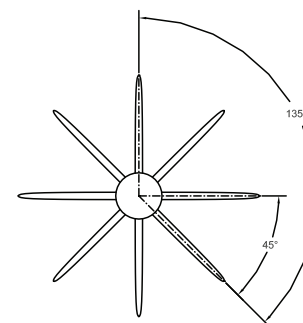
# Conventional Long Guns

## 4-1/2 in (114 mm), 12 SPF, BH and XDP

GEODynamics' perforating systems use bi-directional boosters, non-lead azide explosives, customized connectors and inserts, and high-velocity, low-shrink detonating cord. Additionally, all GEODynamics gun assemblies are scalloped to optimize charge performance and prevent casing damage from perforating exit hole burrs. Shot phasing is designed to maintain the integrity and collapse resistance of the casing after perforating. These attributes, along with premium quality gun material and gun connectors, allow GEODynamics to deliver safe, efficient, and reliable perforating gun solutions to our customers.

### APPLICATION SPECIFICATIONS

|                                |   |
|--------------------------------|---|
| Shot Density and Phasing       | 12 SPF (135-45); Available Gun Lengths range from 2' to 21'           |
| Initiation Point               | Top- or bottom-fired options available; conventional wireline and TCP |
| Mode of Fire                   | Simultaneous or selective fire  |
| Detonating Cord                | 80-grain round  |
| Compatible Perforating Charges | Connex®, Razor®, Basix™   |
| Maximum Gun Swell (in)[mm]     | 4.69 [119.13] @ 22.7g, In Fluid                                       |



### ENVIRONMENTAL

|                             |  |
|-----------------------------|--|
| Maximum Pressure (psi)[MPa] | 17,200 [118]                                       |
| Maximum Tensile* (lbf)[kN]  | 517,800 [2303] *Hardware Calculated Breaking Point |

### CARRIER SPECIFICATIONS

| Carrier Assembly<br>Part Number | Shot Density & Phasing |          | Gun End to Center of<br>First Scallop |        | Distance<br>Shot to Shot |       | Approximate Weights   |                       |
|---------------------------------|------------------------|----------|---------------------------------------|--------|--------------------------|-------|-----------------------|-----------------------|
|                                 | (spf) [spm]            | Phasing  | (in)                                  | (mm)   | (in)                     | (mm)  | Fully<br>Loaded       | Blank Gun             |
| GA4512-5033A-C***               | 12 spf [39 spm]        | 135°-45° | 6.00                                  | 152.40 | 1.00                     | 25.40 | 26.4 lb/ft<br>(w/sub) | 20.4 lb/ft<br>(w/sub) |

\*\*\* Total number of shots, e.g., 21' 12SPF, 135-45 phased gun is GA4512-5033A-C241.

| Available Gun Lengths                     | 21'             | 15'             | 11'             | 7'             | 4'             | 3'             | 2'             |
|---|-----------------|-----------------|-----------------|----------------|----------------|----------------|----------------|
| Typical Gun Length (ft) [m]               | 20.75<br>[6.32] | 14.75<br>[4.50] | 10.75<br>[3.28] | 6.75<br>[2.06] | 3.75<br>[1.14] | 2.75<br>[0.84] | 1.75<br>[0.53] |
| *** 12 SPF Total Number of Loadable Shots | 241             | 169             | 121             | 073            | 037            | 025            | 013            |

Contact your local GEODynamics representative for availability of metric part numbers and additional gun lengths.





# Conventional Long Guns

## 4-1/2 in (114 mm), 12 SPF, BH and XDP

### BIG HOLE

| Carrier O.D. | Shaped Charge | Part Number | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |              | Performance in Stressed Berea |              |
|--------------|---------------|-------------|-----------------------|------------|------------------------|--------------|-------------------------|--------------|-------------------------------|--------------|
|              |               |             |                       |            |                        | Application  | EHD (in)[cm]            | TTP (in)[cm] | EHD^ (in)[cm]                 | TTP (in)[cm] |
| 4-1/2" 23g   | 3323 Basix BH | EC2-33A2331 | Fluid                 | 22.7g, RDX | 12 spf / 135°-45°      | 7.0" L-80    | 0.81 [2.06]             | 5.28 [13.41] | 0.78 [1.98]                   | 5.00 [12.70] |
|              |               | EC2-33A2332 |                       | 22.7g, HMX |                        |              |                         |              | 0.80 [2.03]                   | 5.30 [13.46] |

For this application, 33A charges must have the grooved charge case, EP-1000-100-D.

### DEEP PENETRATING/EXTREME DEEP PENETRATING

| Carrier O.D. | Shaped Charge   | Part Number    | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |               | Performance in Stressed Berea |               |
|--------------|-----------------|----------------|-----------------------|------------|------------------------|--------------|-------------------------|---------------|-------------------------------|---------------|
|              |                 |                |                       |            |                        | Application  | EHD (in)[cm]            | TTP (in)[cm]  | EHD^ (in)[cm]                 | TTP (in)[cm]  |
| 4-1/2" 23g   | 3323 Connex SDP | EC2-33A2321-RC | Fluid                 | 22.7g, RDX | 12 spf / 135°-45°      | 7.0" L-80    |                         |               |                               |               |
|              |                 | EC2-33A2322-RC |                       | 22.7g, HMX |                        |              |                         |               | 0.46 [1.17]                   | 15.31 [38.89] |
|              | 3323 Razor XDP  | EC2-33A2321    |                       | 22.7g, RDX |                        |              |                         |               | 0.43 [1.09]                   | 15.70 [39.88] |
|              |                 | EC2-33A2322    |                       | 22.7g, HMX |                        |              | 0.38 [0.97]             | 34.90 [88.65] |                               |               |

For this application, 33A charges must have the grooved charge case, EP-1000-100-D.

### HARDWARE

Gun Body Configuration/Material

Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel

Charge Tube Type & Retention

Round steel tube strip; bend tab retention

Type of Tandem Connection

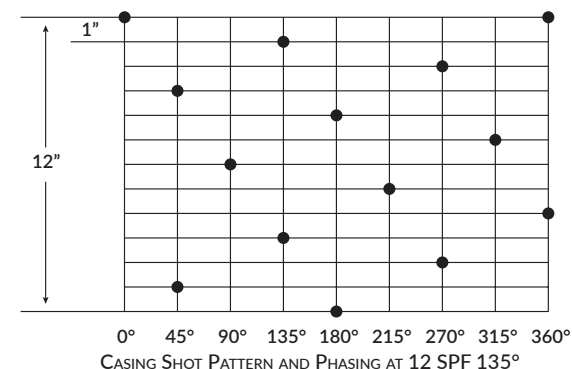
Booster to booster (no splice)

Nominal OD / Wall Thickness (in)[mm]

4.50 [114.30] / 0.375 [9.53]

Upper/Lower Thread Connections

3-15/16" - 6P ACME-2G



Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

FLUID: Qualified for shooting in FLUID only with perforating systems qualified by GEODynamics.

IN FLUID or DRY: Qualified for shooting in FLUID or DRY GAS with perforating systems qualified by GEODynamics.

Revised: August 31, 2023 9:46 PM

# Conventional Long Guns

## 4-1/2 in (114 mm), 12 SPF, BH and XDP

### COMPONENTS AND ACCESSORIES

| Description                                     | Part Number(s)                    |                |
|---|-----------------------------------|----------------|
| Top Sub Lift Sub Assembly, 4-5/8"               | TC-LT45-000H                      |                |
| TCP Transfer Kit (4-1/2" through 7")            | GN-000-0030                       |                |
| Top Sub, 4-1/2"                                 | GN-R45-0020                       |                |
| Top Sub Wireline Insert                         | GN-E00-0011 (o-ring: OR-N569-211) |                |
| Spring Contact Assembly                         | GN-E00-0020                       |                |
| Tandem Sub, 4-1/2"                              | GN-R45-0021                       |                |
| O-Ring Materials and Size                       | Top Connection                    | Gun Connection |
| Nitrile (standard option)                       | OR-N569-230                       | OR-N569-342    |
| Viton (with back-up rings required for > 325°F) | OR-V95G-230                       | OR-V95G-342    |
| Back-up rings for > 325°F                       | OR-B230-2813                      | OR-B342-3997   |
| Bull Plug, 4-1/2" Standard                      | GN-R45-0022                       |                |
| 4-1/2" with 2-7/8" EUE Pin                      | GN-R45-0023                       |                |
| Thread Protectors, Top Sub (Top Pin)            | GN-THD-312-020                    |                |
| Carrier (Gun) Protector                         | GN-THD-450-030                    |                |
| Tandem Sub & Bull Plug Protector                | GN-THD-450-040                    |                |



**WIRELINE INSERT**  
GN-E00-0011

**SPRING CONTACT ASSEMBLY**  
GN-E00-0011  
(4-1/2" OD TOP SUB SHOWN FOR  
REFERENCE ONLY)

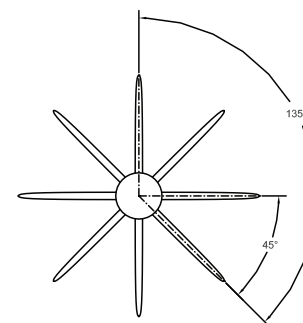
# Conventional Long Guns

## 4-1/2 in (114 mm), 12 SPF, SBH

GEODynamics' perforating systems use bi-directional boosters, non-lead azide explosives, customized connectors and inserts, and high-velocity, low-shrink detonating cord. Additionally, all GEODynamics gun assemblies are scalloped to optimize charge performance and prevent casing damage from perforating exit hole burrs. Shot phasing is designed to maintain the integrity and collapse resistance of the casing after perforating. These attributes, along with premium quality gun material and gun connectors, allow GEODynamics to deliver safe, efficient, and reliable perforating gun solutions to our customers.

### APPLICATION SPECIFICATIONS

|                                |   |
|--------------------------------|---|
| Shot Density and Phasing       | 12 SPF (135-45); Available Gun Lengths range from 2' to 21'           |
| Initiation Point               | Top- or bottom-fired options available; conventional wireline and TCP |
| Mode of Fire                   | Simultaneous or selective fire  |
| Detonating Cord                | 80-grain round  |
| Compatible Perforating Charges | Razor®, Basix™  |
| Maximum Gun Swell (in)[mm]     | 4.81 [122.17] @ 26.0g, In Fluid                                       |



### ENVIRONMENTAL

|                             |  |
|-----------------------------|--|
| Maximum Pressure (psi)[MPa] | 17,200 [118]                                       |
| Maximum Tensile* (lbf)[kN]  | 517,800 [2303] *Hardware Calculated Breaking Point |

### CARRIER SPECIFICATIONS

| Carrier Assembly<br>Part Number | Shot Density & Phasing |          | Gun End to Center of<br>First Scallop |        | Distance<br>Shot to Shot |       | Approximate Weights   |                       |
|---------------------------------|------------------------|----------|---------------------------------------|--------|--------------------------|-------|-----------------------|-----------------------|
|                                 | (spf) [spm]            | Phasing  | (in)                                  | (mm)   | (in)                     | (mm)  | Fully<br>Loaded       | Blank Gun             |
| GA4512-4046A-C***               | 12 spf [39 spm]        | 135°-45° | 6.00                                  | 152.40 | 1.00                     | 25.40 | 23.8 lb/ft<br>(w/sub) | 20.5 lb/ft<br>(w/sub) |

\*\*\* Total number of shots, e.g., 21' 12SPF, 135-45 phased gun is GA4512-4046A-C241.

| Available Gun Lengths                     | 21'             | 15'             | 11'             | 7'             | 4'             | 3'             | 2'             |
|---|-----------------|-----------------|-----------------|----------------|----------------|----------------|----------------|
| Typical Gun Length (ft) [m]               | 20.75<br>[6.32] | 14.75<br>[4.50] | 10.75<br>[3.28] | 6.75<br>[2.06] | 3.75<br>[1.14] | 2.75<br>[0.84] | 1.75<br>[0.53] |
| *** 12 SPF Total Number of Loadable Shots | 241             | 169             | 121             | 073            | 037            | 025            | 013            |

Contact your local GEODynamics representative for availability of metric part numbers and additional gun lengths.



# Conventional Long Guns

## 4-1/2 in (114 mm), 12 SPF, SBH

### SUPER BIG HOLE

| Carrier O.D. | Shaped Charge     | Part Number | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |              | Performance in Stressed Berea |              |
|--------------|-------------------|-------------|-----------------------|------------|------------------------|--------------|-------------------------|--------------|-------------------------------|--------------|
|              |                   |             |                       |            |                        | Application  | EHD (in)[cm]            | TTP (in)[cm] | EHD^ (in)[cm]                 | TTP (in)[cm] |
| 4-1/2" 26g   | 4526 Basix SBH TL | EC2-45B2631 | Fluid                 | 26.0g, RDX | 12 spf/135°-45°        | 7.0" L-80    | 0.87 [2.21]             | 5.67 [14.40] |                               |              |
|              |                   | EC2-45B2632 |                       | 26.0g, HMX | 16 spf/ 140°-20°       |              | 0.93 [2.36]             | 5.77 [14.66] |                               |              |

Maximum shot density in 4-1/2" carrier is 12 spf. Charge cases 45B, 46A, 46B with 26g load are compatible with 4-1/2" carrier and 4046A load tube.

Charge cases 45A & 46A are zinc; charge cases 45B & 46B are steel. Blank charge case P/N: EP-1085-100-D (4-1/2" BH LD, zinc).

### HARDWARE

|                                      |  |
|--------------------------------------|--|
| Gun Body Configuration/Material      | Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel |
| Charge Tube Type & Retention         | Round steel tube strip; bend tab retention                                 |
| Type of Tandem Connection            | Booster to booster (no splice)   |
| Nominal OD / Wall Thickness (in)[mm] | 4.50 [114.30] / 0.375 [9.53]   |
| Upper/Lower Thread Connections       | 3-15/16" - 6P ACME-2G  |

### COMPONENTS AND ACCESSORIES

| Description                                     | Part Number(s)                    |                |
|---|-----------------------------------|----------------|
| Top Sub Lift Sub Assembly, 4-5/8"               | TC-LT45-000H                      |                |
| TCP Transfer Kit (4-1/2" through 7")            | GN-000-0030                       |                |
| Top Sub, 4-1/2"                                 | GN-R45-0020                       |                |
| Top Sub Wireline Insert                         | GN-E00-0011 (o-ring: OR-N569-211) |                |
| Spring Contact Assembly                         | GN-E00-0020                       |                |
| Tandem Sub, 4-1/2"                              | GN-R45-0021                       |                |
| O-Ring Materials and Size                       | Top Connection                    | Gun Connection |
| Nitrile (standard option)                       | OR-N569-230                       | OR-N569-342    |
| Viton (with back-up rings required for > 325°F) | OR-V95G-230                       | OR-V95G-342    |
| Back-up rings for > 325°F                       | OR-B230-2813                      | OR-B342-3997   |
| Bull Plug, 4-1/2" Standard                      | GN-R45-0022                       |                |
| 4-1/2" with 2-7/8" EUE Pin                      | GN-R45-0023                       |                |
| Thread Protectors, Top Sub (Top Pin)            | GN-THD-312-020                    |                |
| Carrier (Gun) Protector                         | GN-THD-450-030                    |                |
| Tandem Sub & Bull Plug Protector                | GN-THD-450-040                    |                |



WIRELINE INSERT  
GN-E00-0011

SPRING CONTACT ASSEMBLY  
GN-E00-0011  
(4-1/2" OD TOP SUB SHOWN FOR  
REFERENCE ONLY)

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

FLUID: Qualified for shooting in FLUID only with perforating systems qualified by GEODynamics.

IN FLUID or DRY: Qualified for shooting in FLUID or DRY GAS with perforating systems qualified by GEODynamics.

Revised: August 31, 2023 3:22 PM

# Conventional Long Guns

## 4-5/8 in (117 mm), 5 SPF, BH and XDP, Standard and High-Pressure

GEODynamics' perforating systems use bi-directional boosters, non-lead azide explosives, customized connectors and inserts, and high-velocity, low-shrink detonating cord. Additionally, all GEODynamics gun assemblies are scalloped to optimize charge performance and prevent casing damage from perforating exit hole burrs. Shot phasing is designed to maintain the integrity and collapse resistance of the casing after perforating. These attributes, along with premium quality gun material and gun connectors, allow GEODynamics to deliver safe, efficient, and reliable perforating gun solutions to our customers.

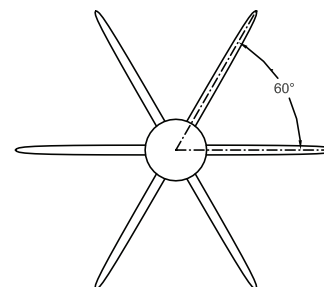
### APPLICATION SPECIFICATIONS

|                                |   |
|--------------------------------|---|
| Shot Density and Phasing       | 5 SPF (60°); Available Gun Lengths range from 2' to 21'               |
| Initiation Point               | Top- or bottom-fired options available; conventional wireline and TCP |
| Mode of Fire                   | Simultaneous or selective fire  |
| Detonating Cord                | 80-grain round  |
| Compatible Perforating Charges | Connex®, Razor®, Basix™   |
| Maximum Gun Swell (in)[mm]     | 4.816 [122.33] @ 39.0g, In Fluid                                      |

### ENVIRONMENTAL

|                             | Standard        | High Pressure        |
|-----------------------------|-----------------|----------------------|
| Maximum Pressure (psi)[MPa] | 18,900 [130]    | 25,000 [172] @ 250°F |
| Maximum Tensile* (lbf)[kN]  | *454,600 [2022] | *454,600 [2022]      |

\*Hardware Calculated Breaking Point



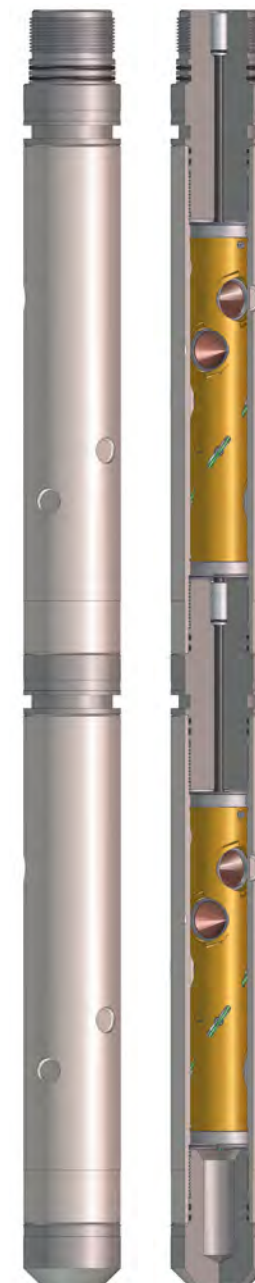
### CARRIER SPECIFICATIONS

| Carrier Assembly Part Number | Shot Density & Phasing |         | Gun End to Center of First Scallop |      | Distance Shot to Shot |       | Approximate Weights |                    |
|------------------------------|------------------------|---------|------------------------------------|------|-----------------------|-------|---------------------|--------------------|
|                              | (spf) [spm]            | Phasing | (in)                               | (mm) | (in)                  | (mm)  | Fully Loaded        | Blank Gun          |
| GA4605-4540A-A***            | 5 spf [16 spm]         | 60°     | 7.20                               | 183  | 2.40                  | 60.96 | 32.5 lb/ft (w/sub)  | 25.0 lb/ft (w/sub) |
| GA4605-4540A-A***-HP         | 5 spf [16 spm]         | 60°     | 7.20                               | 183  | 2.40                  | 60.96 | 32.7 lb/ft (w/sub)  | 25.2 lb/ft (w/sub) |

\*\*\* Total number of shots, e.g., 21' 5 SPF, 60° phased gun is GA4605-4540A-A100; high-pressure with same phasing is GA4605-4540A-A100-HP.

| Available Gun Lengths                    | 21'          | 15'          | 11'          | 7'          | 4'          | 2'          |
|--|--------------|--------------|--------------|-------------|-------------|-------------|
| Typical Gun Length (ft) [m]              | 20.75 [6.32] | 14.75 [4.50] | 10.75 [3.28] | 6.75 [2.06] | 3.75 [1.14] | 1.75 [0.53] |
| *** 5 SPF Total Number of Loadable Shots | 100          | 070          | 050          | 030         | 015         | 005         |

Contact your local GEODynamics representative for availability of metric part numbers and additional gun lengths.



Revised: August 31, 2023 9:46 PM

# Conventional Long Guns

## 4-5/8 in (117 mm), 5 SPF, BH and XDP, Standard and High-Pressure



### BIG HOLE

| Carrier O.D. | Shaped Charge | Part Number | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |              | Performance in Stressed Berea |              |
|--------------|---------------|-------------|-----------------------|------------|------------------------|--------------|-------------------------|--------------|-------------------------------|--------------|
|              |               |             |                       |            |                        | Application  | EHD (in)[cm]            | TTP (in)[cm] | EHD^ (in)[cm]                 | TTP (in)[cm] |
| 4-1/2" 39g   | 4039 Basix BH | EC2-40A3931 | Fluid                 | 39.0g, RDX | 5 spf / 60°            | 7.0" L-80    | 0.86 [2.18]             | 6.13 [15.57] |                               |              |
|              |               | EC2-40A3932 |                       | 39.0g, HMX |                        |              |                         |              |                               |              |

### DEEP PENETRATING/EXTREME DEEP PENETRATING

| Carrier O.D. | Shaped Charge   | Part Number    | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |              | Performance in Stressed Berea |               |
|--------------|-----------------|----------------|-----------------------|------------|------------------------|--------------|-------------------------|--------------|-------------------------------|---------------|
|              |                 |                |                       |            |                        | Application  | EHD (in)[cm]            | TTP (in)[cm] | EHD^ (in)[cm]                 | TTP (in)[cm]  |
| 4-5/8" 39g   | 4039 Connex SDP | EC2-40A3921-RC | Fluid                 | 39.0g, RDX | 5 spf / 60°            | 7.0"         |                         |              | 0.41 [1.04]                   | 17.15 [43.56] |
|              |                 | EC2-40A3922-RC |                       | 39.0g, HMX |                        |              |                         |              | 0.43 [1.09]                   | 17.80 [45.21] |
|              |                 | EC2-40A3923-RC |                       | 39.0g, HNS |                        |              |                         |              | 0.36 [0.91]                   | 15.20 [38.61] |
|              | 4039 Razor XDP  | EC2-40A3921    |                       | 39.0g, RDX |                        |              |                         |              | 0.38 [0.97]                   | 18.60 [47.24] |
|              |                 | EC2-40A3922    |                       | 39.0g, HMX |                        |              |                         |              | 0.37 [0.94]                   | 19.10 [48.51] |
|              |                 | EC2-40A3923    |                       | 39.0g, HNS |                        |              |                         |              | 0.33 [0.84]                   | 16.40 [41.66] |
|              | 4039 Basix XDP  | EC2-40A3921-E  |                       | 39.0g, RDX |                        |              |                         |              | 0.56 [1.42]                   | 16.10 [40.89] |
|              |                 | EC2-40A3922-E  |                       | 39.0g, HMX |                        |              |                         |              | 0.44 [1.12]                   | 16.30 [41.40] |

### DYNAMIC UNDERBALANCE PUNCHERS

| Carrier O.D. | Product Name      | Part Number | Explosive | Exit Hole (in)[cm] |
|--------------|-------------------|-------------|-----------|--------------------|
| 4-5/8"       | 4008 GEOPunch RDX | EC2-40A0861 | 8.0g, RDX | 1.05 [2.67]        |
|              | 4008 GEOPunch HMX | EC2-40A0862 | 8.0g, HMX |                    |
|              | 4008 GEOPunch HNS | EC2-40A0863 | 8.0g, HNS |                    |

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

FLUID: Qualified for shooting in FLUID only with perforating systems qualified by GEODynamics.

IN FLUID or DRY: Qualified for shooting in FLUID or DRY GAS with perforating systems qualified by GEODynamics.

Revised: August 31, 2023 9:46 PM



# Conventional Long Guns

## 4-5/8 in (117 mm), 5 SPF, BH and XDP, Standard and High-Pressure

### HARDWARE

|                                      |  |
|--------------------------------------|--|
| Gun Body Configuration/Material      | Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel |
| Charge Tube Type & Retention         | Round steel tube strip; bend tab retention                                 |
| Type of Tandem Connection            | Booster to booster (no splice)   |
| Nominal OD / Wall Thickness (in)[mm] | 4.625 [117.48] / 0.4375 [11.11]  |
| Upper/Lower Thread Connections       | 3-15/16" - 6P ACME-2G  |

### COMPONENTS AND ACCESSORIES

| Description                                     | Part Number(s)                    |                |
|---|-----------------------------------|----------------|
| Top Sub Lift Sub Assembly, 4-5/8"               | TC-LT45-000H                      |                |
| TCP Transfer Kit (4-1/2" through 7")            | GN-000-0030                       |                |
| Top Sub, 4-1/2"                                 | GN-R45-0020                       |                |
| Top Sub Wireline Insert                         | GN-E00-0011 (o-ring: OR-N569-211) |                |
| Spring Contact Assembly                         | GN-E00-0020                       |                |
| Tandem Sub, 4-1/2"                              | GN-R45-0021                       |                |
| O-Ring Materials and Size                       | Top Connection                    | Gun Connection |
| Nitrile (standard option)                       | OR-N569-230                       | OR-N569-342    |
| Viton (with back-up rings required for > 325°F) | OR-V95G-230                       | OR-V95G-342    |
| Back-up rings for > 325°F                       | OR-B230-2813                      | OR-B342-3997   |
| Bull Plug, 4-1/2" Standard                      | GN-R45-0022                       |                |
| 4-1/2" with 2-7/8" EUE Pin                      | GN-R45-0023                       |                |
| Thread Protectors, Top Sub (Top Pin)            | GN-THD-312-020                    |                |
| Carrier (Gun) Protector                         | GN-THD-450-030                    |                |
| Tandem Sub & Bull Plug Protector                | GN-THD-450-040                    |                |



WIRELINE INSERT  
GN-E00-0011

SPRING CONTACT ASSEMBLY  
GN-E00-0011  
(4-1/2" OD TOP SUB SHOWN FOR  
REFERENCE ONLY)

# Conventional Long Guns

## 4-5/8 in (117 mm), 12 SPF, XDP

GEODynamics' perforating systems use bi-directional boosters, non-lead azide explosives, customized connectors and inserts, and high-velocity, low-shrink detonating cord. Additionally, all GEODynamics gun assemblies are scalloped to optimize charge performance and prevent casing damage from perforating exit hole burrs. Shot phasing is designed to maintain the integrity and collapse resistance of the casing after perforating. These attributes, along with premium quality gun material and gun connectors, allow GEODynamics to deliver safe, efficient, and reliable perforating gun solutions to our customers.

## APPLICATION SPECIFICATIONS

|                                |   |
|--------------------------------|---|
| Shot Density and Phasing       | 12 SPF (135°-45°); <a href="#">Available Gun Lengths</a> range from 2' to 21' |
| Initiation Point               | Top- or bottom-fired options available; conventional wireline and TCP         |
| Mode of Fire                   | Simultaneous or selective fire  |
| Detonating Cord                | 80-grain round  |
| Compatible Perforating Charges | Connex®, Razor®   |
| Maximum Gun Swell (in)[mm]     | 4.69 [119.13] @ 22.7g, In Fluid   |

## ENVIRONMENTAL

|                             |  |
|-----------------------------|--|
| Maximum Pressure (psi)[MPa] | 18,900 [130]                                       |
| Maximum Tensile* (lbf)[kN]  | 454,600 [2022] *Hardware Calculated Breaking Point |

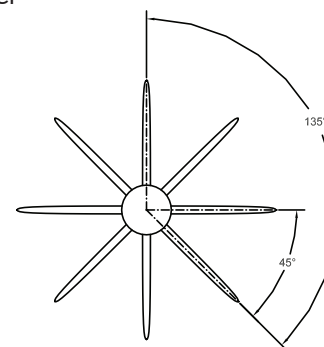
## CARRIER SPECIFICATIONS

| Carrier Assembly<br>Part Number | Shot Density & Phasing |          | Gun End to Center of<br>First Scalloped |        | Distance<br>Shot to Shot |       | Approximate Weights    |                        |
|---------------------------------|------------------------|----------|---|--------|--------------------------|-------|------------------------|------------------------|
|                                 | (spf) [spm]            | Phasing  | (in)                                    | (mm)   | (in)                     | (mm)  | Fully Loaded           | Blank Gun              |
| GA4612-5033A-C***               | 12 spf [39 spm]        | 135°-45° | 6.00                                    | 152.40 | 1.00                     | 25.40 | 29.4 lb/ft (w/<br>sub) | 23.4 lb/ft (w/<br>sub) |

\*\*\* Total number of shots, e.g., 21' 12 SPF, 135°-45° phased gun is GA4612-5033A-C241. Refer to [Available Gun Lengths](#).

| Available Gun Lengths                     | 21'          | 15'          | 11'          | 7'          | 4'          | 2'          |
|---|--------------|--------------|--------------|-------------|-------------|-------------|
| Typical Gun Length (ft) [m]               | 20.75 [6.32] | 14.75 [4.50] | 10.75 [3.28] | 6.75 [2.06] | 3.75 [1.14] | 1.75 [0.53] |
| *** 12 SPF Total Number of Loadable Shots | 241          | 169          | 121          | 073         | 037         | 013         |

Contact your local GEODynamics representative for availability of metric part numbers and additional gun lengths.



# Conventional Long Guns

## 4-5/8 in (117 mm), 12 SPF, XDP

### DEEP PENETRATING/EXTREME DEEP PENETRATING

| Carrier O.D. | Shaped Charge   | Part Number    | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |               | Performance in Stressed Berea |               |
|--------------|-----------------|----------------|-----------------------|------------|------------------------|--------------|-------------------------|---------------|-------------------------------|---------------|
|              |                 |                |                       |            |                        | Application  | EHD (in)[cm]            | TTP (in)[cm]  | EHD^ (in)[cm]                 | TTP (in)[cm]  |
| 4-5/8" 23g   | 3323 Connex SDP | EC2-33A2321-RC | Fluid                 | 22.7g, RDX | 12 spf / 135°-45°      | 7.0" L-80    |                         |               |                               |               |
|              |                 | EC2-33A2322-RC |                       | 22.7g, HMX |                        |              |                         |               | 0.46 [1.17]                   | 15.31 [38.89] |
|              | 3323 Razor XDP  | EC2-33A2321    |                       | 22.7g, RDX |                        |              |                         |               |                               |               |
|              |                 | EC2-33A2322    |                       | 22.7g, HMX |                        |              | 0.37 [0.94]             | 35.03 [88.98] |                               |               |

For this application, 33A charges must have the grooved charge case, EP-1000-100-D.

### HARDWARE

|                                      |  |
|--------------------------------------|--|
| Gun Body Configuration/Material      | Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel |
| Charge Tube Type & Retention         | Round steel tube strip; bend tab retention                                 |
| Type of Tandem Connection            | Booster to booster (no splice)   |
| Nominal OD / Wall Thickness (in)[mm] | 4.625 [117.48] / 0.4375 [11.11]  |
| Upper/Lower Thread Connections       | 3-15/16" - 6P ACME-2G  |

### COMPONENTS AND ACCESSORIES

| Description                                     | Part Number(s)                    |                |
|---|-----------------------------------|----------------|
| Top Sub Lift Sub Assembly, 4-5/8"               | TC-LT45-000H                      |                |
| TCP Transfer Kit (4-1/2" through 7")            | GN-000-0030                       |                |
| Top Sub, 4-1/2"                                 | GN-R45-0020                       |                |
| Top Sub Wireline Insert                         | GN-E00-0011 (o-ring: OR-N569-211) |                |
| Spring Contact Assembly                         | GN-E00-0020                       |                |
| Tandem Sub, 4-1/2"                              | GN-R45-0021                       |                |
| O-Ring Materials and Size                       | Top Connection                    | Gun Connection |
| Nitrile (standard option)                       | OR-N569-230                       | OR-N569-342    |
| Viton (with back-up rings required for > 325°F) | OR-V95G-230                       | OR-V95G-342    |
| Back-up rings for > 325°F                       | OR-B230-2813                      | OR-B342-3997   |
| Bull Plug, 4-1/2" Standard                      | GN-R45-0022                       |                |
| 4-1/2" with 2-7/8" EUE Pin                      | GN-R45-0023                       |                |
| Thread Protectors, Top Sub (Top Pin)            | GN-THD-312-020                    |                |
| Carrier (Gun) Protector                         | GN-THD-450-030                    |                |
| Tandem Sub & Bull Plug Protector                | GN-THD-450-040                    |                |



WIRELINE INSERT  
GN-E00-0011

SPRING CONTACT ASSEMBLY  
GN-E00-0011  
(4-1/2" OD TOP SUB SHOWN FOR  
REFERENCE ONLY)

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

FLUID: Qualified for shooting in FLUID only with perforating systems qualified by GEODynamics.

IN FLUID or DRY: Qualified for shooting in FLUID or DRY GAS with perforating systems qualified by GEODynamics.

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# Conventional Long Guns

## 4-5/8 in (117 mm), 12 SPF, SBH

GEODynamics' perforating systems use bi-directional boosters, non-lead azide explosives, customized connectors and inserts, and high-velocity, low-shrink detonating cord. Additionally, all GEODynamics gun assemblies are scalloped to optimize charge performance and prevent casing damage from perforating exit hole burrs. Shot phasing is designed to maintain the integrity and collapse resistance of the casing after perforating. These attributes, along with premium quality gun material and gun connectors, allow GEODynamics to deliver safe, efficient, and reliable perforating gun solutions to our customers.

## APPLICATION SPECIFICATIONS

|                                |   |
|--------------------------------|---|
| Shot Density and Phasing       | 12 SPF (135°-45°); <a href="#">Available Gun Lengths</a> range from 2' to 21' |
| Initiation Point               | Top- or bottom-fired options available; conventional wireline and TCP         |
| Mode of Fire                   | Simultaneous or selective fire  |
| Detonating Cord                | 80-grain round  |
| Compatible Perforating Charges | <a href="#">Razor®</a>  |
| Maximum Gun Swell (in)[mm]     | 4.81 [122.17] @ 26.0g, In Fluid   |

## ENVIRONMENTAL

|                             |  |
|-----------------------------|--|
| Maximum Pressure (psi)[MPa] | 18,900 [130]                                       |
| Maximum Tensile* (lbf)[kN]  | 454,600 [2022] *Hardware Calculated Breaking Point |

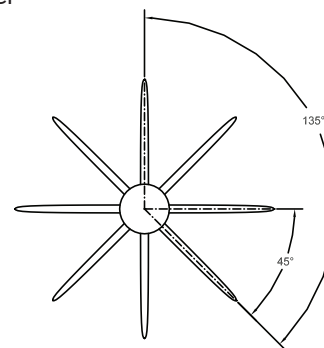
## CARRIER SPECIFICATIONS

| Carrier Assembly<br>Part Number | Shot Density & Phasing |          | Gun End to Center of<br>First Scalloped |        | Distance<br>Shot to Shot |       | Approximate Weights    |                        |
|---------------------------------|------------------------|----------|---|--------|--------------------------|-------|------------------------|------------------------|
|                                 | (spf) [spm]            | Phasing  | (in)                                    | (mm)   | (in)                     | (mm)  | Fully<br>Loaded        | Blank Gun              |
| GA4612-4045A-C***               | 12 spf [39 spm]        | 135°-45° | 6.00                                    | 152.40 | 1.00                     | 25.40 | 26.8 lb/ft (w/<br>sub) | 23.5 lb/ft (w/<br>sub) |

\*\*\* Total number of shots, e.g., 21' 12 SPF, 135°-45° phased gun is GA4612-4054A-C241. Refer to [Available Gun Lengths](#).

| Available Gun Lengths                     | 21'          | 15'          | 11'          | 7'          | 4'          | 2'          |
|---|--------------|--------------|--------------|-------------|-------------|-------------|
| Typical Gun Length (ft) [m]               | 20.75 [6.32] | 14.75 [4.50] | 10.75 [3.28] | 6.75 [2.06] | 3.75 [1.14] | 1.75 [0.53] |
| *** 12 SPF Total Number of Loadable Shots | 241          | 169          | 121          | 073         | 037         | 013         |

Contact your local GEODynamics representative for availability of metric part numbers and additional gun lengths.



# Conventional Long Guns

## 4-5/8 in (117 mm), 12 SPF, SBH

### SUPER BIG HOLE

| Carrier O.D. | Shaped Charge        | Part Number              | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |              | Performance in Stressed Berea |              |
|--------------|----------------------|--------------------------|-----------------------|------------|------------------------|--------------|-------------------------|--------------|-------------------------------|--------------|
|              |                      |                          |                       |            |                        | Application  | EHD (in)[cm]            | TTP (in)[cm] | EHD^ (in)[cm]                 | TTP (in)[cm] |
| 4-5/8" 26g   | 4626 Razor SBH TL LD | <sup>1</sup> EC2-46A2631 | Fluid                 | 26.0g, RDX | 16 spf/ 140°-20°       | 7.0" L-80    | 0.90 [2.29]             | 5.50 [13.97] |                               |              |
|              |                      | <sup>1</sup> EC2-46A2632 |                       | 26.0g, HMX |                        |              |                         |              |                               |              |
|              |                      | <sup>1</sup> EC2-46A2631 |                       | 26.0g, RDX |                        | 7-3/4" C-110 | 0.96 [2.44]             | 5.40 [13.72] |                               |              |
|              | 4526 Basix SBH TL    | EC2-45B2631              |                       | 26.0g, RDX |                        | 7.0" L-80    | 0.94 [2.39]             | 6.27 [15.93] |                               |              |
|              |                      | EC2-45B2632              |                       | 26.0g, HMX |                        |              |                         |              |                               |              |
|              | 4626 Basix SBH TL    | <sup>1</sup> EC2-46B2631 |                       | 26.0g, RDX |                        |              | 0.94 [2.39]             | 6.27 [15.93] |                               |              |
|              |                      | <sup>1</sup> EC2-46B2632 |                       | 26.0g, HMX |                        |              |                         |              |                               |              |
|              |                      |                          |                       |            |                        |              |                         |              |                               |              |

Charge cases 45A & 46A are zinc; charge cases 45B & 46B are steel. <sup>1</sup>Blank charge case P/N: EP-1085-100-D (4-1/2" BH LD, zinc).

Performance in concrete represents API RP43 or API RP19B Section 1 testing results with the shot density/phasing, casing OD, and casing grade specified.

^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

### HARDWARE

|                                      |  |
|--------------------------------------|--|
| Gun Body Configuration/Material      | Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel |
| Charge Tube Type & Retention         | Round steel tube strip; twist-lock retention                               |
| Type of Tandem Connection            | Booster to booster (no splice)   |
| Nominal OD / Wall Thickness (in)[mm] | 4.625 [117.48] / 0.4375 [11.11]  |
| Upper/Lower Thread Connections       | 3-15/16" - 6P ACME-2G  |

### COMPONENTS AND ACCESSORIES

| Description                                     | Part Number(s)                    |                |
|---|-----------------------------------|----------------|
| Top Sub Lift Sub Assembly, 4-5/8"               | TC-LT45-000H                      |                |
| TCP Transfer Kit (4-1/2" through 7")            | GN-000-0030                       |                |
| Top Sub, 4-1/2"                                 | GN-R45-0020                       |                |
| Top Sub Wireline Insert                         | GN-E00-0011 (o-ring: OR-N569-211) |                |
| Spring Contact Assembly                         | GN-E00-0020                       |                |
| Tandem Sub, 4-1/2"                              | GN-R45-0021                       |                |
| O-Ring Materials and Size                       | Top Connection                    | Gun Connection |
| Nitrile (standard option)                       | OR-N569-230                       | OR-N569-342    |
| Viton (with back-up rings required for > 325°F) | OR-V95G-230                       | OR-V95G-342    |
| Back-up rings for > 325°F                       | OR-B230-2813                      | OR-B342-3997   |
| Bull Plug, 4-1/2" Standard                      | GN-R45-0022                       |                |
| 4-1/2" with 2-7/8" EUE Pin                      | GN-R45-0023                       |                |
| Thread Protectors, Top Sub (Top Pin)            | GN-THD-312-020                    |                |
| Carrier (Gun) Protector                         | GN-THD-450-030                    |                |
| Tandem Sub & Bull Plug Protector                | GN-THD-450-040                    |                |



WIRELINE INSERT  
GN-E00-0011

SPRING CONTACT ASSEMBLY  
GN-E00-0011  
(4-1/2" OD TOP SUB SHOWN FOR  
REFERENCE ONLY)

# Conventional Long Guns

## 4-5/8 in (117 mm), 16 SPF, SBH, Standard and High-Pressure

GEODynamics' perforating systems use bi-directional boosters, non-lead azide explosives, customized connectors and inserts, and high-velocity, low-shrink detonating cord. Additionally, all GEODynamics gun assemblies are scalloped to optimize charge performance and prevent casing damage from perforating exit hole burrs. Shot phasing is designed to maintain the integrity and collapse resistance of the casing after perforating. These attributes, along with premium quality gun material and gun connectors, allow GEODynamics to deliver safe, efficient, and reliable perforating gun solutions to our customers.

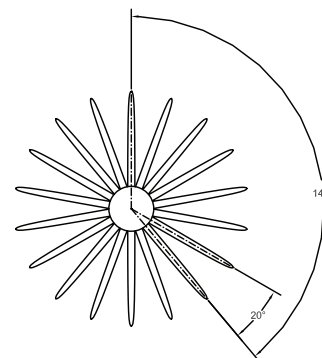
### APPLICATION SPECIFICATIONS

|                                |   |
|--------------------------------|---|
| Shot Density and Phasing       | 16 SPF (140°-20°); <a href="#">Available Gun Lengths</a> range from 4' to 21' |
| Initiation Point               | Top- or bottom-fired options available; conventional wireline and TCP         |
| Mode of Fire                   | Simultaneous or selective fire  |
| Detonating Cord                | 80-grain round  |
| Compatible Perforating Charges | Razor®  |
| Maximum Gun Swell (in)[mm]     | 4.81 [122.17] @ 26.0g, In Fluid   |

### ENVIRONMENTAL

|                             | Standard       | High Pressure        |
|-----------------------------|----------------|----------------------|
| Maximum Pressure (psi)[MPa] | 18,900 [130]   | 20,000 [138] @ 235°F |
| Maximum Tensile* (lbf)[kN]  | 454,600 [2022] | 465,300 [2069]       |

\*Hardware Calculated Breaking Point



### CARRIER SPECIFICATIONS

| Carrier Assembly<br>Part Number     | Shot Density & Phasing |          | Gun End to Center of<br>First Scallop |        | Distance<br>Shot to Shot |       | Approximate Weights    |                        |
|-------------------------------------|------------------------|----------|---------------------------------------|--------|--------------------------|-------|------------------------|------------------------|
|                                     | (spf) [spm]            | Phasing  | (in)                                  | (mm)   | (in)                     | (mm)  | Fully<br>Loaded        | Blank Gun              |
| Standard: GA4616-4045A-D***         | 16 spf [52 spm]        | 140°-20° | 6.00                                  | 152.40 | 0.75                     | 19.05 | 27.4 lb/ft (w/<br>sub) | 22.9 lb/ft (w/<br>sub) |
| High Pressure: GA4616-4045A-D***-HP | 16 spf [52 spm]        | 140°-20° | 6.00                                  | 152.40 | 0.75                     | 19.05 | 27.4 lb/ft (w/<br>sub) | 22.9 lb/ft (w/<br>sub) |

\*\*\* Total number of shots, e.g., 21' 16 SPF, 140°-20° phased high-pressure gun is GA4616-4045A-D321-HP. Refer to [Available Gun Lengths](#).

| Available Gun Lengths                     | 21'          | 15'          | 11'          | 7'          | 4'          |
|---|--------------|--------------|--------------|-------------|-------------|
| Typical Gun Length (ft) [m]               | 20.75 [6.32] | 14.75 [4.50] | 10.75 [3.28] | 6.75 [2.06] | 3.75 [1.14] |
| *** 16 SPF Total Number of Loadable Shots | 321          | 225          | 161          | 097         | 049         |

Contact your local GEODynamics representative for availability of metric part numbers and additional gun lengths.



Revised: August 31, 2023 9:46 PM



# Conventional Long Guns

## 4-5/8 in (117 mm), 16 SPF, SBH, Standard and High-Pressure

### SUPER BIG HOLE

| Carrier O.D. | Shaped Charge        | Part Number              | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |              | Performance in Stressed Berea |              |
|--------------|----------------------|--------------------------|-----------------------|------------|------------------------|--------------|-------------------------|--------------|-------------------------------|--------------|
|              |                      |                          |                       |            |                        | Application  | EHD (in)[cm]            | TTP (in)[cm] | EHD^ (in)[cm]                 | TTP (in)[cm] |
| 4-5/8" 26g   | 4626 Razor SBH TL LD | <sup>1</sup> EC2-46A2631 | Fluid                 | 26.0g, RDX | 16 spf/ 140°-20°       | 7.0" L-80    | 0.90 [2.29]             | 5.50 [13.97] |                               |              |
|              |                      | <sup>1</sup> EC2-46A2632 |                       | 26.0g, HMX |                        |              |                         |              |                               |              |
|              |                      | <sup>1</sup> EC2-46A2631 |                       | 26.0g, RDX |                        | 7-3/4" C-110 | 0.96 [2.44]             | 5.40 [13.72] |                               |              |
|              | 4526 Basix SBH TL    | EC2-45B2631              |                       | 26.0g, RDX |                        | 7.0" L-80    | 0.94 [2.39]             | 6.27 [15.93] |                               |              |
|              |                      | EC2-45B2632              |                       | 26.0g, HMX |                        |              |                         |              |                               |              |
|              | 4626 Basix SBH TL    | <sup>1</sup> EC2-46B2631 |                       | 26.0g, RDX |                        |              | 0.94 [2.39]             | 6.27 [15.93] |                               |              |
|              |                      | <sup>1</sup> EC2-46B2632 |                       | 26.0g, HMX |                        |              |                         |              |                               |              |
|              |                      |                          |                       |            |                        |              |                         |              |                               |              |

Charge cases 45A & 46A are zinc; charge cases 45B & 46B are steel. <sup>1</sup>Blank charge case P/N: EP-1085-100-D (4-1/2" BH LD, zinc).

Performance in concrete represents API RP43 or API RP19B Section 1 testing results with the shot density/phasing, casing OD, and casing grade specified.

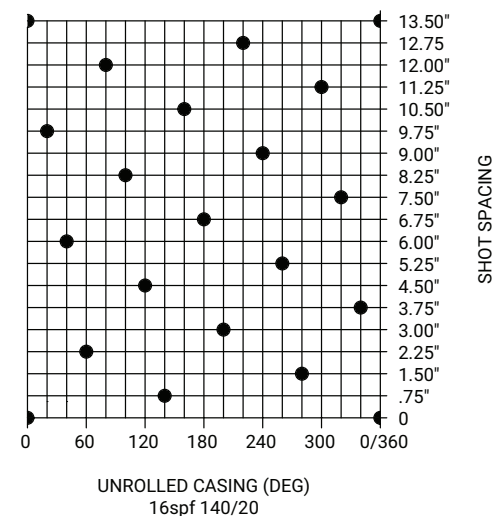
<sup>^</sup>EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

### HARDWARE

|                                      |  |
|--------------------------------------|--|
| Gun Body Configuration/Material      | Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel |
| Charge Tube Type & Retention         | Round steel tube strip; twist-lock retention                               |
| Type of Tandem Connection            | Booster to booster (no splice)   |
| Nominal OD / Wall Thickness (in)[mm] | 4.625 [117.48] / 0.4375 [11.11]  |
| Upper/Lower Thread Connections       | 3-15/16" - 6P ACME-2G  |

### COMPONENTS AND ACCESSORIES

| Description                                     | Part Number(s)                    |                |
|---|-----------------------------------|----------------|
| Top Sub Lift Sub Assembly, 4-5/8"               | TC-LT45-000H                      |                |
| TCP Transfer Kit (4-1/2" through 7")            | GN-000-0030                       |                |
| Top Sub, 4-1/2"                                 | GN-R45-0020                       |                |
| Top Sub Wireline Insert                         | GN-E00-0011 (o-ring: OR-N569-211) |                |
| Spring Contact Assembly                         | GN-E00-0020                       |                |
| Tandem Sub, 4-1/2"                              | GN-R45-0021                       |                |
| O-Ring Materials and Size                       | Top Connection                    | Gun Connection |
| Nitrile (standard option)                       | OR-N569-230                       | OR-N569-342    |
| Viton (with back-up rings required for > 325°F) | OR-V95G-230                       | OR-V95G-342    |
| Back-up rings for > 325°F                       | OR-B230-2813                      | OR-B342-3997   |
| Bull Plug, 4-1/2" Standard                      | GN-R45-0022                       |                |
| 4-1/2" with 2-7/8" EUE Pin                      | GN-R45-0023                       |                |
| Thread Protectors, Top Sub (Top Pin)            | GN-THD-312-020                    |                |
| Carrier (Gun) Protector                         | GN-THD-450-030                    |                |
| Tandem Sub & Bull Plug Protector                | GN-THD-450-040                    |                |



CASING SHOT PATTERN AND PHASING AT 16 SPF 140°

Revised: August 31, 2023 9:46 PM

# Conventional Long Guns

## 4-3/4 in (121 mm), 12 SPF, XDP

GEODynamics' perforating systems use bi-directional boosters, non-lead azide explosives, customized connectors and inserts, and high-velocity, low-shrink detonating cord. Additionally, all GEODynamics gun assemblies are scalloped to optimize charge performance and prevent casing damage from perforating exit hole burrs. Shot phasing is designed to maintain the integrity and collapse resistance of the casing after perforating. These attributes, along with premium quality gun material and gun connectors, allow GEODynamics to deliver safe, efficient, and reliable perforating gun solutions to our customers.

## APPLICATION SPECIFICATIONS

|                                |   |
|--------------------------------|---|
| Shot Density and Phasing       | 12 SPF (135°-45°); <a href="#">Available Gun Lengths</a> range from 2' to 21' |
| Initiation Point               | Top- or bottom-fired options available; conventional wireline and TCP         |
| Mode of Fire                   | Simultaneous or selective fire  |
| Detonating Cord                | 80-grain round  |
| Compatible Perforating Charges | Connex®, Razor®   |
| Maximum Gun Swell (in)[mm]     | 4.867 [123.62] @ 22.7g, In Fluid  |

## ENVIRONMENTAL

|                             |  |
|-----------------------------|--|
| Maximum Pressure (psi)[MPa] | 25,000 [172] @ 260°F                               |
| Maximum Tensile* (lbf)[kN]  | 454,600 [2022] *Hardware Calculated Breaking Point |

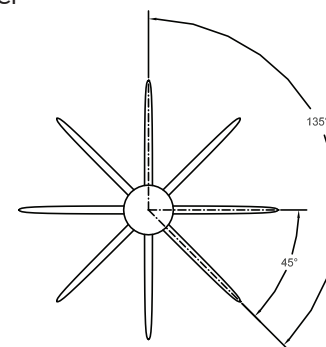
## CARRIER SPECIFICATIONS

| Carrier Assembly<br>Part Number | Shot Density & Phasing |          | Gun End to Center of<br>First Scalloped |        | Distance<br>Shot to Shot |       | Approximate Weights    |                        |
|---------------------------------|------------------------|----------|---|--------|--------------------------|-------|------------------------|------------------------|
|                                 | (spf) [spm]            | Phasing  | (in)                                    | (mm)   | (in)                     | (mm)  | Fully Loaded           | Blank Gun              |
| GA4712-5033A-C***-HP            | 12 spf [39 spm]        | 135°-45° | 6.00                                    | 152.40 | 1.00                     | 25.40 | 37.0 lb/ft (w/<br>sub) | 31.0 lb/ft (w/<br>sub) |

\*\*\* Total number of shots, e.g., 21' 12 SPF, 135°-45° phased gun is GA4712-5033A-C241-HP. Refer to [Available Gun Lengths](#).

| Available Gun Lengths                     | 21'          | 15'          | 11'          | 7'          | 4'          | 2'          |
|---|--------------|--------------|--------------|-------------|-------------|-------------|
| Typical Gun Length (ft) [m]               | 20.75 [6.32] | 14.75 [4.50] | 10.75 [3.28] | 6.75 [2.06] | 3.75 [1.14] | 1.75 [0.53] |
| *** 12 SPF Total Number of Loadable Shots | 241          | 169          | 121          | 073         | 037         | 013         |

Contact your local GEODynamics representative for availability of metric part numbers and additional gun lengths.



# Conventional Long Guns

## 4-3/4 in (121 mm), 12 SPF, XDP

### DEEP PENETRATING/EXTREME DEEP PENETRATING

| Carrier O.D. | Shaped Charge   | Part Number    | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |               | Performance in Stressed Berea |               |
|--------------|-----------------|----------------|-----------------------|------------|------------------------|--------------|-------------------------|---------------|-------------------------------|---------------|
|              |                 |                |                       |            |                        | Application  | EHD (in)[cm]            | TTP (in)[cm]  | EHD^ (in)[cm]                 | TTP (in)[cm]  |
| 4-5/8" 23g   | 3323 Connex SDP | EC2-33A2321-RC | Fluid                 | 22.7g, RDX | 12 spf / 135°-45°      | 7.0" L-80    |                         |               |                               |               |
|              |                 | EC2-33A2322-RC |                       | 22.7g, HMX |                        |              |                         |               | 0.46 [1.17]                   | 15.31 [38.89] |
|              | 3323 Razor XDP  | EC2-33A2321    |                       | 22.7g, RDX |                        |              |                         |               |                               |               |
|              |                 | EC2-33A2322    |                       | 22.7g, HMX |                        |              | 0.37 [0.94]             | 35.03 [88.98] |                               |               |

For this application, 33A charges must have the grooved charge case, EP-1000-100-D.

Performance in concrete represents API RP43 or API RP19B Section 1 testing results with the shot density/phasing, casing OD, and casing grade specified.

^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

### HARDWARE

|                                      |  |
|--------------------------------------|--|
| Gun Body Configuration/Material      | Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel |
| Charge Tube Type & Retention         | Round steel tube strip; bend tab retention                                 |
| Type of Tandem Connection            | Booster to booster (no splice)   |
| Nominal OD / Wall Thickness (in)[mm] | 4.75 [120.65] / 0.50 [12.7]  |
| Upper/Lower Thread Connections       | 3-15/16" - 6P ACME-2G  |

### COMPONENTS AND ACCESSORIES

| Description                                     | Part Number(s)                    |                |
|---|-----------------------------------|----------------|
| Top Sub Lift Sub Assembly, 4-5/8"               | TC-LT45-000H                      |                |
| TCP Transfer Kit (4-1/2" through 7")            | GN-000-0030                       |                |
| Top Sub, 4-1/2"                                 | GN-R45-0020                       |                |
| Top Sub Wireline Insert                         | GN-E00-0011 (o-ring: OR-N569-211) |                |
| Spring Contact Assembly                         | GN-E00-0020                       |                |
| Tandem Sub, 4-1/2"                              | GN-R45-0021                       |                |
| O-Ring Materials and Size                       | Top Connection                    | Gun Connection |
| Nitrile (standard option)                       | OR-N569-230                       | OR-N569-342    |
| Viton (with back-up rings required for > 325°F) | OR-V95G-230                       | OR-V95G-342    |
| Back-up rings for > 325°F                       | OR-B230-2813                      | OR-B342-3997   |
| Bull Plug, 4-1/2" Standard                      | GN-R45-0022                       |                |
| 4-1/2" with 2-7/8" EUE Pin                      | GN-R45-0023                       |                |
| Thread Protectors, Top Sub (Top Pin)            | GN-THD-312-020                    |                |
| Carrier (Gun) Protector                         | GN-THD-450-030                    |                |
| Tandem Sub & Bull Plug Protector                | GN-THD-450-040                    |                |



WIRELINE INSERT  
GN-E00-0011

SPRING CONTACT ASSEMBLY  
GN-E00-0011  
(4-1/2" OD TOP SUB SHOWN FOR  
REFERENCE ONLY)

# Conventional Long Guns

## 4-3/4 in (121 mm) 16 SPF, SBH

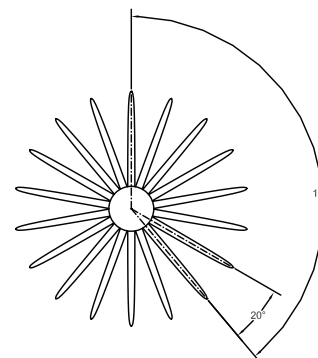
GEODynamics' perforating systems use bi-directional boosters, non-lead azide explosives, customized connectors and inserts, and high-velocity, low-shrink detonating cord. Additionally, all GEODynamics gun assemblies are scalloped to optimize charge performance and prevent casing damage from perforating exit hole burrs. Shot phasing is designed to maintain the integrity and collapse resistance of the casing after perforating. These attributes, along with premium quality gun material and gun connectors, allow GEODynamics to deliver safe, efficient, and reliable perforating gun solutions to our customers.

## APPLICATION SPECIFICATIONS

|                                |   |
|--------------------------------|---|
| Shot Density and Phasing       | 16 SPF (140°-20°); <a href="#">Available Gun Lengths</a> range from 3' to 21' |
| Initiation Point               | Top- or bottom-fired options available; conventional wireline and TCP         |
| Mode of Fire                   | Simultaneous or selective fire  |
| Detonating Cord                | 80-grain round  |
| Compatible Perforating Charges | Razor®, Basix™  |
| Maximum Gun Swell (in)[mm]     | 4.828 [122.63] @ 26.0g, In Fluid  |

## ENVIRONMENTAL

|                             |   |
|-----------------------------|---|
| Maximum Pressure (psi)[MPa] | 23,000 [158.6] @ 260°F                          |
| Maximum Tensile* (lbf)[kN]  | 454,600 [2022] *Hardware Calculated Break Point |



## CARRIER SPECIFICATIONS

| Carrier Assembly<br>Part Number | Shot Density & Phasing |          | Gun End to Center of<br>First Scallop |        | Distance<br>Shot to Shot |       | Approximate Weights    |                        |
|---------------------------------|------------------------|----------|---------------------------------------|--------|--------------------------|-------|------------------------|------------------------|
|                                 | (spf) [spm]            | Phasing  | (in)                                  | (mm)   | (in)                     | (mm)  | Fully<br>Loaded        | Blank Gun              |
| GA4716-4045A-D***               | 16 spf [52 spm]        | 140°-20° | 6.00                                  | 152.40 | 0.75                     | 19.05 | 35.60 lb/ft<br>(w/sub) | 31.0 lb/ft (w/<br>sub) |

\*\*\* Total number of shots, e.g., 21' 16 SPF, 140°-20° phased gun is GA4716-4045A-D321. Refer to [Available Gun Lengths](#).

| Available Gun Lengths                     | 21'          | 16'          | 15'          | 11'          | 9'             | 7'             | 4'             | 3'             |
|---|--------------|--------------|--------------|--------------|----------------|----------------|----------------|----------------|
| Typical Gun Length (ft) [m]               | 20.75 [6.32] | 15.75 [4.80] | 14.75 [4.50] | 10.75 [3.28] | 8.75<br>[2.67] | 6.75<br>[2.06] | 3.75<br>[1.14] | 2.75<br>[0.84] |
| *** 16 SPF Total Number of Loadable Shots | 321          | 241          | 225          | 161          | 129            | 097            | 049            | 33             |

Contact your local GEODynamics representative for availability of metric part numbers and additional gun lengths.



Revised: August 31, 2023 9:46 PM

# Conventional Long Guns

## 4-3/4 in (121 mm) 16 SPF, SBH

### SUPER BIG HOLE

| Carrier O.D. | Shaped Charge        | Part Number              | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |              | Performance in Stressed Berea |              |
|--------------|----------------------|--------------------------|-----------------------|------------|------------------------|--------------|-------------------------|--------------|-------------------------------|--------------|
|              |                      |                          |                       |            |                        | Application  | EHD (in)[cm]            | TTP (in)[cm] | EHD^ (in)[cm]                 | TTP (in)[cm] |
| 4-3/4" 26g   | 4626 Razor SBH TL LD | <sup>1</sup> EC2-46A2631 | Fluid                 | 26.0g, RDX | 16 spf/ 140°-20°       | 7.0" L-80    | 0.90 [2.29]             | 5.50 [13.97] |                               |              |
|              |                      | <sup>1</sup> EC2-46A2632 |                       | 26.0g, HMX |                        |              |                         |              |                               |              |
|              |                      | <sup>1</sup> EC2-46A2631 |                       | 26.0g, RDX |                        | 7-3/4" C-110 | 0.96 [2.44]             | 5.40 [13.72] |                               |              |
|              | 4526 Basix SBH TL    | EC2-45B2631              |                       | 26.0g, RDX |                        | 7.0" L-80    | 0.94 [2.39]             | 6.27 [15.93] |                               |              |
|              |                      | EC2-45B2632              |                       | 26.0g, HMX |                        |              |                         |              |                               |              |
|              | 4626 Basix SBH TL    | <sup>1</sup> EC2-46B2631 |                       | 26.0g, RDX |                        |              | 0.94 [2.39]             | 6.27 [15.93] |                               |              |
|              |                      | <sup>1</sup> EC2-46B2632 |                       | 26.0g, HMX |                        |              |                         |              |                               |              |
|              |                      |                          |                       |            |                        |              |                         |              |                               |              |

Charge cases 45A & 46A are zinc; charge cases 45B & 46B are steel. <sup>1</sup>Blank charge case P/N: EP-1085-100-D (4-1/2" BH LD, zinc).

Performance in concrete represents API RP43 or API RP19B Section 1 testing results with the shot density/phasing, casing OD, and casing grade specified.

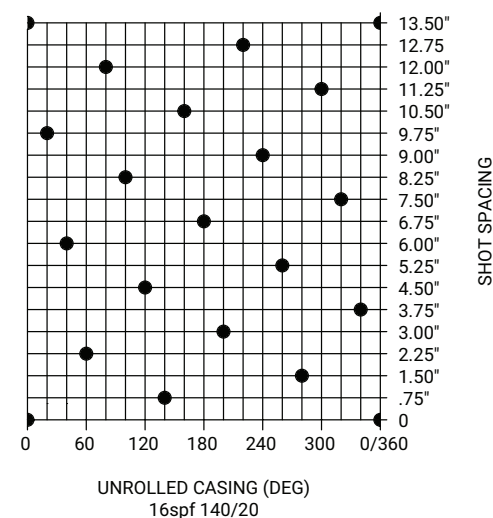
^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

### HARDWARE

|                                      |  |
|--------------------------------------|--|
| Gun Body Configuration/Material      | Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel |
| Charge Tube Type & Retention         | Round steel tube strip; twist-lock retention                               |
| Type of Tandem Connection            | Booster to booster (no splice)   |
| Nominal OD / Wall Thickness (in)[mm] | 4.75 [120.65] / 0.50 [12.70]   |
| Upper/Lower Thread Connections       | 3.9375" - 6P ACME-2G   |

### COMPONENTS AND ACCESSORIES

| Description                                     | Part Number(s)                    |                |
|---|-----------------------------------|----------------|
| Top Sub Lift Sub Assembly, 4-5/8"               | TC-LT45-000H                      |                |
| TCP Transfer Kit (4-1/2" through 7")            | GN-000-0030                       |                |
| Top Sub, 4-1/2"                                 | GN-R45-0020                       |                |
| Top Sub Wireline Insert                         | GN-E00-0011 (o-ring: OR-N569-211) |                |
| Spring Contact Assembly                         | GN-E00-0020                       |                |
| Tandem Sub, 4-1/2"                              | GN-R45-0021                       |                |
| O-Ring Materials and Size                       | Top Connection                    | Gun Connection |
| Nitrile (standard option)                       | OR-N569-230                       | OR-N569-342    |
| Viton (with back-up rings required for > 325°F) | OR-V95G-230                       | OR-V95G-342    |
| Back-up rings for > 325°F                       | OR-B230-2813                      | OR-B342-3997   |
| Bull Plug, 4-1/2" Standard                      | GN-R45-0022                       |                |
| 4-1/2" with 2-7/8" EUE Pin                      | GN-R45-0023                       |                |
| Thread Protectors, Top Sub (Top Pin)            | GN-THD-312-020                    |                |
| Carrier (Gun) Protector                         | GN-THD-450-030                    |                |
| Tandem Sub & Bull Plug Protector                | GN-THD-450-040                    |                |



CASING SHOT PATTERN AND PHASING AT 16 SPF 140°

Revised: August 31, 2023 9:46 PM

# Conventional Long Guns

## 4-3/4 in (121 mm), 24 SPF, HPHF, SBH

GEODynamics' perforating systems use bi-directional boosters, non-lead azide explosives, customized connectors and inserts, and high-velocity, low-shrink detonating cord. Additionally, all GEODynamics gun assemblies are scalloped to optimize charge performance and prevent casing damage from perforating exit hole burrs. Shot phasing is designed to maintain the integrity and collapse resistance of the casing after perforating. These attributes, along with premium quality gun material and gun connectors, allow GEODynamics to deliver safe, efficient, and reliable perforating gun solutions to our customers.

## APPLICATION SPECIFICATIONS

|                                  |   |
|----------------------------------|---|
| Shot Density and Phasing Options | 24 SPF (90°-45°) 90° planar, 45° between planes; <a href="#">Available Gun Lengths</a> from 2' to 21' |
| Initiation Point                 | Top- or bottom-fired options available; conventional wireline and TCP                                 |
| Mode of Fire                     | Simultaneous or selective fire  |
| Detonating Cord                  | 80-grain round  |
| Compatible Perforating Charges   | Razor®  |
| Maximum Gun Swell (in)[mm]       | 4.81 [122.17] In Fluid  |

## ENVIRONMENTAL

|                             |   |
|-----------------------------|---|
| Maximum Pressure (psi)[MPa] | 30,000 [207]                                    |
| Maximum Tensile* (lbf)[kN]  | 688,000 [3060] *Hardware Calculated Break Point |

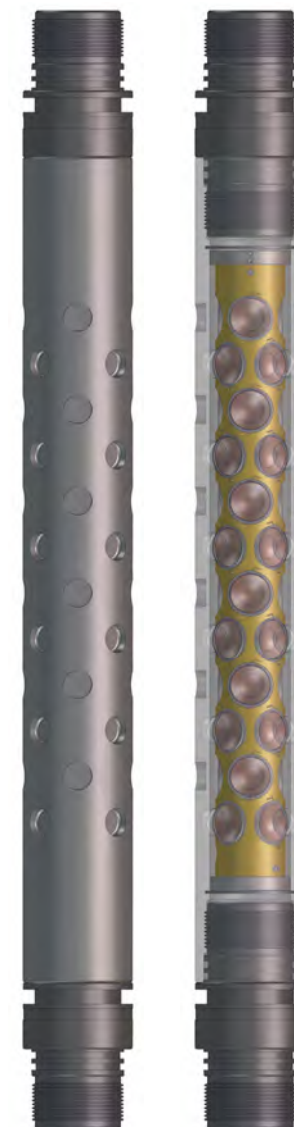
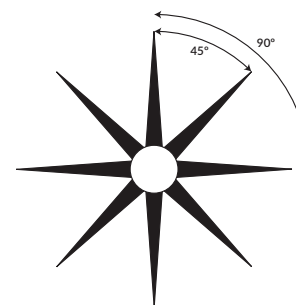
## CARRIER SPECIFICATIONS

| Carrier Assembly<br>Part Number | Shot Density & Phasing |         | Gun End to Center<br>of First Scallop |        | Shot to Shot Distance<br>Across Tandem |        | Distance Between<br>Planes |       | Approximate Weights |             |
|---------------------------------|------------------------|---------|---------------------------------------|--------|--|--------|----------------------------|-------|---------------------|-------------|
|                                 | (spf) [spm]            | Phasing | (in)                                  | (mm)   | (in)                                   | (mm)   | (in)                       | (mm)  | Fully<br>Loaded     | Blank Gun   |
| GA4724-3548K-N***               | 24 spf<br>[79 spm]     | 90°-45° | 7.00                                  | 177.80 | 16.90                                  | 429.26 | 2.0                        | 50.80 | 33.40 lb/ft         | 25.80 lb/ft |

\*\*\* Total number of shots (e.g., 15' 24 SPF, 90° gun is GA4724-3548K-N336. Refer to [Available Gun Lengths](#).

| Available Gun Lengths                     | 21'             | 15'             | 11'             | 7'             | 5'             | 4'             | 3'             | 2'             |
|---|-----------------|-----------------|-----------------|----------------|----------------|----------------|----------------|----------------|
| Typical Gun Length (ft) [m]               | 20.75<br>[6.32] | 14.75<br>[4.50] | 10.75<br>[3.28] | 6.75<br>[2.06] | 4.75<br>[1.45] | 3.75<br>[1.14] | 2.75<br>[0.84] | 1.75<br>[0.53] |
| *** 24 SPF Total Number of Loadable Shots | 480             | 336             | 240             | 144            | 096            | 072            | 048            | 024            |

Contact your local GEODynamics representative for availability of metric part numbers and additional gun lengths.



Contact Joey Prestenbach,  
Global Technical Advisor  
[Joey.Prestenbach@perf.com](mailto:Joey.Prestenbach@perf.com)  
for more information about this system



# Conventional Long Guns

## 4-3/4 in (121 mm), 24 SPF, HPHF, SBH

### SUPER BIG HOLE

| Carrier O.D. | Shaped Charge  | Part Number | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D.   | Performance in Concrete |              | Performance in Stressed Berea |              |
|--------------|----------------|-------------|-----------------------|------------|------------------------|----------------|-------------------------|--------------|-------------------------------|--------------|
|              |                |             |                       |            |                        | Application    | EHD (in)[cm]            | TTP (in)[cm] | EHD^ (in)[cm]                 | TTP (in)[cm] |
| 4-3/4" 18g   | 4818 Razor SBH | EC2-48K1831 | Fluid                 | 18.0g, RDX | 24 spf/ 90°-45°        | 7.0" L-80      |                         |              |                               |              |
|              |                | EC2-48K1832 |                       | 18.0g, HMX |                        |                | 0.73 [1.85]             | 4.81 [12.22] |                               |              |
|              |                |             |                       |            |                        | † 7-3/4" Q-125 | 0.63 [1.60]             | 3.70 [9.40]  |                               |              |

† Heavy weight 7-3/4" 45.51#, Q-125 casing was used in lieu of 7" 31.70# L-80.

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

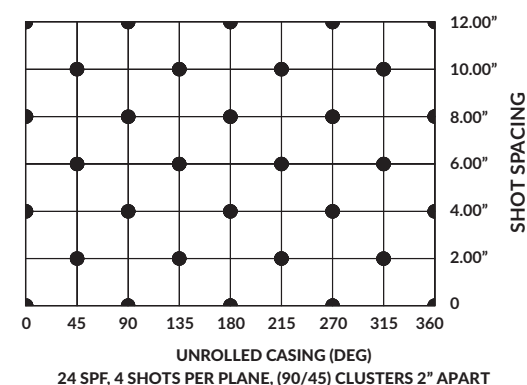
^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

### HARDWARE

|                                      |  |
|--------------------------------------|--|
| Gun Body Configuration/Material      | Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel |
| Charge Tube Type & Retention         | Round steel tube strip, bend tab charge retention                          |
| Type of Tandem Connection            | Booster to booster (no splice)   |
| Nominal OD / Wall Thickness (in)[mm] | 4.75 [120.65] / 0.625 [15.88]  |
| Upper/Lower Thread Connections       | 3.9375 in. - 6P ACME-2G  |

### COMPONENTS AND ACCESSORIES

| Description   | Part Number(s)                                 |                             |
|---|--|-----------------------------|
| <b>O-Ring Materials and Size</b><br>Viton (with back-up rings required for > 325°F)<br>Back-up rings for > 325°F    | Top Connection                                 | Gun Connection              |
|   | OR-V95G-230<br>OR-B230-2813                    | OR-V95G-342<br>OR-B342-3997 |
| <b>TCP Transfer Kit (4-1/2" through 7")</b>   | GN-000-0030                                    |                             |
| <b>Lift Sub Assembly, Tandem, 4-1/2"</b>  | TC-LT45-000H                                   |                             |
| <b>Lifting Clamp Assembly, 4.75"</b>  | TC-LC-04750-0000                               |                             |
| <b>Top Sub, 4-3/4"</b><br>Top Sub Wireline Insert; Spring Contact Assembly  | GN-R475-0020                                   |                             |
|   | GN-E00-0011 (o-ring: OR-N569-211); GN-E00-0020 |                             |
| <b>Tandem Sub, 4-3/4"</b>   | GN-R475-0021                                   |                             |
| <b>Bull Plugs, 4-3/4" Standard</b><br>4-3/4" with 2-7/8" EUE Pin<br>Finned Centralizing Bull Plug, 4.75" OD x 6.25" | GN-R475-0022                                   |                             |
|   | GN-R475-0023                                   |                             |
|   | GN-R47523-C625                                 |                             |
| <b>Thread Protector, Top Sub (Top Pin)</b><br>Carrier (Gun) Protector<br>Tandem Sub & Bull Plug Protector           | GN-THD-312-020                                 |                             |
|   | GN-THD-450-030                                 |                             |
|   | GN-THD-450-040                                 |                             |



# Conventional Long Guns

## 5-1/8 in (130 mm), 12 SPF, XDP

GEODynamics' perforating systems use bi-directional boosters, non-lead azide explosives, customized connectors and inserts, and high-velocity, low-shrink detonating cord. Additionally, all GEODynamics gun assemblies are scalloped to optimize charge performance and prevent casing damage from perforating exit hole burrs. Shot phasing is designed to maintain the integrity and collapse resistance of the casing after perforating. These attributes, along with premium quality gun material and gun connectors, allow GEODynamics to deliver safe, efficient, and reliable perforating gun solutions to our customers.

## APPLICATION SPECIFICATIONS

|                                  |   |
|----------------------------------|---|
| Shot Density and Phasing Options | 12 SPF (135°-45°); <a href="#">Available Gun Lengths</a> range from 4' to 22' |
| Initiation Point                 | Top- or bottom-fired options available; conventional wireline and TCP         |
| Mode of Fire                     | Simultaneous or selective fire  |
| Detonating Cord                  | 80-grain round  |
| Compatible Perforating Charges   | Razor®, Basix™, (23g max.; grooved charge case required)                      |
| Maximum Gun Swell (in)[mm]       | 5.34 [135.64] @ 19.0g in Fluid  |

## ENVIRONMENTAL

|                             |  |
|-----------------------------|--|
| Maximum Pressure (psi)[MPa] | 17,200 [118.59]                                    |
| Maximum Tensile* (lbf)[kN]  | 461,800 [2054] *Hardware Calculated Breaking Point |

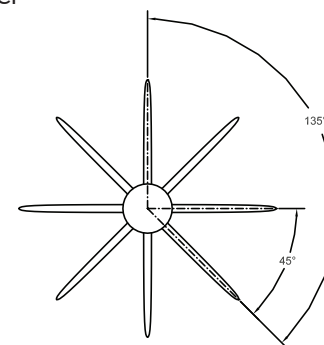
## CARRIER SPECIFICATIONS

| Carrier Assembly Part Number | Shot Density & Phasing |          | Gun End to Center of First Scallop |        | Distance Shot to Shot |       | Approximate Weights |            |
|------------------------------|------------------------|----------|------------------------------------|--------|-----------------------|-------|---------------------|------------|
|                              | (spf) [spm]            | Phasing  | (in)                               | (mm)   | (in)                  | (mm)  | Fully Loaded        | Blank Gun  |
| GA5112-5033A-C***            | 12 spf [39 spm]        | 135°-45° | 6.00                               | 152.40 | 1.00                  | 25.40 | 31.0 lb/ft          | 25.0 lb/ft |

\*\*\* Total number of shots (e.g., 15' 12 SPF, 135° gun is GA5112-5033A-**C169**. Refer to [Available Gun Lengths](#).

| Available Gun Lengths                     | 22"          | 21'          | 15'          | 11'          | 7'          | 4'          |
|---|--------------|--------------|--------------|--------------|-------------|-------------|
| Typical Gun Length (ft) [m]               | 21.75 [6.63] | 20.75 [6.32] | 14.75 [4.50] | 10.75 [3.28] | 6.75 [2.06] | 3.75 [1.14] |
| *** 12 SPF Total Number of Loadable Shots | 253          | 241          | 169          | 121          | 073         | 037         |

Contact your local GEODynamics representative for availability of metric part numbers and additional gun lengths.



# Conventional Long Guns

## 5-1/8 in (130 mm), 12 SPF, XDP

### DEEP PENETRATING/EXTREME DEEP PENETRATING

| Carrier O.D. | Shaped Charge  | Part Number | Perforating Condition | Explosive    | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |              | Performance in Stressed Berea |               |
|--------------|----------------|-------------|-----------------------|--------------|------------------------|--------------|-------------------------|--------------|-------------------------------|---------------|
|              |                |             |                       |              |                        | Application  | EHD (in)[cm]            | TTP (in)[cm] | EHD^ (in)[cm]                 | TTP (in)[cm]  |
| 5-1/8" 23g   | 3323 Razor XDP | EC2-33A2321 | Fluid                 | † 22.7g, RDX | 12 spf / 135°-45°      | 7-5/8"       |                         |              |                               |               |
|              |                | EC2-33A2322 |                       | † 22.7g, HMX |                        |              |                         |              | 0.38 [0.97]                   | 12.60 [32.00] |

† 33A charge case must be grooved. For 5-1/8" 12 spf, max. explosive load is 22.7g.

Performance in concrete represents API RP43 or API RP19B Section 1 testing results with the shot density/phasing, casing OD, and casing grade specified.

^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

### HARDWARE

|                                      |  |
|--------------------------------------|--|
| Gun Body Configuration/Material      | Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel |
| Charge Tube Type & Retention         | Round steel tube strip; bend tab retention                                 |
| Type of Tandem Connection            | Booster to booster (no splice)   |
| Nominal OD / Wall Thickness (in)[mm] | 5.125 [130.18] / 0.4375 [11.11]  |
| Upper/Lower Thread Connections       | 4.500 in. - 6P ACME-2G   |

### COMPONENTS AND ACCESSORIES

| Description   | Part Number(s)                                 |                |
|---|--|----------------|
| <b>O-Ring Materials and Size</b><br>Nitrile (standard option)<br>Viton (with back-up rings required for > 325°F)<br>Back-up rings for > 325°F | Top Connection                                 | Gun Connection |
|   | OR-N569-230                                    | OR-N569-346    |
|   | OR-V95G-230                                    | OR-V95G-346    |
|   | OR-B230-2813                                   | OR-B346-4559   |
| <b>TCP Transfer Kit (4-1/2" through 7")</b>   | GN-000-0030                                    |                |
| <b>Top Sub Lift Sub Assembly, 5-1/8"</b>  | TC-LT51-000H                                   |                |
| <b>Top Sub, 5-1/8"</b><br>Top Sub Wireline Insert; Spring Contact Assembly  | GN-R51-0020                                    |                |
|   | GN-E00-0011 (o-ring: OR-N569-211); GN-E00-0020 |                |
| <b>Tandem Sub, 5-1/8"</b>   | GN-R51-0021                                    |                |
| <b>Bull Plugs, 5-1/8" Standard</b><br>5-1/8" with 2-7/8" EUE Pin<br>Centralized Bull Plug, 5-1/8" with 6-1/4" O.D                             | GN-R51-0022                                    |                |
|   | GN-R51-0023                                    |                |
|   | GN-R5122-C625                                  |                |
| <b>Thread Protector, Top Sub (Top Pin)</b><br>Carrier (Gun) Protector<br>Tandem Sub & Bull Plug Protector                                     | GN-THD-312-020                                 |                |
|   | GN-THD-512-030                                 |                |
|   | GN-THD-512-040                                 |                |



WIRELINE INSERT  
GN-E00-0011

SPRING CONTACT ASSEMBLY  
GN-E00-0011  
(4-1/2" OD TOP SUB SHOWN FOR  
REFERENCE ONLY)

# Conventional Long Guns

## 5-1/8 in (130 mm), 12 SPF, SBH

GEODynamics' perforating systems use bi-directional boosters, non-lead azide explosives, customized connectors and inserts, and high-velocity, low-shrink detonating cord. Additionally, all GEODynamics gun assemblies are scalloped to optimize charge performance and prevent casing damage from perforating exit hole burrs. Shot phasing is designed to maintain the integrity and collapse resistance of the casing after perforating. These attributes, along with premium quality gun material and gun connectors, allow GEODynamics to deliver safe, efficient, and reliable perforating gun solutions to our customers.

## APPLICATION SPECIFICATIONS

|                                  |   |
|----------------------------------|---|
| Shot Density and Phasing Options | 12 SPF (135°-45°); <a href="#">Available Gun Lengths</a> range from 4' to 22' |
| Initiation Point                 | Top- or bottom-fired options available; conventional wireline and TCP         |
| Mode of Fire                     | Simultaneous or selective fire  |
| Detonating Cord                  | 80-grain round  |
| Compatible Perforating Charges   | Razor®  |
| Maximum Gun Swell (in)[mm]       | 5.33 [135.38] @ 32.0g In Fluid  |

## ENVIRONMENTAL

|                             |  |
|-----------------------------|--|
| Maximum Pressure (psi)[MPa] | 17,200 [118.59]                                    |
| Maximum Tensile* (lbf)[kN]  | 461,800 [2054] *Hardware Calculated Breaking Point |

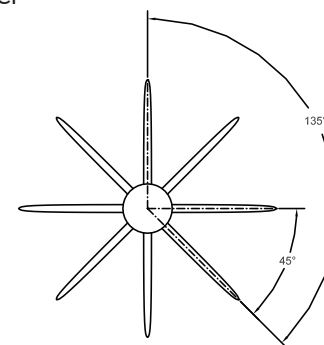
## CARRIER SPECIFICATIONS

| Carrier Assembly<br>Part Number | Shot Density & Phasing |          | Gun End to Center of<br>First Scalloped |        | Distance<br>Shot to Shot |       | Approximate Weights |            |
|---------------------------------|------------------------|----------|---|--------|--------------------------|-------|---------------------|------------|
|                                 | (spf) [spm]            | Phasing  | (in)                                    | (mm)   | (in)                     | (mm)  | Fully Loaded        | Blank Gun  |
| GA5112-3551A-C***               | 12 spf [39 spm]        | 135°-45° | 6.00                                    | 152.40 | 1.00                     | 25.40 | 29.0 lb/ft          | 25.0 lb/ft |

\*\*\* Total number of shots (e.g., 15' 12 SPF, 135° gun is GA5112-3551A-C**169**. Refer to [Available Gun Lengths](#).

| Available Gun Lengths                     | 22'          | 21'          | 15'          | 11'          | 7'          | 4'          |
|---|--------------|--------------|--------------|--------------|-------------|-------------|
| Typical Gun Length (ft) [m]               | 21.75 [6.63] | 20.75 [6.32] | 14.75 [4.50] | 10.75 [3.28] | 6.75 [2.06] | 3.75 [1.14] |
| *** 12 SPF Total Number of Loadable Shots | 253          | 241          | 169          | 121          | 073         | 037         |

Contact your local GEODynamics representative for availability of metric part numbers and additional gun lengths.



# Conventional Long Guns

## 5-1/8 in (130 mm), 12 SPF, SBH

### SUPER BIG HOLE

| Carrier O.D.  | Shaped Charge        | Part Number | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |              | Performance in Stressed Berea |              |  |
|---------------|----------------------|-------------|-----------------------|------------|------------------------|--------------|-------------------------|--------------|-------------------------------|--------------|--|
|               |                      |             |                       |            |                        | Application  | EHD (in)[cm]            | TTP (in)[cm] | EHD^ (in)[cm]                 | TTP (in)[cm] |  |
| 5-1/8"<br>32g | 5132 Razor SBH TL LD | EC2-51A3231 | Fluid                 | 32.0g, RDX | 16 spf / 140°-20°      | 7-5/8" L-80  | 1.07 [2.72]             | 6.60 [16.76] |                               |              |  |
|               |                      | EC2-51A3232 |                       | 32.0g, HMX |                        |              |                         |              |                               |              |  |
|               | 5132 Razor SBH LD    | EC2-51B3231 |                       | 32.0g, RDX | 12 spf/135°-45°        |              | 1.05 [2.67]             | 7.08 [17.98] |                               |              |  |
|               |                      |             |                       | 32.0g, RDX | 16 spf / 140°-20°      |              | 1.05 [2.67]             | 6.88 [17.48] |                               |              |  |

Charge case 51A is zinc; charge case 51B is steel.

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

### HARDWARE

|                                      |  |
|--------------------------------------|--|
| Gun Body Configuration/Material      | Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel |
| Charge Tube Type & Retention         | Round steel tube strip, twist lock retention                               |
| Type of Tandem Connection            | Booster to booster (no splice)   |
| Nominal OD / Wall Thickness (in)[mm] | 5.125 [130.18] / 0.4375 [11.11]  |
| Upper/Lower Thread Connections       | 4.500 in. - 6P ACME-2G   |

### COMPONENTS AND ACCESSORIES

| Description   | Part Number(s)                                 |                |
|---|--|----------------|
| <b>O-Ring Materials and Size</b><br>Nitrile (standard option)<br>Viton (with back-up rings required for > 325°F)<br>Back-up rings for > 325°F | Top Connection                                 | Gun Connection |
|   | OR-N569-230                                    | OR-N569-346    |
|   | OR-V95G-230                                    | OR-V95G-346    |
|   | OR-B230-2813                                   | OR-B346-4559   |
| <b>TCP Transfer Kit (4-1/2" through 7")</b>   | GN-000-0030                                    |                |
| <b>Top Sub Lift Sub Assembly, 5-1/8"</b>  | TC-LT51-000H                                   |                |
| <b>Top Sub, 5-1/8"</b>  | GN-R51-0020                                    |                |
| Top Sub Wireline Insert; Spring Contact Assembly  | GN-E00-0011 (o-ring: OR-N569-211); GN-E00-0020 |                |
| <b>Tandem Sub, 5-1/8"</b>   | GN-R51-0021                                    |                |
| <b>Bull Plugs, 5-1/8" Standard</b><br>5-1/8" with 2-7/8" EUE Pin<br>Centralized Bull Plug, 5-1/8" with 6-1/4" O.D                             | GN-R51-0022                                    |                |
|   | GN-R51-0023                                    |                |
|   | GN-R5122-C625                                  |                |
| <b>Thread Protector, Top Sub (Top Pin)</b><br>Carrier (Gun) Protector<br>Tandem Sub & Bull Plug Protector                                     | GN-THD-312-020                                 |                |
|   | GN-THD-512-030                                 |                |
|   | GN-THD-512-040                                 |                |



**WIRELINE INSERT**  
GN-E00-0011

**SPRING CONTACT ASSEMBLY**  
GN-E00-0011  
(4-1/2" OD TOP SUB SHOWN FOR  
REFERENCE ONLY)

# Conventional Long Guns

## 5-1/8 in (130 mm), 16 SPF, SBH

GEODynamics' perforating systems use bi-directional boosters, non-lead azide explosives, customized connectors and inserts, and high-velocity, low-shrink detonating cord. Additionally, all GEODynamics gun assemblies are scalloped to optimize charge performance and prevent casing damage from perforating exit hole burrs. Shot phasing is designed to maintain the integrity and collapse resistance of the casing after perforating. These attributes, along with premium quality gun material and gun connectors, allow GEODynamics to deliver safe, efficient, and reliable perforating gun solutions to our customers.

## APPLICATION SPECIFICATIONS

|                                  |   |
|----------------------------------|---|
| Shot Density and Phasing Options | 16 SPF (140°-20°); <a href="#">Available Gun Lengths</a> range from 3' to 22' |
| Initiation Point                 | Top- or bottom-fired options available; conventional wireline and TCP         |
| Mode of Fire                     | Simultaneous or selective fire  |
| Detonating Cord                  | 80-grain round  |
| Compatible Perforating Charges   | Razor®  |
| Maximum Gun Swell (in)[mm]       | 5.33 [135.38] @ 32.0g In Fluid  |

## ENVIRONMENTAL

|                             |  |
|-----------------------------|--|
| Maximum Pressure (psi)[MPa] | 17,200 [118.59]                                    |
| Maximum Tensile* (lbf)[kN]  | 461,800 [2054] *Hardware Calculated Breaking Point |

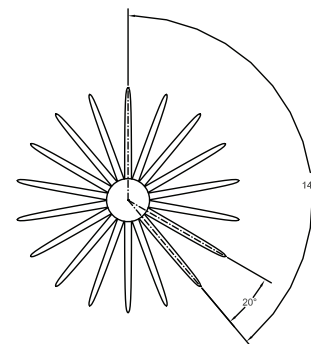
## CARRIER SPECIFICATIONS

| Carrier Assembly<br>Part Number | Shot Density & Phasing |          | Gun End to Center of<br>First Scalloped |        | Distance<br>Shot to Shot |       | Approximate Weights |             |
|---------------------------------|------------------------|----------|---|--------|--------------------------|-------|---------------------|-------------|
|                                 | (spf) [spm]            | Phasing  | (in)                                    | (mm)   | (in)                     | (mm)  | Fully Loaded        | Blank Gun   |
| GA5116-3551A-D***               | 16 spf [52 spm]        | 140°-20° | 6.00                                    | 152.40 | 0.75                     | 19.05 | 30.08 lb/ft         | 25.10 lb/ft |

\*\*\* Total number of shots (e.g., 15' 16 SPF, 140° gun is GA5116-3551A-D225. Refer to [Available Gun Lengths](#).

| Available Gun Lengths                    | 22"          | 21'          | 15'          | 11'          | 7'          | 4'          | 3'          |
|--|--------------|--------------|--------------|--------------|-------------|-------------|-------------|
| Typical Gun Length (ft) [m]              | 21.75 [6.63] | 20.75 [6.32] | 14.75 [4.50] | 10.75 [3.28] | 6.75 [2.06] | 3.75 [1.14] | 2.75 [0.84] |
| ***16 SPF Total Number of Loadable Shots | 337          | 321          | 225          | 161          | 097         | 049         | 033         |

Contact your local GEODynamics representative for availability of metric part numbers and additional gun lengths.





# Conventional Long Guns

## 5-1/8 in (130 mm), 16 SPF, SBH

### SUPER BIG HOLE

| Carrier<br>O.D. | Shaped Charge        | Part Number | Perforating<br>Condition | Explosive  | Shot Density /<br>Phasing | ^Casing O.D. | Performance in Concrete  |                          | Performance in Stressed Berea |                          |  |
|-----------------|----------------------|-------------|--------------------------|------------|---------------------------|--------------|--------------------------|--------------------------|-------------------------------|--------------------------|--|
|                 |                      |             |                          |            |                           | Application  | EHD <sup>(in)</sup> [cm] | TTP <sup>(in)</sup> [cm] | EHD^ <sup>(in)</sup> [cm]     | TTP <sup>(in)</sup> [cm] |  |
| 5-1/8"<br>32g   | 5132 Razor SBH TL LD | EC2-51A3231 | Fluid                    | 32.0g, RDX | 16 spf / 140°-20°         | 7-5/8" L-80  | 1.07 [2.72]              | 6.60 [16.76]             |                               |                          |  |
|                 |                      | EC2-51A3232 |                          | 32.0g, HMX |                           |              |                          |                          |                               |                          |  |
|                 | 5132 Razor SBH LD    | EC2-51B3231 |                          | 32.0g, RDX | 12 spf/135°-45°           |              | 1.05 [2.67]              | 7.08 [17.98]             |                               |                          |  |
|                 |                      |             |                          | 32.0g, RDX | 16 spf / 140°-20°         |              | 1.05 [2.67]              | 6.88 [17.48]             |                               |                          |  |

Charge case 51A is zinc; charge case 51B is steel.

Performance in concrete represents API RP43 or API RP19B Section 1 testing results with the shot density/phasing, casing OD, and casing grade specified.

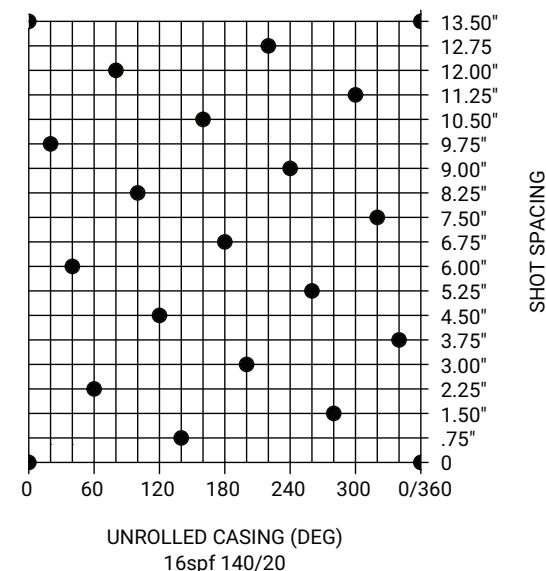
^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

### HARDWARE

|                                      |  |
|--------------------------------------|--|
| Gun Body Configuration/Material      | Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel |
| Charge Tube Type & Retention         | Round steel tube strip, twist lock charge retention                        |
| Type of Tandem Connection            | Booster to booster (no splice)   |
| Nominal OD / Wall Thickness (in)[mm] | 5.125 [130.18] / 0.4375 [11.11]  |
| Upper/Lower Thread Connections       | 4.500 in. - 6P ACME-2G   |

### COMPONENTS AND ACCESSORIES

| Description   | Part Number(s)                                 |                |
|---|--|----------------|
| <b>O-Ring Materials and Size</b><br>Nitrile (standard option)<br>Viton (with back-up rings required for > 325°F)<br>Back-up rings for > 325°F | Top Connection                                 | Gun Connection |
|   | OR-N569-230                                    | OR-N569-346    |
|   | OR-V95G-230                                    | OR-V95G-346    |
|   | OR-B230-2813                                   | OR-B346-4559   |
| TCP Transfer Kit (4-1/2" through 7")  | GN-000-0030                                    |                |
| Top Sub Lift Sub Assembly, 5-1/8"   | TC-LT51-000H                                   |                |
| Top Sub, 5-1/8"   | GN-R51-0020                                    |                |
| Top Sub Wireline Insert; Spring Contact Assembly  | GN-E00-0011 (o-ring: OR-N569-211); GN-E00-0020 |                |
| Tandem Sub, 5-1/8"  | GN-R51-0021                                    |                |
| <b>Bull Plugs, 5-1/8" Standard</b><br>5-1/8" with 2-7/8" EUE Pin<br>Centralized Bull Plug, 5-1/8" with 6-1/4" O.D                             | GN-R51-0022                                    |                |
|   | GN-R51-0023                                    |                |
|   | GN-R5122-C625                                  |                |
| <b>Thread Protector, Top Sub (Top Pin)</b><br>Carrier (Gun) Protector<br>Tandem Sub & Bull Plug Protector                                     | GN-THD-312-020                                 |                |
|   | GN-THD-512-030                                 |                |
|   | GN-THD-512-040                                 |                |



CASING SHOT PATTERN AND PHASING AT 16 SPF 140°

Revised: August 31, 2023 9:46 PM

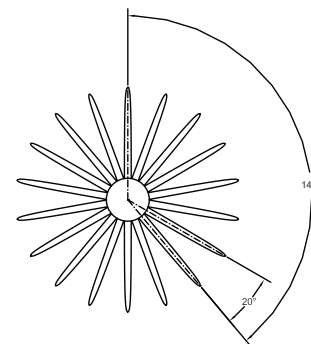
# Conventional Long Guns

## 5-1/8 in (130 mm), 22 SPF, GH and DP

GEODynamics' perforating systems use bi-directional boosters, non-lead azide explosives, customized connectors and inserts, and high-velocity, low-shrink detonating cord. Additionally, all GEODynamics gun assemblies are scalloped to optimize charge performance and prevent casing damage from perforating exit hole burrs. Shot phasing is designed to maintain the integrity and collapse resistance of the casing after perforating. These attributes, along with premium quality gun material and gun connectors, allow GEODynamics to deliver safe, efficient, and reliable perforating gun solutions to our customers.

## APPLICATION SPECIFICATIONS

|                                  |  |
|----------------------------------|--|
| Shot Density and Phasing Options | 22 SPF (140°-20°); <a href="#">Available Gun Lengths</a> range from 3' to 21'              |
| Initiation Point                 | Top- or bottom-fired options available; conventional wireline and TCP                      |
| Mode of Fire                     | Simultaneous or selective fire   |
| Detonating Cord                  | 80-grain round   |
| Compatible Perforating Charges   | <a href="#">Basix™</a> and <a href="#">Razor®</a> (19g max.; grooved charge case required) |
| Maximum Gun Swell (in)[mm]       | 5.34 [135.64] @ 19.0g, In Fluid  |



## ENVIRONMENTAL

|                             |  |
|-----------------------------|--|
| Maximum Pressure (psi)[MPa] | 15,400 [106.18]                                    |
| Maximum Tensile* (lbf)[kN]  | 461,800 [2054] *Hardware Calculated Breaking Point |

## CARRIER SPECIFICATIONS

| Carrier Assembly<br>Part Number | Shot Density & Phasing |          | Gun End to Center of<br>First Scallop |        | Distance<br>Shot to Shot |       | Approximate Weights |            |
|---------------------------------|------------------------|----------|---------------------------------------|--------|--------------------------|-------|---------------------|------------|
|                                 | (spf) [spm]            | Phasing  | (in)                                  | (mm)   | (in)                     | (mm)  | Fully Loaded        | Blank Gun  |
| GA5122-5033A-D***               | 22 spf [72 spm]        | 140°-20° | 6.00                                  | 152.40 | 0.5454                   | 13.85 | 36.4 lb/ft          | 25.0 lb/ft |

\*\*\* Total number of shots (e.g., 15' 22 SPF, 140° gun is GA5122-5033A-D309. Refer to [Available Gun Lengths](#).

| Available Gun Lengths                     | 21'          | 15'          | 11'          | 7'          | 4'          | 3'          |
|---|--------------|--------------|--------------|-------------|-------------|-------------|
| Typical Gun Length (ft) [m]               | 20.75 [6.32] | 14.75 [4.50] | 10.75 [3.28] | 6.75 [2.06] | 3.75 [1.14] | 2.75 [0.84] |
| *** 22 SPF Total Number of Loadable Shots | 441          | 309          | 221          | 133         | 067         | 045         |

Contact your local GEODynamics representative for availability of metric part numbers and additional gun lengths.

# Conventional Long Guns

## 5-1/8 in (130 mm), 22 SPF, GH and DP

### GOOD HOLE

| Carrier O.D. | Shaped Charge | Part Number    | Perforating Condition | Explosive    | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |               | Performance in Stressed Berea |               |
|--------------|---------------|----------------|-----------------------|--------------|------------------------|--------------|-------------------------|---------------|-------------------------------|---------------|
|              |               |                |                       |              |                        | Application  | EHD (in)[cm]            | TTP (in)[cm]  | EHD^ (in)[cm]                 | TTP (in)[cm]  |
| 5-1/8" 19g   | 3319 Razor GH | EC2-33A1941-G  | Fluid                 | † 19.0g, RDX | 22 spf / 140°-20°      | 7-5/8"       |                         |               | 0.37 [0.94]                   | 12.10 [30.73] |
|              |               | EC2-33A1942-G  |                       | † 19.0g, HMX |                        |              |                         |               |                               |               |
|              | 3319 Basix GH | EC2-33A1941-EG |                       | † 19.0g, RDX |                        |              | 0.37 [0.94]             | 25.20 [64.01] |                               |               |
|              |               | EC2-33A1942-EG |                       | † 19.0g, HMX |                        |              |                         |               |                               |               |

† 33A charge case must be grooved. For 5-1/8" 22 spf, max. explosive load is 19g.

### DEEP PENETRATING

| Carrier O.D. | Shaped Charge | Part Number    | Perforating Condition | Explosive    | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |               | Performance in Stressed Berea |              |
|--------------|---------------|----------------|-----------------------|--------------|------------------------|--------------|-------------------------|---------------|-------------------------------|--------------|
|              |               |                |                       |              |                        | Application  | EHD (in)[cm]            | TTP (in)[cm]  | EHD^ (in)[cm]                 | TTP (in)[cm] |
| 5-1/8" 19g   | 3319 Basix DP | EC2-33A1921-EG | Fluid                 | † 19.0g, RDX | 22 spf / 140°-20°      | 7-5/8"       | 0.36 [0.91]             | 26.30 [66.80] |                               |              |

† 33A charge case must be grooved. For 5-1/8" 22 spf, max. explosive load is 19g.

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

FLUID: Qualified for shooting in FLUID only with perforating systems qualified by GEODynamics.

IN FLUID or DRY: Qualified for shooting in FLUID or DRY GAS with perforating systems qualified by GEODynamics.

Revised: August 31, 2023 3:22 PM

# Conventional Long Guns

## 5-1/8 in (130 mm), 22 SPF, GH and DP

### HARDWARE

|                                      |  |
|--------------------------------------|--|
| Gun Body Configuration/Material      | Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel |
| Charge Tube Type & Retention         | Round steel tube strip, twist lock charge retention                        |
| Type of Tandem Connection            | Booster to booster (no splice)   |
| Nominal OD / Wall Thickness (in)[mm] | 5.125 [130.18] / 0.4375 [11.11]  |
| Upper/Lower Thread Connections       | 4.500 in. - 6P ACME-2G   |

### COMPONENTS AND ACCESSORIES

| Description   | Part Number(s)                                 |                |
|---|--|----------------|
| <b>O-Ring Materials and Size</b><br>Nitrile (standard option)<br>Viton (with back-up rings required for > 325°F)<br>Back-up rings for > 325°F | Top Connection                                 | Gun Connection |
|   | OR-N569-230                                    | OR-N569-346    |
|   | OR-V95G-230                                    | OR-V95G-346    |
|   | OR-B230-2813                                   | OR-B346-4559   |
| <b>TCP Transfer Kit (4-1/2" through 7")</b>   | GN-000-0030                                    |                |
| <b>Top Sub Lift Sub Assembly, 5-1/8"</b>  | TC-LT51-000H                                   |                |
| <b>Top Sub, 5-1/8"</b>  | GN-R51-0020                                    |                |
| Top Sub Wireline Insert; Spring Contact Assembly  | GN-E00-0011 (o-ring: OR-N569-211); GN-E00-0020 |                |
| <b>Tandem Sub, 5-1/8"</b>   | GN-R51-0021                                    |                |
| <b>Bull Plugs, 5-1/8" Standard</b><br>5-1/8" with 2-7/8" EUE Pin<br>Centralized Bull Plug, 5-1/8" with 6-1/4" O.D                             | GN-R51-0022                                    |                |
|   | GN-R51-0023                                    |                |
|   | GN-R5122-C625                                  |                |
| <b>Thread Protector, Top Sub (Top Pin)</b><br>Carrier (Gun) Protector<br>Tandem Sub & Bull Plug Protector                                     | GN-THD-312-020                                 |                |
|   | GN-THD-512-030                                 |                |
|   | GN-THD-512-040                                 |                |



**WIRELINE INSERT**  
GN-E00-0011

**SPRING CONTACT ASSEMBLY**  
GN-E00-0011  
(4-1/2" OD TOP SUB SHOWN FOR  
REFERENCE ONLY)

# Conventional Long Guns

## 6-3/4 in (171 mm), 22 SPF, HPHF, SBH

GEODynamics' perforating systems use bi-directional boosters, non-lead azide explosives, customized connectors and inserts, and high-velocity, low-shrink detonating cord. Additionally, all GEODynamics gun assemblies are scalloped to optimize charge performance and prevent casing damage from perforating exit hole burrs. Shot phasing is designed to maintain the integrity and collapse resistance of the casing after perforating. These attributes, along with premium quality gun material and gun connectors, allow GEODynamics to deliver safe, efficient, and reliable perforating gun solutions to our customers.

## APPLICATION SPECIFICATIONS

|                                  |   |
|----------------------------------|---|
| Shot Density and Phasing Options | 22 SPF (90°-45°) 90° planar, 45° between planes; <a href="#">Available Gun Lengths</a> from 2' to 21' |
| Initiation Point                 | Top- or bottom-fired options available; conventional wireline and TCP                                 |
| Mode of Fire                     | Simultaneous or selective fire  |
| Detonating Cord                  | 80-grain round  |
| Compatible Perforating Charges   | <a href="#">Super Big Hole</a>  |
| Maximum Gun Swell (in)[mm]       | 6.83 [173.48] @ 52.0g, In Fluid   |

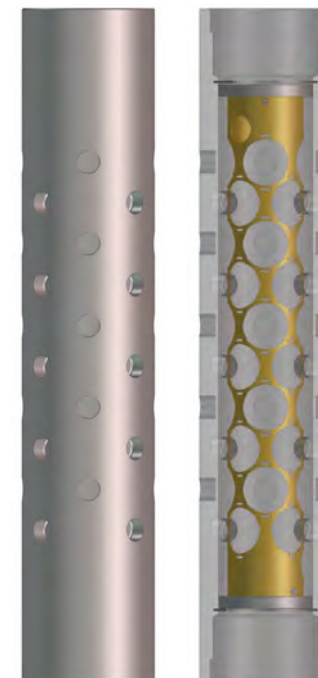
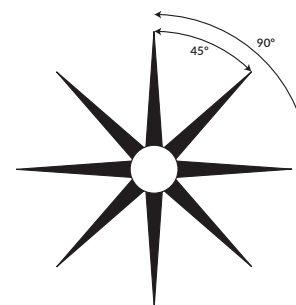
## ENVIRONMENTAL

|                             |   |
|-----------------------------|---|
| Maximum Pressure (psi)[MPa] | 30,000 [207]                                      |
| Maximum Tensile* (lbf)[kN]  | 1,229,000 [5466] *Hardware Calculated Break Point |

## CARRIER SPECIFICATIONS

| Carrier Assembly<br>Part Number | Shot Density & Phasing |         | Gun End to Center<br>of First Scallop |        | Shot to Shot Distance<br>Across Tandem |        | Distance Between<br>Planes |       | Approximate Weights |             |
|---------------------------------|------------------------|---------|---------------------------------------|--------|--|--------|----------------------------|-------|---------------------|-------------|
|                                 | (spf) [spm]            | Phasing | (in)                                  | (mm)   | (in)                                   | (mm)   | (in)                       | (mm)  | Fully Loaded        | Blank Gun   |
| GA6722-2068K-N***               | 22 spf<br>[72 spm]     | 90°-45° | 8.18                                  | 207.77 | 19.26                                  | 489.20 | 2.19                       | 55.63 | 76.70 lb/ft         | 60.20 lb/ft |
|                                 |                        |         | 5ft and longer guns                   |        |  |        |                            |       |                     |             |

\*\*\* Total number of shots (e.g., 15' 22 SPF, 90° gun is GA6722-2068K-N304. Refer to [Available Gun Lengths](#).



| Available Gun Lengths                     | 21'             | 15'             | 11'             | 7'             | 5'             | 4'             | 3'             | 2'             |
|---|-----------------|-----------------|-----------------|----------------|----------------|----------------|----------------|----------------|
| Typical Gun Length (ft) [m]               | 20.75<br>[6.32] | 14.75<br>[4.50] | 10.75<br>[3.28] | 6.75<br>[2.06] | 4.75<br>[1.45] | 3.75<br>[1.14] | 2.75<br>[0.84] | 1.75<br>[0.53] |
| *** 22 SPF Total Number of Loadable Shots | 436             | 304             | 216             | 128            | 084            | 060            | 040            | 016            |

Contact your local GEODynamics representative for availability of metric part numbers and additional gun lengths.

Contact Joey Prestenbach,  
Global Technical Advisor  
[Joey.Prestenbach@perf.com](mailto:Joey.Prestenbach@perf.com)  
for more information about this system

# Conventional Long Guns

## 6-3/4 in (171 mm), 22 SPF, HPHF, SBH

### SUPER BIG HOLE

| Carrier O.D. | Shaped Charge  | Part Number | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D.   | Performance in Concrete |              | Performance in Stressed Berea |              |
|--------------|----------------|-------------|-----------------------|------------|------------------------|----------------|-------------------------|--------------|-------------------------------|--------------|
|              |                |             |                       |            |                        | Application    | EHD (in)[cm]            | TTP (in)[cm] | EHD^ (in)[cm]                 | TTP (in)[cm] |
| 6-3/4" 52g   | 6852 Razor SBH | EC2-68K5231 | Fluid                 | 52.0g, RDX | 22 spf/ 90°-45°        | 9-5/8" L-80    | 1.08 [2.74]             | 5.62 [14.27] |                               |              |
|              |                | EC2-68K5232 |                       | 52.0g, HMX |                        | † 9-7/8" Q-125 | 0.97 [2.46]             | 5.35 [13.59] |                               |              |
|              |                |             |                       |            |                        |                |                         |              |                               |              |

† Heavy weight 9-7/8" 61.80#, Q-125 casing was used in lieu of 9-5/8" 46.18# L-80.

### HARDWARE

**Gun Body Configuration/Material**

Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel

**Charge Tube Type & Retention**

Round steel tube strip, bend tab charge retention

**Type of Tandem Connection**

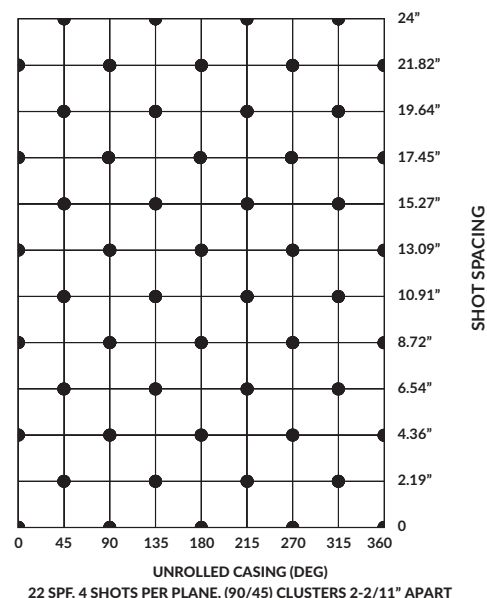
Booster to booster (no splice)

**Nominal OD / Wall Thickness (in)[mm]**

6.75 [171] / 0.875 [22.23]

**Upper/Lower Thread Connections**

5.75 in. - 6P ACME-2G



Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

FLUID: Qualified for shooting in FLUID only with perforating systems qualified by GEODynamics.

IN FLUID or DRY: Qualified for shooting in FLUID or DRY GAS with perforating systems qualified by GEODynamics.

Revised: August 31, 2023 9:34 PM



# Conventional Long Guns

## 6-3/4 in (171 mm), 22 SPF, HPHF, SBH

### COMPONENTS AND ACCESSORIES

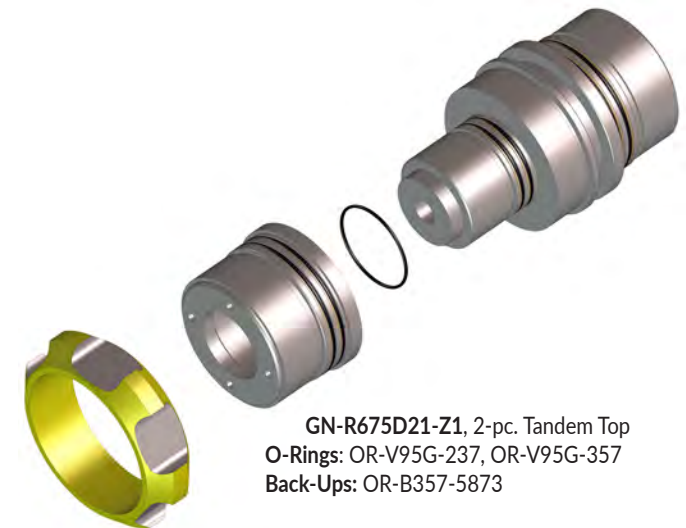
| Description  | Part Number(s)   |                |
|--|--|----------------|
| <b>O-Ring Materials and Size</b><br>Viton (with back-up rings required for > 325°F)<br>Back-up rings for > 325°F   | Top Connection   | Gun Connection |
|  | OR-V95G-230  | OR-V95G-357    |
|  | OR-B230-2813   | OR-B357-5873   |
| <b>TCP Transfer Kit, Long Transfer</b>   | GN-000-0035  |                |
| <b>Lift Sub Assembly, Tandem, 4-1/2"</b>   | TC-LT45-000H <i>(threads into bottom part of 2-piece tandem)</i>                             |                |
| <b>Top Sub, 6-3/4"</b>   | GN-R675D20   |                |
| Top Sub Wireline Insert; Spring Contact Assembly   | GN-E00-0011 (o-ring: OR-N569-211); GN-E00-0020   |                |
| <b>Two Piece Tandem 6-3/4" w/8-1/4" Centralizing Ring</b>  | GN-R675D21-Z827-CT   |                |
| Two Piece Tandem 6-3/4" (Top)  | GN-R675D21-Z1 (o-rings: OR-V95G-237, OR-V95G-357; back-up rings: OR-B357-5873)               |                |
| Two Piece Tandem 6-3/4" (Bottom)   | GN-R675D21-Z2 (o-rings: OR-V95G-342, OR-V95G-357; back-up rings: OR-B342-3997, OR-B357-5873) |                |
| Centralizing Ring 6-3/4" (8.270" OD)<br>Sub Wrench   | GN-RH675-R827<br>GN-R675D21-ZTL  |                |
| <b>Bull Plugs, 6-3/4" Standard</b><br>6-3/4" with 2-7/8" EUE Pin<br>6-3/4" with 3-1/2" EUE Pin<br>Centralized with 2-7/8" EUE Pin<br>Centralized with 3-1/2" EUE Pin | GN-R675D22   |                |
|  | GN-R675D23   |                |
|  | GN-R675D24   |                |
|  | GN-R675D23-C825  |                |
|  | GN-R675D24-C825  |                |
| <b>Thread Protector, Top Sub (Top Pin)</b><br>Carrier (Gun) Protector<br>Tandem Sub & Bull Plug Protector  | GN-THD-312-020   |                |
|  | GN-THD-675-030   |                |
|  | GN-THD-675-040   |                |



**GN-R675D21-Z827-CT**  
2-pc. Tandem with  
8-1/4" OD Ring Centralizer



**GN-R675D21-ZTL**  
Sub Wrench



**GN-RH675-R827**  
8-1/4" Ring Centralizer

**GN-R675D21-Z2, 2-pc. Tandem Bottom**  
O-Rings: OR-V95G-342, OR-V95G-357  
Back-Ups: OR-B342-3997, OR-B357-5873

**GN-R675D21-Z1, 2-pc. Tandem Top**  
O-Rings: OR-V95G-237, OR-V95G-357  
Back-Ups: OR-B357-5873

# Conventional Long Guns

## 7 in (178 mm), 12 SPF, DP, GH, and SGH

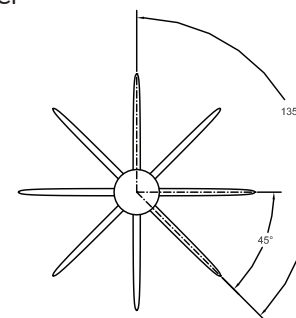
GEODynamics' perforating systems use bi-directional boosters, non-lead azide explosives, customized connectors and inserts, and high-velocity, low-shrink detonating cord. Additionally, all GEODynamics gun assemblies are scalloped to optimize charge performance and prevent casing damage from perforating exit hole burrs. Shot phasing is designed to maintain the integrity and collapse resistance of the casing after perforating. These attributes, along with premium quality gun material and gun connectors, allow GEODynamics to deliver safe, efficient, and reliable perforating gun solutions to our customers.

## APPLICATION SPECIFICATIONS

|                                  |   |
|----------------------------------|---|
| Shot Density and Phasing Options | 12 SPF (135°-45°); <a href="#">Available Gun Lengths</a> range from 2' to 22' |
| Initiation Point                 | Top- or bottom-fired options available; conventional wireline and TCP         |
| Mode of Fire                     | Simultaneous or selective fire  |
| Detonating Cord                  | 80-grain round  |
| Compatible Perforating Charges   | Connex®, Razor®, Basix™   |
| Maximum Gun Swell (in)[mm]       | 7.28 [184.91] @ 39.0g   |

## ENVIRONMENTAL

|                             |   |
|-----------------------------|---|
| Maximum Pressure (psi)[MPa] | 13,500 [93]   |
| Maximum Tensile* (lbf)[kN]  | 770,700 [3,428] *Hardware Calculated Breaking Point |



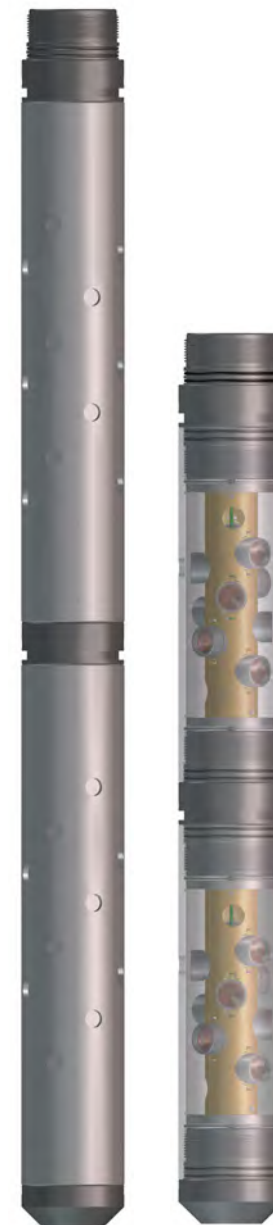
## CARRIER SPECIFICATIONS

| Carrier Assembly<br>Part Numbers | Shot Density & Phasing |          | Gun End to Center of<br>First Scallop |        | Distance Shot to Shot |       | Approximate Weights |             |
|----------------------------------|------------------------|----------|---------------------------------------|--------|-----------------------|-------|---------------------|-------------|
|                                  | (spf) [spm]            | Phasing  | (in)                                  | (mm)   | (in)                  | (mm)  | Fully Loaded        | Blank Gun   |
| Standard: GA7012-3040A-C***      | 12 spf [39 spm]        | 135°-45° | 7.50                                  | 190.50 | 1.0                   | 25.40 | 49.14 lb/ft         | 42.25 lb/ft |

\*\*\* Total number of shots (e.g., 11' 12 SPF, 135° DP gun is GA7012-3040A-C118. Refer to [Available Gun Lengths](#).

| Available Gun Lengths                     | 22'             | 21'             | 15'             | 11'             | 7'             | 6'             | 4'             | 3'             | 2'             |
|---|-----------------|-----------------|-----------------|-----------------|----------------|----------------|----------------|----------------|----------------|
| Typical Gun Length (ft) [m]               | 21.75<br>[6.63] | 20.75<br>[6.32] | 14.75<br>[4.50] | 10.75<br>[3.28] | 6.75<br>[2.06] | 5.75<br>[1.75] | 3.75<br>[1.14] | 2.75<br>[0.84] | 1.75<br>[0.53] |
| *** 12 SPF Total Number of Loadable Shots | 250             | 238             | 166             | 118             | 70             | 58             | 34             | 22             | 10             |

Contact your local GEODynamics representative for availability of metric part numbers and additional gun lengths.



# Conventional Long Guns

## 7 in (178 mm), 12 SPF, DP, GH, and SGH

### DEEP PENETRATING/EXTREME DEEP PENETRATING

| Carrier O.D. | Shaped Charge   | Part Number    | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |                | Performance in Stressed Berea |               |
|--------------|-----------------|----------------|-----------------------|------------|------------------------|--------------|-------------------------|----------------|-------------------------------|---------------|
|              |                 |                |                       |            |                        | Application  | EHD (in)[cm]            | TTP (in)[cm]   | EHD <sup>^</sup> (in)[cm]     | TTP (in)[cm]  |
| 7" 39g       | 4039 Connex SDP | EC2-40A3921-RC | Fluid                 | 39.0g, RDX | 12 spf / 135°-45°      | 9-5/8" L-80  |                         |                | 0.46 [1.17]                   | 16.50 [41.91] |
|              |                 | EC2-40A3922-RC |                       | 39.0g, HMX |                        |              |                         |                | 0.42 [1.07]                   | 17.50 [44.45] |
|              | 4039 Razor XDP  | EC2-40A3921    |                       | 39.0g, RDX |                        |              |                         |                | 0.38 [0.97]                   | 16.90 [42.93] |
|              |                 | EC2-40A3922    |                       | 39.0g, HMX |                        |              | 0.41 [1.04]             | 53.59 [136.12] | 0.44 [1.12]                   | 17.65 [44.83] |
|              | 4039 Basix XDP  | EC2-40A3921-E  |                       | 39.0g, RDX |                        |              |                         |                | 0.50 [1.27]                   | 15.70 [39.88] |
|              |                 | EC2-40A3922-E  |                       | 39.0g, HMX |                        |              |                         |                |                               |               |

### GOOD HOLE

| Carrier O.D. | Shaped Charge | Part Number | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |               | Performance in Stressed Berea |              |
|--------------|---------------|-------------|-----------------------|------------|------------------------|--------------|-------------------------|---------------|-------------------------------|--------------|
|              |               |             |                       |            |                        | Application  | EHD (in)[cm]            | TTP (in)[cm]  | EHD <sup>^</sup> (in)[cm]     | TTP (in)[cm] |
| 7" 39g       | 4039 Basix GH | EC2-40A3941 | Fluid                 | 39.0g, RDX | 12 spf / 135°-45°      | 9-5/8"       | 0.80 [2.03]             | 15.42 [39.17] |                               |              |
|              |               | EC2-40A3942 |                       | 39.0g, HMX |                        |              |                         |               |                               |              |

### SUPER GOOD HOLE

| Carrier O.D. | Shaped Charge       | Part Number | Perforating Condition | Explosive  | Shot Density / Phasing | Casing O.D. | Performance in Concrete |               | Performance in Stressed Berea |              |
|--------------|---------------------|-------------|-----------------------|------------|------------------------|-------------|-------------------------|---------------|-------------------------------|--------------|
|              |                     |             |                       |            |                        | Application | EHD (in)[cm]            | TTP (in)[cm]  | EHD <sup>^</sup> (in)[cm]     | TTP (in)[cm] |
| 7" 45g       | 4045 Razor SGH, RDX | EC2-40S4551 | Fluid                 | 45.0g, RDX | 12 spf / 135° - 45°    | 9-5/8" L-80 | 0.90 [2.29]             | 22.01 [55.91] |                               |              |
|              | 4045 Razor SGH, HMX | EC2-40S4552 |                       | 45.0g, HMX |                        |             |                         |               |                               |              |

### HARDWARE

**Gun Body Configuration/Material**

Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel

**Charge Tube Type & Retention**

Round steel tube strip; bend tab retention

**Type of Tandem Connection**

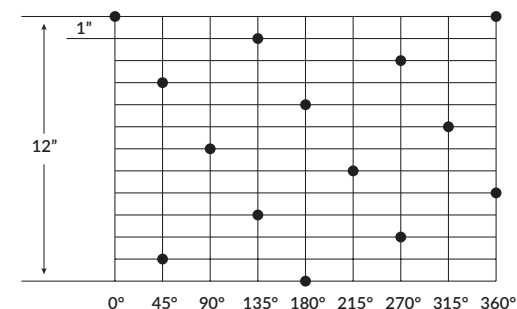
Booster to booster (no splice)

**Nominal OD / Wall Thickness (in)[mm]**

7.00 [178] / 0.50 [12.7] \*Contact your sales representative for special material requirements.

**Upper/Lower Thread Connections**

6.25 in. - 5P ACME-2G



CASING SHOT PATTERN AND PHASING AT 12 SPF 135°

Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

<sup>^</sup>EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

FLUID: Qualified for shooting in FLUID only with perforating systems qualified by GEODynamics.

IN FLUID or DRY: Qualified for shooting in FLUID or DRY GAS with perforating systems qualified by GEODynamics.

Revised: August 31, 2023 9:46 PM

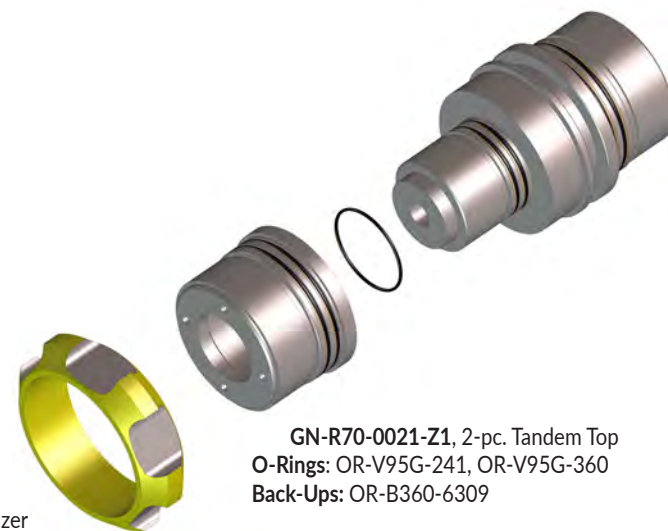
# Conventional Long Guns

## 7 in (178 mm), 12 SPF, GH and DP

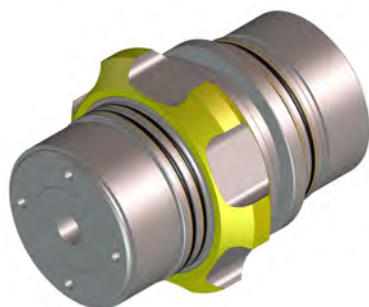
### COMPONENTS AND ACCESSORIES

| Description   | Part Number(s)  |                               |
|---|---|-------------------------------|
| <b>O-Ring Materials and Size</b><br>Nitrile (standard option)   | Top Connection<br>OR-N569-230                                   | Gun Connection<br>OR-N569-360 |
| Viton (with back-up rings required for > 325°F)<br>Back-up rings for > 325°F  | OR-V95G-230<br>OR-B230-2813                                     | OR-V95G-360<br>OR-B360-6309   |
| <b>TCP Transfer Kit (4-1/2" through 7")</b>   | GN-000-0030   |                               |
| <b>Lift Sub Assembly, Tandem, 5-1/8"</b>  | TC-LT51-000H  |                               |
| <b>Top Sub, 7"</b><br>Top Sub Wireline Insert<br>Spring Contact Assembly  | GN-R70-0020<br>GN-E00-0011 (o-ring: OR-N569-211)<br>GN-E00-0020 |                               |
| <b>Tandem Sub, 7"</b>   | GN-R70-0021 (o-rings: OR-N569-360)                              |                               |
| <b>Two Piece Tandem 7" with 8-1/4" Centralizing Ring</b>  | GN-R70-0021-Z825  |                               |
| Two Piece Tandem 7" (Top)<br>GN-R70-0021-Z1 (o-rings: OR-V95G-241, OR-V95G-360; back-up rings: OR-B360-6309)                  |   |                               |
| Two Piece Tandem 7" (Bottom)<br>GN-R70-0021-Z2 (o-rings: OR-V95G-346, OR-V95G-360; back-up rings: OR-B346-4559, OR-B360-6309) |   |                               |
| Centralizing Ring 7" (8-1/4" OD)<br>Sub Wrench  | GN-RH70-R825<br>GN-R70-0021-ZTL                                 |                               |
| <b>Bull Plugs, 7" Standard</b><br>7" with 2-7/8" EUE Pin<br>7" with 3-1/2" EUE Pin  | GN-R70-0022<br>GN-R70-0023<br>GN-R70-0024                       |                               |
| <b>Thread Protector, Top Sub (Top Pin)</b><br>Carrier (Gun) Protector<br>Tandem Sub & Bull Plug Protector                     | GN-THD-312-020<br>GN-THD-700-030<br>GN-THD-700-040              |                               |

GN-R70-0021-Z2, 2-pc. Tandem Bottom  
O-Rings: OR-V95G-346, OR-V95G-360  
Back-Ups: OR-B346-4559, OR-B360-6309



GN-R70-0021-Z1, 2-pc. Tandem Top  
O-Rings: OR-V95G-241, OR-V95G-360  
Back-Ups: OR-B360-6309



GN-R70-0021-Z825  
2-pc. Tandem with  
8-1/4" OD Ring Centralizer

GN-RH70-R825  
8-1/4" OD Ring Centralizer



GN-R70-0021-ZTL  
Sub Wrench

# Conventional Long Guns

## 7 in (178 mm), 12 SPF, SBH

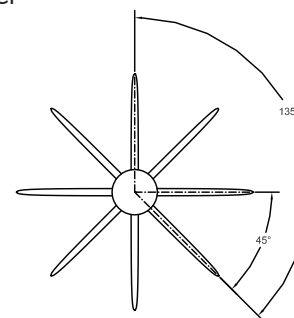
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## APPLICATION SPECIFICATIONS

|                                  |   |
|----------------------------------|---|
| Shot Density and Phasing Options | 12 SPF (135°-45°); <a href="#">Available Gun Lengths</a> range from 2' to 22' |
| Initiation Point                 | Top- or bottom-fired options available; conventional wireline and TCP         |
| Mode of Fire                     | Simultaneous or selective fire  |
| Detonating Cord                  | 80-grain round  |
| Compatible Perforating Charges   | Razor®  |
| Maximum Gun Swell (in)[mm]       | 7.15 [181.61] @ 52.0g, In Fluid   |

## ENVIRONMENTAL

|                             |   |
|-----------------------------|---|
| Maximum Pressure (psi)[MPa] | 13,500 [93]   |
| Maximum Tensile* (lbf)[kN]  | 770,700 [3,428] *Hardware Calculated Breaking Point |



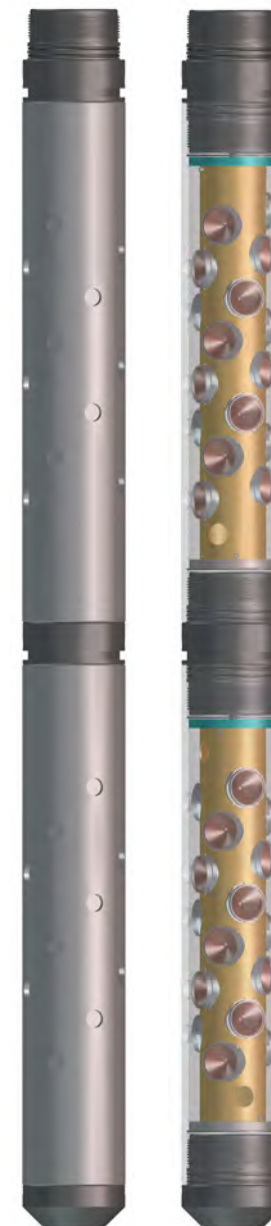
## CARRIER SPECIFICATIONS

| Carrier Assembly<br>Part Numbers | Shot Density & Phasing |          | Gun End to Center of<br>First Scallop |        | Distance Shot to Shot |       | Approximate Weights |             |
|----------------------------------|------------------------|----------|---------------------------------------|--------|-----------------------|-------|---------------------|-------------|
|                                  | (spf) [spm]            | Phasing  | (in)                                  | (mm)   | (in)                  | (mm)  | Fully Loaded        | Blank Gun   |
| Standard: GA7012-2070C-C***      | 12 spf [39 spm]        | 135°-45° | 7.50                                  | 190.50 | 1.0                   | 25.40 | 49.14 lb/ft         | 42.25 lb/ft |

\*\*\* Total number of shots (e.g., 11' 12 SPF, 135° SBH gun is GA7012-2070C-C118. Refer to [Available Gun Lengths](#).

| Available Gun Lengths                     | 22'             | 21'             | 15'             | 11'             | 7'             | 6'             | 4'             | 3'             | 2'             |
|---|-----------------|-----------------|-----------------|-----------------|----------------|----------------|----------------|----------------|----------------|
| Typical Gun Length (ft) [m]               | 21.75<br>[6.63] | 20.75<br>[6.32] | 14.75<br>[4.50] | 10.75<br>[3.28] | 6.75<br>[2.06] | 5.75<br>[1.75] | 3.75<br>[1.14] | 2.75<br>[0.84] | 1.75<br>[0.53] |
| *** 12 SPF Total Number of Loadable Shots | 250             | 238             | 166             | 118             | 70             | 58             | 34             | 22             | 10             |

Contact your local GEODynamics representative for availability of metric part numbers and additional gun lengths.



# Conventional Long Guns

## 7 in (178 mm), 12 SPF, SBH

### SUPER BIG HOLE

| Carrier O.D. | Shaped Charge        | Part Number | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D.      | Performance in Concrete |              | Performance in Stressed Berea |              |
|--------------|----------------------|-------------|-----------------------|------------|------------------------|-------------------|-------------------------|--------------|-------------------------------|--------------|
|              |                      |             |                       |            |                        | Application       | EHD (in)[cm]            | TTP (in)[cm] | EHD^ (in)[cm]                 | TTP (in)[cm] |
| 7" 39g       | 7039 Razor SBH TL LD | EC2-70C3931 | Fluid                 | 39.0g, RDX | 15 spf / 140°-20°      | 9-5/8" L-80       | 1.24 [3.15]             | 7.08 [17.98] |                               |              |
|              |                      | EC2-70C3932 |                       | 39.0g, HMX |                        |                   |                         |              |                               |              |
| 7" 52g       | 7052 Razor SBH TL LD | EC2-70C5231 |                       | 52.0g, RDX |                        | 9-5/8" L-80       | 1.39 [3.53]             | 6.50 [16.51] |                               |              |
|              |                      | EC2-70C5232 |                       | 52.0g, HMX |                        | ^^10-1/8" SM-125S | 1.12 [2.84]             | 6.60 [16.76] |                               |              |
|              |                      |             |                       |            |                        | 9-5/8"            |                         |              |                               |              |

^^ Heavy weight 10-1/8" 79.75# SM-125S grade casing used in lieu of 9-5/8" 47# L-80.

### HARDWARE

**Gun Body Configuration/Material**

Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel

**Charge Tube Type & Retention**

Round steel tube strip; twist-lock retention

**Type of Tandem Connection**

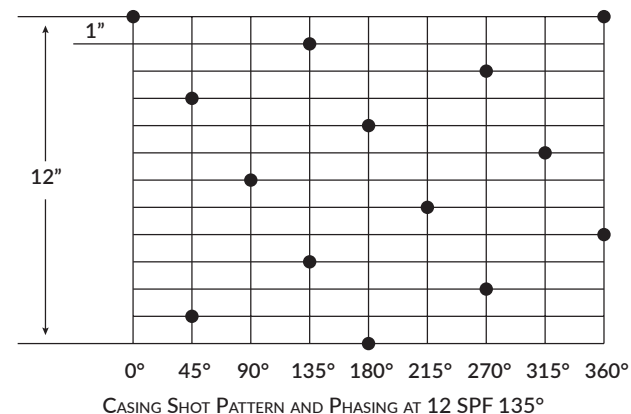
Booster to booster (no splice)

**Nominal OD / Wall Thickness (in)[mm]**

7.00 [178] / 0.50 [12.7] \*Contact your sales representative for special material requirements.

**Upper/Lower Thread Connections**

6.25 in. - 5P ACME-2G



Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

FLUID: Qualified for shooting in FLUID only with perforating systems qualified by GEODynamics.

IN FLUID or DRY: Qualified for shooting in FLUID or DRY GAS with perforating systems qualified by GEODynamics.

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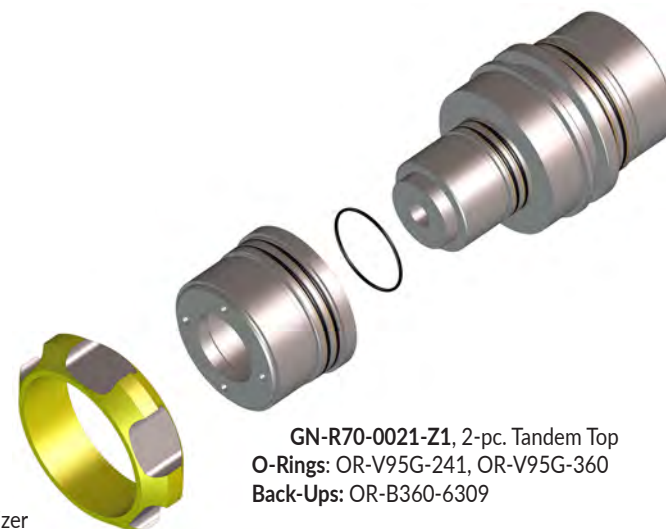
# Conventional Long Guns

## 7 in (178 mm), 12 SPF, SBH

### COMPONENTS AND ACCESSORIES

| Description   | Part Number(s)  |                               |
|---|---|-------------------------------|
| <b>O-Ring Materials and Size</b><br>Nitrile (standard option)   | Top Connection<br>OR-N569-230                                   | Gun Connection<br>OR-N569-360 |
| Viton (with back-up rings required for > 325°F)<br>Back-up rings for > 325°F  | OR-V95G-230<br>OR-B230-2813                                     | OR-V95G-360<br>OR-B360-6309   |
| <b>TCP Transfer Kit (4-1/2" through 7")</b>   | GN-000-0030   |                               |
| <b>Lift Sub Assembly, Tandem, 5-1/8"</b>  | TC-LT51-000H  |                               |
| <b>Top Sub, 7"</b><br>Top Sub Wireline Insert<br>Spring Contact Assembly  | GN-R70-0020<br>GN-E00-0011 (o-ring: OR-N569-211)<br>GN-E00-0020 |                               |
| <b>Tandem Sub, 7"</b>   | GN-R70-0021 (o-rings: OR-N569-360)                              |                               |
| <b>Two Piece Tandem 7" with 8-1/4" Centralizing Ring</b>  | GN-R70-0021-Z825  |                               |
| Two Piece Tandem 7" (Top)<br>GN-R70-0021-Z1 (o-rings: OR-V95G-241, OR-V95G-360; back-up rings: OR-B360-6309)                  |   |                               |
| Two Piece Tandem 7" (Bottom)<br>GN-R70-0021-Z2 (o-rings: OR-V95G-346, OR-V95G-360; back-up rings: OR-B346-4559, OR-B360-6309) |   |                               |
| Centralizing Ring 7" (8-1/4" OD)<br>Sub Wrench  | GN-RH70-R825<br>GN-R70-0021-ZTL                                 |                               |
| <b>Bull Plugs, 7" Standard</b><br>7" with 2-7/8" EUE Pin<br>7" with 3-1/2" EUE Pin  | GN-R70-0022<br>GN-R70-0023<br>GN-R70-0024                       |                               |
| <b>Thread Protector, Top Sub (Top Pin)</b><br>Carrier (Gun) Protector<br>Tandem Sub & Bull Plug Protector                     | GN-THD-312-020<br>GN-THD-700-030<br>GN-THD-700-040              |                               |

GN-R70-0021-Z2, 2-pc. Tandem Bottom  
O-Rings: OR-V95G-346, OR-V95G-360  
Back-Ups: OR-B346-4559, OR-B360-6309



GN-R70-0021-Z1, 2-pc. Tandem Top  
O-Rings: OR-V95G-241, OR-V95G-360  
Back-Ups: OR-B360-6309



GN-R70-0021-Z825  
2-pc. Tandem with  
8-1/4" OD Ring Centralizer



GN-R70-0021-ZTL  
Sub Wrench

GN-RH70-R825  
8-1/4" OD Ring Centralizer

# Conventional Long Guns

## 7 in (178 mm), 15 SPF, SBH, Standard and High Pressure

GEODynamics' perforating systems use bi-directional boosters, non-lead azide explosives, customized connectors and inserts, and high-velocity, low-shrink detonating cord. Additionally, all GEODynamics gun assemblies are scalloped to optimize charge performance and prevent casing damage from perforating exit hole burrs. Shot phasing is designed to maintain the integrity and collapse resistance of the casing after perforating. These attributes, along with premium quality gun material and gun connectors, allow GEODynamics to deliver safe, efficient, and reliable perforating gun solutions to our customers.

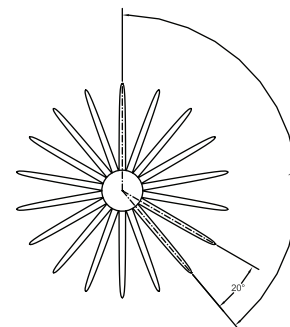
### APPLICATION SPECIFICATIONS

|                                  |   |
|----------------------------------|---|
| Shot Density and Phasing Options | 15 SPF (140°-20°); <a href="#">Available Gun Lengths</a> from 2' to 21' |
| Initiation Point                 | Top- or bottom-fired options available; conventional wireline and TCP   |
| Mode of Fire                     | Simultaneous or selective fire  |
| Detonating Cord                  | 80-grain round  |
| Compatible Perforating Charges   | Razor®  |
| Maximum Gun Swell (in)[mm]       | 7.23 [183.64] @ 52.0g, In Fluid   |

### ENVIRONMENTAL

|                             | Standard        | High Pressure   |
|-----------------------------|-----------------|-----------------|
| Maximum Pressure (psi)[MPa] | 13,500 [93]     | 14,600 [100]    |
| Maximum Tensile* (lbf)[kN]  | 770,700 [3,428] | 770,700 [3,428] |

\*Hardware Calculated Breaking Point



### CARRIER SPECIFICATIONS

| Carrier Assembly<br>Part Numbers    | Shot Density & Phasing |          | Gun End to Center of<br>First Scallop |        | Distance Shot to Shot |       | Approximate Weights |             |
|-------------------------------------|------------------------|----------|---------------------------------------|--------|-----------------------|-------|---------------------|-------------|
|                                     | (spf) [spm]            | Phasing  | (in)                                  | (mm)   | (in)                  | (mm)  | Fully Loaded        | Blank Gun   |
| Standard: GA7015-2070C-D***         | 15 spf [49 spm]        | 140°-20° | 7.60                                  | 193.04 | 0.80                  | 20.32 | 50.87 lb/ft         | 42.25 lb/ft |
| High Pressure: GA7015-2070C-D***-HP | 15 spf [49 spm]        | 140°-20° | 7.60                                  | 193.04 | 0.80                  | 20.32 | 50.87 lb/ft         | 42.25 lb/ft |

\*\*\* Total number of shots (e.g., 11' 15 SPF, 140° gun is GA7015-2070C-D**147**. Refer to [Available Gun Lengths](#).

| Available Gun Lengths                     | 22'          | 21'          | 15'          | 11'          | 7'          | 4'          | 3'          |
|---|--------------|--------------|--------------|--------------|-------------|-------------|-------------|
| Typical Gun Length (ft) [m]               | 21.75 [6.63] | 20.75 [6.32] | 14.75 [4.50] | 10.75 [3.28] | 6.75 [2.06] | 3.75 [1.14] | 2.75 [0.84] |
| *** 15 SPF Total Number of Loadable Shots | 312          | 297          | 207          | 147          | 087         | 042         | 027         |

Contact your local GEODynamics representative for availability of metric part numbers and additional gun lengths.



# Conventional Long Guns

## 7 in (178 mm), 15 SPF, SBH, Standard and High Pressure

### SUPER BIG HOLE

| Carrier O.D. | Shaped Charge        | Part Number | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D.      | Performance in Concrete |              | Performance in Stressed Berea |              |
|--------------|----------------------|-------------|-----------------------|------------|------------------------|-------------------|-------------------------|--------------|-------------------------------|--------------|
|              |                      |             |                       |            |                        | Application       | EHD (in)[cm]            | TTP (in)[cm] | EHD^ (in)[cm]                 | TTP (in)[cm] |
| 7" 39g       | 7039 Razor SBH TL LD | EC2-70C3931 | Fluid                 | 39.0g, RDX | 15 spf / 140°-20°      | 9-5/8" L-80       | 1.24 [3.15]             | 7.08 [17.98] |                               |              |
|              |                      | EC2-70C3932 |                       | 39.0g, HMX |                        |                   |                         |              |                               |              |
| 7" 52g       | 7052 Razor SBH TL LD | EC2-70C5231 |                       | 52.0g, RDX |                        | 9-5/8" L-80       | 1.39 [3.53]             | 6.50 [16.51] |                               |              |
|              |                      | EC2-70C5232 |                       | 52.0g, HMX |                        | ^^10-1/8" SM-125S | 1.12 [2.84]             | 6.60 [16.76] |                               |              |
|              |                      |             |                       |            |                        | 9-5/8"            |                         |              |                               |              |

^^ Heavy weight 10-1/8" 79.75# SM-125S grade casing used in lieu of 9-5/8" 47# L-80.

### HARDWARE

**Gun Body Configuration/Material**

Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel

**Charge Tube Type & Retention**

Round steel tube strip; twist-lock retention

**Type of Tandem Connection**

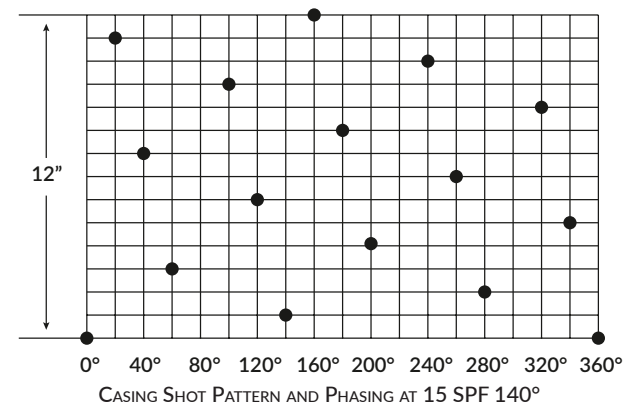
Booster to booster (no splice)

**Nominal OD / Wall Thickness (in)[mm]**

7.00 [178] / 0.50 [12.7] \*Contact your sales representative for special material requirements.

**Upper/Lower Thread Connections**

6.25 in. - 5P ACME-2G



Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

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IN FLUID or DRY: Qualified for shooting in FLUID or DRY GAS with perforating systems qualified by GEODynamics.

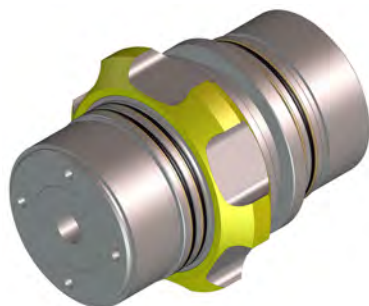
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# Conventional Long Guns

## 7 in (178 mm), 15 SPF, SBH, Standard and High Pressure

### COMPONENTS AND ACCESSORIES

| Description   | Part Number(s)  |                               |
|---|---|-------------------------------|
| <b>O-Ring Materials and Size</b><br>Nitrile (standard option)   | Top Connection<br>OR-N569-230                                   | Gun Connection<br>OR-N569-360 |
| Viton (with back-up rings required for > 325°F)<br>Back-up rings for > 325°F  | OR-V95G-230<br>OR-B230-2813                                     | OR-V95G-360<br>OR-B360-6309   |
| <b>TCP Transfer Kit (4-1/2" through 7")</b>   | GN-000-0030   |                               |
| <b>Lift Sub Assembly, Tandem, 5-1/8"</b>  | TC-LT51-000H  |                               |
| <b>Top Sub, 7"</b><br>Top Sub Wireline Insert<br>Spring Contact Assembly  | GN-R70-0020<br>GN-E00-0011 (o-ring: OR-N569-211)<br>GN-E00-0020 |                               |
| <b>Tandem Sub, 7"</b>   | GN-R70-0021 (o-rings: OR-N569-360)                              |                               |
| <b>Two Piece Tandem 7" with 8-1/4" Centralizing Ring</b>  | GN-R70-0021-Z825  |                               |
| Two Piece Tandem 7" (Top)<br>GN-R70-0021-Z1 (o-rings: OR-V95G-241, OR-V95G-360; back-up rings: OR-B360-6309)                  |   |                               |
| Two Piece Tandem 7" (Bottom)<br>GN-R70-0021-Z2 (o-rings: OR-V95G-346, OR-V95G-360; back-up rings: OR-B346-4559, OR-B360-6309) |   |                               |
| Centralizing Ring 7" (8-1/4" OD)<br>Sub Wrench  | GN-RH70-R825<br>GN-R70-0021-ZTL                                 |                               |
| <b>Bull Plugs, 7" Standard</b><br>7" with 2-7/8" EUE Pin<br>7" with 3-1/2" EUE Pin  | GN-R70-0022<br>GN-R70-0023<br>GN-R70-0024                       |                               |
| <b>Thread Protector, Top Sub (Top Pin)</b><br>Carrier (Gun) Protector<br>Tandem Sub & Bull Plug Protector                     | GN-THD-312-020<br>GN-THD-700-030<br>GN-THD-700-040              |                               |



**GN-R70-0021-Z825**  
2-pc. Tandem with  
8-1/4" OD Ring Centralizer



**GN-R70-0021-ZTL**  
Sub Wrench



**GN-RH70-R825**  
8-1/4" OD Ring Centralizer

**GN-R70-0021-Z2, 2-pc. Tandem Bottom**  
O-Rings: OR-V95G-346, OR-V95G-360  
Back-Ups: OR-B346-4559, OR-B360-6309

**GN-R70-0021-Z1, 2-pc. Tandem Top**  
O-Rings: OR-V95G-241, OR-V95G-360  
Back-Ups: OR-B360-6309

# Channel Finder Gun System

## 7 in (178 mm), 18 SPF, SBH, 360°



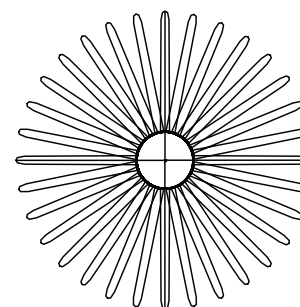
GEODynamics' perforating systems use bi-directional boosters, non-lead azide explosives, customized connectors and inserts, and high-velocity, low-shrink detonating cord. Additionally, all GEODynamics gun assemblies are scalloped to optimize charge performance and prevent casing damage from perforating exit hole burrs. Shot phasing is designed to maintain the integrity and collapse resistance of the casing after perforating. These attributes, along with premium quality gun material and gun connectors, allow GEODynamics to deliver safe, efficient, and reliable perforating gun solutions to our customers.

## APPLICATION SPECIFICATIONS

|                                  |  |
|----------------------------------|--|
| Shot Density and Phasing Options | 18 SPF (90°) rotated cluster 11.25° spiral; <a href="#">Available Gun Lengths</a> from 4' to 21' |
| Initiation Point                 | Top- or bottom-fired options available; conventional wireline and TCP                            |
| Mode of Fire                     | Simultaneous or selective fire   |
| Detonating Cord                  | 80-grain round   |
| Compatible Perforating Charges   | <a href="#">Razor®</a>   |
| Maximum Gun Swell (in)[mm]       | 7.22 [183.39] In Fluid @ 52.0g   |
| Perforation Area Open to Flow    | 360° coverage in 9-5/8" casing   |

## ENVIRONMENTAL

|                             |  |
|-----------------------------|--|
| Maximum Pressure (psi)[MPa] | 11,500 [79]                                      |
| Maximum Tensile* (lbf)[kN]  | 770,700 [3,428] *Hardware Calculated Break Point |



## CARRIER SPECIFICATIONS

| Carrier Assembly Part Number | Shot Density & Phasing |                             | Gun End to Center of First Scalloped |        | Distance Between Planes |       | Approximate Weights |             |
|------------------------------|------------------------|-----------------------------|--------------------------------------|--------|-------------------------|-------|---------------------|-------------|
|                              | (spf) [spm]            | Phasing                     | (in)                                 | (mm)   | (in)                    | (mm)  | Fully Loaded        | Blank Gun   |
| GA7018-1870K-Q***            | 18 spf<br>[59 spm]     | 90° Planar<br>11.25° Spiral | 4' guns = 8.00                       | 203.20 | 2.67                    | 67.82 | 55.94 lb/ft         | 34.27 lb/ft |
|                              |                        |                             | 7'-21' guns = 7.333                  | 186.18 |                         |       |                     |             |

\*\*\* Total number of shots (e.g., 15' 18 SPF, 90° gun is GA7018-1870K-Q252. Refer to [Available Gun Lengths](#).

| Available Gun Lengths                     | 21'          | 15'          | 11'          | 7'          | 4'          |
|---|--------------|--------------|--------------|-------------|-------------|
| Typical Gun Length (ft) [m]               | 20.75 [6.32] | 14.75 [4.50] | 10.75 [3.28] | 6.75 [2.06] | 3.75 [1.14] |
| *** 18 SPF Total Number of Loadable Shots | 360          | 252          | 180          | 108         | 052         |

Contact your local GEODynamics representative for availability of metric part numbers and additional gun lengths.



Revised: August 31, 2023 9:46 PM

# Channel Finder Gun System

## 7 in (178 mm), 18 SPF, SBH, 360°

### SUPER BIG HOLE

| Carrier O.D. | Shaped Charge     | Part Number | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |              | Performance in Stressed Berea |              |
|--------------|-------------------|-------------|-----------------------|------------|------------------------|--------------|-------------------------|--------------|-------------------------------|--------------|
|              |                   |             |                       |            |                        | Application  | EHD (in)[cm]            | TTP (in)[cm] | EHD^ (in)[cm]                 | TTP (in)[cm] |
| 7" 39g       | 7039K Razor SBH   | EC2-70K3931 | Fluid                 | 39.0g, RDX | 20 spf / 90°-45°       | 9-5/8" L-80  | 1.04 [2.64]             | 6.31 [16.03] | 1.10 [2.79]                   | 4.40 [11.18] |
|              |                   | EC2-70K3932 |                       | 39.0g, HMX |                        |              |                         |              | 1.18 [3.00]                   | 4.60 [11.68] |
| 7" 52g       | 7052K Razor SBH** | EC2-70K5231 |                       | 52.0g, RDX |                        |              | 1.41 [3.58]             | 5.67 [14.40] |                               |              |
|              |                   | EC2-70K5232 |                       | 52.0g, HMX |                        |              | 1.42 [3.61]             | 7.06 [17.93] |                               |              |

### HARDWARE

Gun Body Configuration/Material

Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel

Charge Tube Type & Retention

Round steel tube strip, bend tab charge retention

Type of Tandem Connection

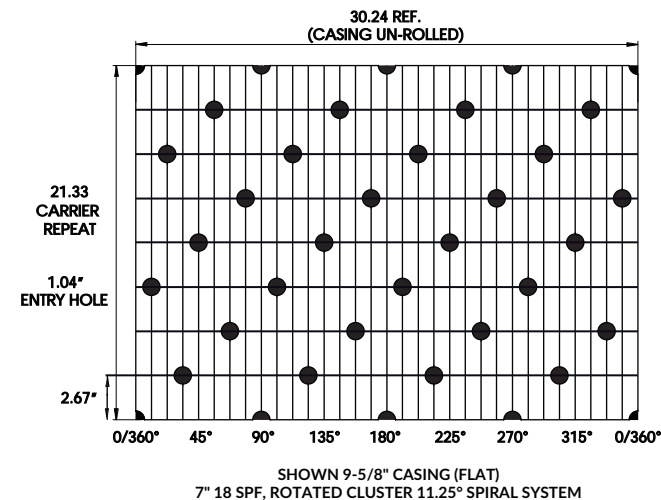
Booster to booster (no splice)

Nominal OD / Wall Thickness (in)[mm]

7.00 [178] / 0.50 [12.7] \*Contact your sales representative for special material requirements.

Upper/Lower Thread Connections

6.25 in. - 5P ACME-2G



Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

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IN FLUID or DRY: Qualified for shooting in FLUID or DRY GAS with perforating systems qualified by GEODynamics.

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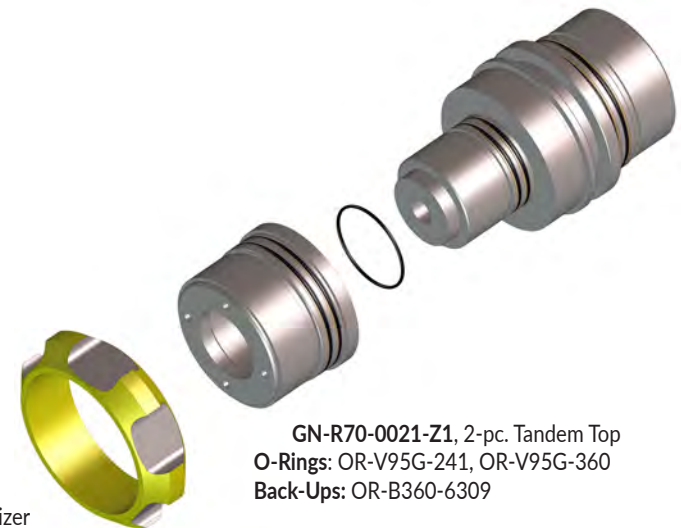
# Channel Finder Gun System

## 7 in (178 mm), 18 SPF, SBH, 360°

### COMPONENTS AND ACCESSORIES

| Description   | Part Number(s)  |                               |
|---|---|-------------------------------|
| <b>O-Ring Materials and Size</b><br>Nitrile (standard option)   | Top Connection<br>OR-N569-230                                   | Gun Connection<br>OR-N569-360 |
| Viton (with back-up rings required for > 325°F)<br>Back-up rings for > 325°F  | OR-V95G-230<br>OR-B230-2813                                     | OR-V95G-360<br>OR-B360-6309   |
| <b>TCP Transfer Kit (4-1/2" through 7")</b>   | GN-000-0030   |                               |
| <b>Lift Sub Assembly, Tandem, 5-1/8"</b>  | TC-LT51-000H  |                               |
| <b>Top Sub, 7"</b><br>Top Sub Wireline Insert<br>Spring Contact Assembly  | GN-R70-0020<br>GN-E00-0011 (o-ring: OR-N569-211)<br>GN-E00-0020 |                               |
| <b>Tandem Sub, 7"</b>   | GN-R70-0021 (o-rings: OR-N569-360)                              |                               |
| <b>Two Piece Tandem 7" with 8-1/4" Centralizing Ring</b>  | GN-R70-0021-Z825  |                               |
| Two Piece Tandem 7" (Top)<br>GN-R70-0021-Z1 (o-rings: OR-V95G-241, OR-V95G-360; back-up rings: OR-B360-6309)                  |   |                               |
| Two Piece Tandem 7" (Bottom)<br>GN-R70-0021-Z2 (o-rings: OR-V95G-346, OR-V95G-360; back-up rings: OR-B346-4559, OR-B360-6309) |   |                               |
| Centralizing Ring 7" (8-1/4" OD)<br>Sub Wrench  | GN-RH70-R825<br>GN-R70-0021-ZTL                                 |                               |
| <b>Bull Plugs, 7" Standard</b><br>7" with 2-7/8" EUE Pin<br>7" with 3-1/2" EUE Pin  | GN-R70-0022<br>GN-R70-0023<br>GN-R70-0024                       |                               |
| <b>Thread Protector, Top Sub (Top Pin)</b><br>Carrier (Gun) Protector<br>Tandem Sub & Bull Plug Protector                     | GN-THD-312-020<br>GN-THD-700-030<br>GN-THD-700-040              |                               |

GN-R70-0021-Z2, 2-pc. Tandem Bottom  
O-Rings: OR-V95G-346, OR-V95G-360  
Back-Ups: OR-B346-4559, OR-B360-6309



GN-R70-0021-Z1, 2-pc. Tandem Top  
O-Rings: OR-V95G-241, OR-V95G-360  
Back-Ups: OR-B360-6309



GN-R70-0021-Z825  
2-pc. Tandem with  
8-1/4" OD Ring Centralizer



GN-R70-0021-ZTL  
Sub Wrench

GN-RH70-R825  
8-1/4" OD Ring Centralizer

# Eclipse™ Gun System

## 7 in (178 mm), 20 SPF, SBH



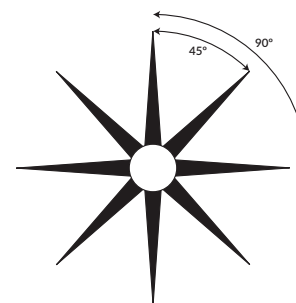
GEODynamics' perforating systems use bi-directional boosters, non-lead azide explosives, customized connectors and inserts, and high-velocity, low-shrink detonating cord. Additionally, all GEODynamics gun assemblies are scalloped to optimize charge performance and prevent casing damage from perforating exit hole burrs. Shot phasing is designed to maintain the integrity and collapse resistance of the casing after perforating. These attributes, along with premium quality gun material and gun connectors, allow GEODynamics to deliver safe, efficient, and reliable perforating gun solutions to our customers.

## APPLICATION SPECIFICATIONS

|                                  |   |
|----------------------------------|---|
| Shot Density and Phasing Options | 20 SPF (90°-45°) 90° planar, 45° between planes; <a href="#">Available Gun Lengths</a> from 2' to 21' |
| Initiation Point                 | Top- or bottom-fired options available; conventional wireline and TCP                                 |
| Mode of Fire                     | Simultaneous or selective fire  |
| Detonating Cord                  | 80-grain round  |
| Compatible Perforating Charges   | Razor®  |
| Maximum Gun Swell (in)[mm]       | 7.22 [183.39] In Fluid  |

## ENVIRONMENTAL

|                             |  |
|-----------------------------|--|
| Maximum Pressure (psi)[MPa] | 11,500 [79]                                      |
| Maximum Tensile* (lbf)[kN]  | 770,700 [3,428] *Hardware Calculated Break Point |



## CARRIER SPECIFICATIONS

| Carrier Assembly<br>Part Number | Shot Density & Phasing |         | Gun End to Center of<br>First Scallop |        | Distance Between<br>Planes |       | Approximate Weights |             |
|---------------------------------|------------------------|---------|---------------------------------------|--------|----------------------------|-------|---------------------|-------------|
|                                 | (spf) [spm]            | Phasing | (in)                                  | (mm)   | (in)                       | (mm)  | Fully Loaded        | Blank Gun   |
| GA7020-1870K-N***               | 20 spf [66 spm]        | 90°-45° | 8.40                                  | 213.36 | 2.40                       | 60.96 | 55.94 lb/ft         | 34.27 lb/ft |

\*\*\* Total number of shots (e.g., 15' 20 SPF, 90° gun is GA7020-1870K-N276. Refer to [Available Gun Lengths](#).

| Available Gun Lengths                     | 21'             | 15'             | 11'             | 7'             | 5'             | 4'             | 3'             | 2'             |
|---|-----------------|-----------------|-----------------|----------------|----------------|----------------|----------------|----------------|
| Typical Gun Length (ft) [m]               | 20.75<br>[6.32] | 14.75<br>[4.50] | 10.75<br>[3.28] | 6.75<br>[2.06] | 4.75<br>[1.45] | 3.75<br>[1.14] | 2.75<br>[0.84] | 1.75<br>[0.53] |
| *** 20 SPF Total Number of Loadable Shots | 396             | 276             | 196             | 116            | 076            | 056            | 036            | 016            |

Contact your local GEODynamics representative for availability of metric part numbers and additional gun lengths.



Revised: August 31, 2023 9:46 PM

# Eclipse™ Gun System

## 7 in (178 mm), 20 SPF, SBH

### SUPER BIG HOLE

| Carrier O.D. | Shaped Charge     | Part Number | Perforating Condition | Explosive  | Shot Density / Phasing | ^Casing O.D. | Performance in Concrete |              | Performance in Stressed Berea |              |
|--------------|-------------------|-------------|-----------------------|------------|------------------------|--------------|-------------------------|--------------|-------------------------------|--------------|
|              |                   |             |                       |            |                        | Application  | EHD (in)[cm]            | TTP (in)[cm] | EHD^ (in)[cm]                 | TTP (in)[cm] |
| 7" 39g       | 7039K Razor SBH   | EC2-70K3931 | Fluid                 | 39.0g, RDX | 20 spf / 90°-45°       | 9-5/8" L-80  | 1.04 [2.64]             | 6.31 [16.03] | 1.10 [2.79]                   | 4.40 [11.18] |
|              |                   | EC2-70K3932 |                       | 39.0g, HMX |                        |              |                         |              | 1.18 [3.00]                   | 4.60 [11.68] |
| 7" 52g       | 7052K Razor SBH** | EC2-70K5231 |                       | 52.0g, RDX |                        |              | 1.41 [3.58]             | 5.67 [14.40] |                               |              |
|              |                   | EC2-70K5232 |                       | 52.0g, HMX |                        |              | 1.42 [3.61]             | 7.06 [17.93] |                               |              |

### HARDWARE

**Gun Body Configuration/Material**

Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel

**Charge Tube Type & Retention**

Round steel tube strip, bend tab charge retention

**Type of Tandem Connection**

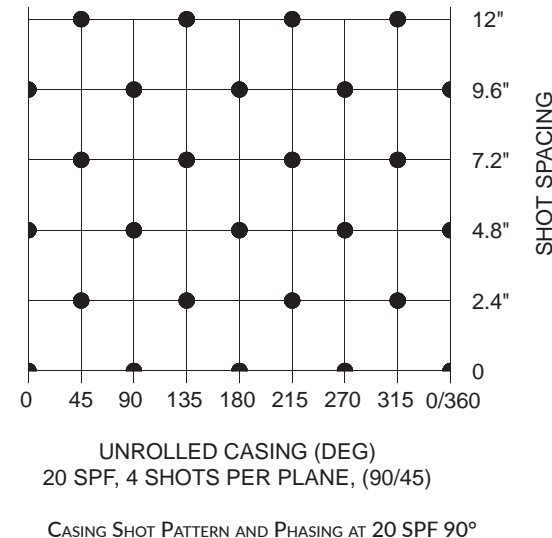
Booster to booster (no splice)

**Nominal OD / Wall Thickness (in)[mm]**

7.00 [178] / 0.50 [12.7] \*Contact your sales representative for special material requirements.

**Upper/Lower Thread Connections**

6.25 in. - 5P ACME-2G



Performance in concrete represents API RP43 or API RP19B Section I testing results with the shot density/phasing, casing OD, and casing grade specified.

^EHD performance in stressed berea represents API RP19B Section 2 testing results with casing flat metal plate equivalent to 0.500" 120KSI yield and penetration (TTP) in stressed berea rock.

FLUID: Qualified for shooting in FLUID only with perforating systems qualified by GEODynamics.

IN FLUID or DRY: Qualified for shooting in FLUID or DRY GAS with perforating systems qualified by GEODynamics.

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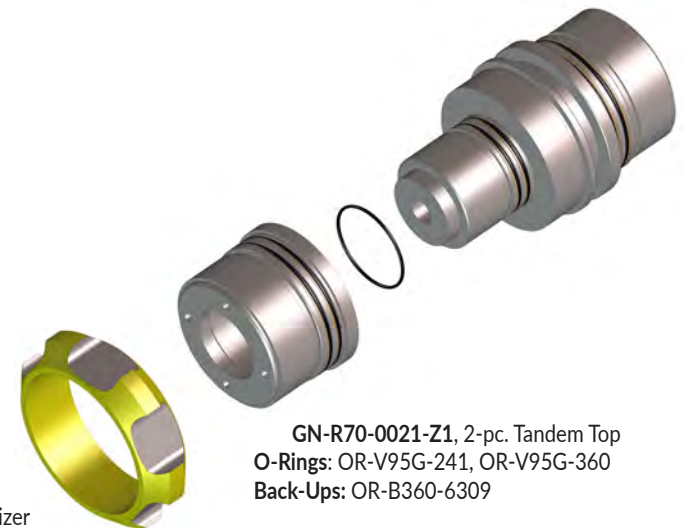
# Eclipse™ Gun System

## 7 in (178 mm), 20 SPF, SBH

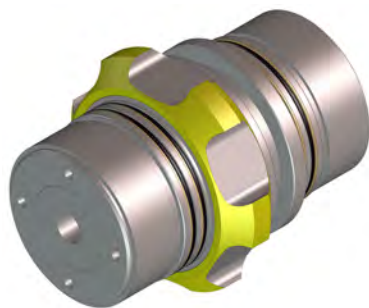
### COMPONENTS AND ACCESSORIES

| Description   | Part Number(s)  |                               |
|---|---|-------------------------------|
| <b>O-Ring Materials and Size</b><br>Nitrile (standard option)   | Top Connection<br>OR-N569-230                                   | Gun Connection<br>OR-N569-360 |
| Viton (with back-up rings required for > 325°F)<br>Back-up rings for > 325°F  | OR-V95G-230<br>OR-B230-2813                                     | OR-V95G-360<br>OR-B360-6309   |
| <b>TCP Transfer Kit (4-1/2" through 7")</b>   | GN-000-0030   |                               |
| <b>Lift Sub Assembly, Tandem, 5-1/8"</b>  | TC-LT51-000H  |                               |
| <b>Top Sub, 7"</b><br>Top Sub Wireline Insert<br>Spring Contact Assembly  | GN-R70-0020<br>GN-E00-0011 (o-ring: OR-N569-211)<br>GN-E00-0020 |                               |
| <b>Tandem Sub, 7"</b>   | GN-R70-0021 (o-rings: OR-N569-360)                              |                               |
| <b>Two Piece Tandem 7" with 8-1/4" Centralizing Ring</b>  | GN-R70-0021-Z825  |                               |
| Two Piece Tandem 7" (Top)<br>GN-R70-0021-Z1 (o-rings: OR-V95G-241, OR-V95G-360; back-up rings: OR-B360-6309)                  |   |                               |
| Two Piece Tandem 7" (Bottom)<br>GN-R70-0021-Z2 (o-rings: OR-V95G-346, OR-V95G-360; back-up rings: OR-B346-4559, OR-B360-6309) |   |                               |
| Centralizing Ring 7" (8-1/4" OD)<br>Sub Wrench  | GN-RH70-R825<br>GN-R70-0021-ZTL                                 |                               |
| <b>Bull Plugs, 7" Standard</b><br>7" with 2-7/8" EUE Pin<br>7" with 3-1/2" EUE Pin  | GN-R70-0022<br>GN-R70-0023<br>GN-R70-0024                       |                               |
| <b>Thread Protector, Top Sub (Top Pin)</b><br>Carrier (Gun) Protector<br>Tandem Sub & Bull Plug Protector                     | GN-THD-312-020<br>GN-THD-700-030<br>GN-THD-700-040              |                               |

GN-R70-0021-Z2, 2-pc. Tandem Bottom  
O-Rings: OR-V95G-346, OR-V95G-360  
Back-Ups: OR-B346-4559, OR-B360-6309



GN-R70-0021-Z1, 2-pc. Tandem Top  
O-Rings: OR-V95G-241, OR-V95G-360  
Back-Ups: OR-B360-6309



GN-R70-0021-Z825  
2-pc. Tandem with  
8-1/4" OD Ring Centralizer



GN-R70-0021-ZTL  
Sub Wrench

GN-RH70-R825  
8-1/4" OD Ring Centralizer

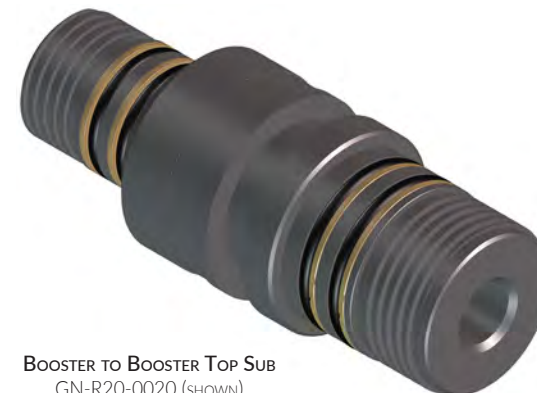
# Conventional Subs

## Booster to Booster Top Subs

GEODynamics' conventional gun connectors (subs) are used in TCP and conventional booster-to-booster perforating applications with GEODynamics' short guns (GLB series) or conventional long guns (GA series). All connections use double o-rings with optional back-up rings.



BOOSTER TO BOOSTER TOP SUB  
GN-R31-0020 (SHOWN)



BOOSTER TO BOOSTER TOP SUB  
GN-R20-0020 (SHOWN)

| Mechanical Specifications |              |                |                 |        |       |                             |              |              |                          |              |              |
|---------------------------|--------------|----------------|-----------------|--------|-------|-----------------------------|--------------|--------------|--------------------------|--------------|--------------|
| Gun Size<br>(OD)          | Part Number  | Length         |                 | Weight |       | Top Connection (UH)         |              |              | Gun Connection (DH)      |              |              |
|                           |              | Makeup (in/cm) | Overall (in/cm) | (lbs)  | (kg)  | Thread                      | O-Rings (2)† | Back-Ups (2) | Thread                   | O-Rings (2)† | Back-Ups (2) |
| 1-9/16"                   | GN-R16-0020  | 2.31 / 5.87    | 5.31 / 13.49    | 1.84   | 0.83  | 1-9/32" 12P STUB<br>ACME-2G | -215         | OR-B215-1308 | 1-9/32" 12P STUB ACME-2G | -215         | OR-B215-1308 |
| 1-3/4"                    | GN-R175-0020 | 2.06 / 5.23    | 5.31 / 13.49    | 2.05   | 0.93  |                             |              |              | 1-7/16" 12P STUB ACME-2G | -218         | OR-B217-1468 |
| 2"                        | GN-R20-0020  | 2.06 / 5.23    | 5.31 / 13.49    | 2.72   | 1.23  |                             |              |              | 1-11/16" 8P STUB ACME    | -221         | OR-B221-1715 |
| 2-3/8"                    | GN-R23-0020  | 1.81 / 4.60    | 5.31 / 13.49    | 3.82   | 1.73  |                             |              |              | 2-1/32" 8P STUB ACME 2G  | -225         | OR-B225-2126 |
| 2-1/2"                    | GN-R25-0020  | 1.81 / 4.60    | 5.31 / 13.49    | 4.10   | 1.86  |                             |              |              | 2-1/8" 8P ACME-2G        | -225         | OR-B225-2160 |
| 2-3/4"                    | GN-R27-0020  | 1.87 / 4.75    | 8.00 / 20.32    | 8.28   | 3.76  | 2-1/8" 8P AC-<br>ME-2G      | -225         | OR-B225-2160 | 2-3/8" 6P ACME-2G        | -227         | OR-B227-2405 |
| 2-7/8"                    | GN-R28-0020  | 1.87 / 4.75    | 8.00 / 20.32    | 8.94   | 4.06  |                             |              |              | 2-1/2" 6P ACME-2G        | -228         | OR-B228-2560 |
| 3-1/8"                    | GN-R31-0020  | 3.12 / 7.92    | 8.03 / 20.40    | 13.13  | 5.96  | 2-3/4" 6P AC-<br>ME-2G      | -230         | OR-B230-2813 | 2-3/4" 6P ACME-2G        | -230         | OR-B230-2813 |
| 3-3/8"                    | GN-R33-0020  | 3.12 / 7.92    | 8.03 / 20.40    | 14.27  | 6.47  |                             |              |              | 2-13/16" 6P ACME-2G      | -231         | OR-B231-2870 |
| 4"                        | GN-R40-0020  | 2.72 / 6.91    | 8.00 / 20.32    | 19.25  | 8.73  |                             |              |              | 3-7/16" 6P ACME-2G       | -236         | OR-B236-3497 |
| 4-1/2"<br>& 4-5/8"        | GN-R45-0020  | 3.47 / 8.81    | 9.00 / 22.86    | 27.69  | 12.56 |                             |              |              | 3-15/16" 6P ACME-2G      | -342         | OR-B342-3997 |
| 4-3/4"                    | GN-R475-0020 | 3.47 / 8.81    | 9.00 / 22.86    | 28.86  | 13.09 |                             |              |              | 3-15/16" 6P ACME-2G      | -342         | OR-B342-3997 |
| 5"                        | GN-R50-0020  | 3.47 / 8.81    | 9.00 / 22.86    | 35.15  | 15.94 |                             |              |              | 4-1/2" 6P ACME-2G        | -346         | OR-B346-4559 |
| 5-1/8"                    | GN-R51-0020  | 3.47 / 8.81    | 9.00 / 22.86    | 35.91  | 16.29 |                             |              |              | 4-1/2" 6P ACME-2G        | -346         | OR-B346-4559 |
| 6-3/4"                    | GN-R675D20   | 4.47 / 11.35   | 10.00 / 25.40   | 61.07  | 27.70 |                             |              |              | 5-3/4" 6P ACME-2G        | -357         | OR-B357-5873 |
| 7"                        | GN-R70-0020  | 3.47 / 8.81    | 9.00 / 22.86    | 62.12  | 28.18 |                             |              |              | 6-1/4" 5P ACME-2G        | -360         | OR-B360-6309 |

Select o-ring material based on fluid compatibility and wellbore temperature.

†Nitrile (OR-N569-\*\*) is the standard option. Viton (OR-V95-\*\*) with back-up rings required at temperatures above 325°F.

# Conventional Subs

## Booster to Booster Tandem Subs

GEODynamics' conventional gun connectors (subs) are used in TCP and conventional booster-to-booster perforating applications with GEODynamics' short guns (GLB series) or conventional long guns (GA series). All connections use double o-rings with optional back-up rings.



BOOSTER TO BOOSTER TANDEM SUB  
GN-R45-0021 (SHOWN)

| Mechanical Specifications |              |                |                 |                 |                          |              |              |
|---------------------------|--------------|----------------|-----------------|-----------------|--------------------------|--------------|--------------|
| Gun Size (OD)             | Part Number  | Length         |                 | Weight (lbs/kg) | Gun Connections          |              |              |
|                           |              | Makeup (in/cm) | Overall (in/cm) |                 | Thread                   | O-Rings (4)† | Back-Ups (4) |
| 1-9/16"                   | GN-R16-0021  | 3.00 / 7.62    | 6.00 / 15.24    | 2.19 / 0.99     | 1-9/32" 12P STUB ACME-2G | -215         | OR-B215-1308 |
| 1-3/4"                    | GN-R175-0021 | 2.50 / 6.35    | 6.00 / 15.24    | 2.57 / 1.17     | 1-7/16" 12P STUB ACME-2G | -218         | OR-B217-1468 |
| 2"                        | GN-R20-0021  | 2.50 / 6.35    | 6.00 / 15.24    | 3.62 / 1.64     | 1-11/16" 8P STUB ACME    | -221         | OR-B221-1715 |
| 2-3/8"                    | GN-R23-0021  | 2.00 / 5.08    | 6.00 / 15.24    | 5.45 / 2.47     | 2-1/32" 8P STUB ACME 2G  | -225         | OR-B225-2126 |
| 2-1/2"                    | GN-R25-0021  | 2.00 / 5.08    | 6.00 / 15.24    | 5.86 / 2.66     | 2-1/8" 8P ACME-2G        | -225         | OR-B225-2160 |
| 2-3/4"                    | GN-R27-0021  | 2.46 / 6.25    | 8.96 / 22.76    | 10.35 / 4.69    | 2-3/8" 6P ACME-2G        | -227         | OR-B227-2405 |
| 2-7/8"                    | GN-R28-0021  | 2.46 / 6.25    | 8.96 / 22.76    | 11.56 / 5.24    | 2-1/2" 6P ACME-2G        | -228         | OR-B228-2560 |
| 3-1/8"                    | GN-R31-0021  | 3.20 / 8.13    | 8.96 / 22.76    | 14.64 / 6.64    | 2-3/4" 6P ACME-2G        | -230         | OR-B230-2813 |
| 3-3/8"                    | GN-R33-0021  | 3.20 / 8.13    | 8.96 / 22.76    | 16.18 / 7.34    | 2-13/16" 6P ACME-2G      | -231         | OR-B231-2870 |
| 4"                        | GN-R40-0021  | 2.40 / 6.10    | 8.90 / 22.61    | 23.37 / 10.60   | 3-7/16" 6P ACME-2G       | -236         | OR-B236-3497 |
| 4-1/2" & 4-5/8"           | GN-R45-0021  | 2.90 / 7.37    | 9.90 / 25.15    | 33.71 / 15.29   | 3-15/16" 6P ACME-2G      | -342         | OR-B342-3997 |
| 4-3/4"                    | GN-R475-0021 | 2.90 / 7.37    | 9.90 / 25.15    | 34.87 / 15.82   | 3-15/16" 6P ACME-2G      | -342         | OR-B342-3997 |
| 5"                        | GN-R50-0021  | 2.90 / 7.37    | 9.90 / 25.15    | 44.29 / 20.09   | 4-1/2" 6P ACME-2G        | -346         | OR-B346-4559 |
| 5-1/8"                    | GN-R51-0021  | 2.90 / 7.37    | 9.90 / 25.15    | 44.90 / 20.37   | 4-1/2" 6P ACME-2G        | -346         | OR-B346-4559 |
| 7"                        | GN-R70-0021  | 2.90 / 7.37    | 9.90 / 25.15    | 88.06 / 39.94   | 6-1/4" 5P ACME-2G        | -360         | OR-B360-6309 |

Select o-ring material based on fluid compatibility and wellbore temperature.

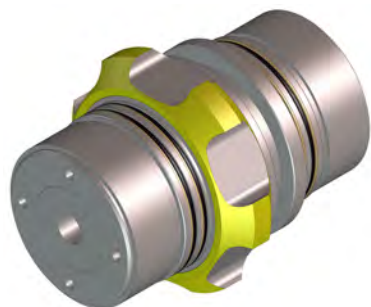
†Nitrile (OR-N569-\*\*\*) is the standard option. Viton (OR-V95-\*\*\*) with back-up rings required at temperatures above 325°F.



# Conventional Subs

## Booster to Booster Two-Piece Tandem Subs, 6-3/4" and 7" Systems

GEODynamics' conventional gun connectors (subs) are used in TCP and conventional booster-to-booster perforating applications with GEODynamics' short guns (GLB series) or conventional long guns (GA series). All connections use double o-rings with optional back-up rings.



**GN-R70-0021-Z825**  
2-pc. Tandem with  
8-1/4" OD Ring Centralizer

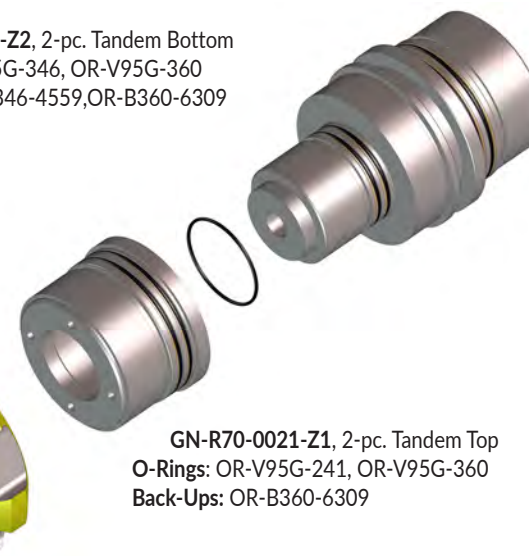


**GN-R70-0021-ZTL**  
Sub Wrench

**GN-RH70-R825**  
8-1/4" OD Ring Centralizer



**GN-R70-0021-Z2, 2-pc. Tandem Bottom**  
O-Rings: OR-V95G-346, OR-V95G-360  
Back-Ups: OR-B346-4559, OR-B360-6309



**GN-R70-0021-Z1, 2-pc. Tandem Top**  
O-Rings: OR-V95G-241, OR-V95G-360  
Back-Ups: OR-B360-6309

## SPECIFICATIONS

| Part Number        | Description   | Makeup Length |      | Overall Length |       | Weight |       |
|--------------------|---|---------------|------|----------------|-------|--------|-------|
|                    |   | (in)          | (cm) | (in)           | (cm)  | (lbs)  | (kg)  |
| GN-R675D21-Z827-CT | 6-3/4" 2 pc. Tandem Sub with 8-1/4" Ring Centralizer* | 3.90          | 9.91 | 10.90          | 27.69 | 90.98  | 41.27 |
| GN-R675D21-ZTL     | 6-3/4" 2 pc. Tandem Sub Wrench                        | N/A           |      | 24.00          | 60.96 | 5.50   | 2.49  |
| GN-R70-0021-Z825   | 7" 2 pc. Tandem Sub with 8-1/4" Ring Centralizer*     | 2.50          | 6.35 | 9.90           | 25.15 | 90.52  | 41.06 |
| GN-R70-0021-ZTL    | 7" 2 pc. Tandem Sub Wrench                            | N/A           |      | 24.00          | 60.96 | 6.00   | 2.72  |

Select o-ring material based on fluid compatibility and wellbore temperature.

Nitrile (OR-N569-\*\*) is the standard option. Viton (OR-V95-\*\*) with back-up rings required at temperatures above 325°F.

\* Refer to Centralizing Gun Connectors catalog pages for additional details and centralizer options.

# Conventional Subs

## Bull Plugs

GEODynamics' conventional gun connectors (subs) are used in TCP and conventional booster-to-booster perforating applications with GEODynamics' short guns (GLB series) or conventional long guns (GA series). All sub connections use double o-rings with optional back-up rings.



BULL PLUG, STANDARD  
GN-R31-0022 (SHOWN)

| Mechanical Specifications |              |                  |                  |                  |                     |                   |                      |                    |                          |                 |              |
|---------------------------|--------------|------------------|------------------|------------------|---------------------|-------------------|----------------------|--------------------|--------------------------|-----------------|--------------|
| Gun Size<br>(OD)          | Part Numbers |                  |                  |                  | Make-Up Length      |                   | Weight               |                    | Gun Connections          |                 |              |
|                           | Standard     | 2-3/8"<br>EU Pin | 2-7/8"<br>EU Pin | 3-1/2"<br>EU Pin | Standard<br>(in/cm) | EU Pin<br>(in/cm) | Standard<br>(lbs/kg) | EU Pin<br>(lbs/kg) | Thread                   | O-Rings<br>(4)† | Back-Ups (4) |
| 1-9/16"                   | GN-R16-0022  | -                | -                | -                | 2.00 / 5.08         | -                 | 1.24 / 0.56          | -                  | 1-9/32" 12P STUB ACME-2G | -215            | OR-B215-1308 |
| 1-3/4"                    | GN-R175-0022 | -                | -                | -                | 1.75 / 4.45         | -                 | 1.41 / 0.64          | -                  | 1-7/16" 12P STUB ACME-2G | -218            | OR-B217-1468 |
| 2"                        | GN-R20-0022  | -                | -                | -                | 1.75 / 4.45         | -                 | 1.84 / 0.83          | -                  | 1-11/16" 8P STUB ACME    | -221            | OR-B221-1715 |
| 2-3/8"                    | GN-R23-0022  | -                | -                | -                | 1.75 / 4.45         | -                 | 2.66 / 1.21          | -                  | 2-1/32" 8P STUB ACME 2G  | -225            | OR-B225-2126 |
| 2-1/2"                    | GN-R25-0022  | -                | -                | -                | 1.75 / 4.45         | -                 | 2.91 / 1.32          | -                  | 2-1/8" 8P ACME-2G        | -225            | OR-B225-2160 |
| 2-3/4"                    | GN-R27-0022  | GN-R27-0023      | -                | -                | 2.75 / 6.99         | 2.00 / 5.08       | 6.30 / 2.86          | 9.56 / 4.34        | 2-3/8" 6P ACME-2G        | -227            | OR-B227-2405 |
| 2-7/8"                    | GN-R28-0022  | GN-R28-0023      | -                | -                | 2.75 / 6.99         | 2.00 / 5.08       | 7.08 / 3.21          | 10.33 / 4.69       | 2-1/2" 6P ACME-2G        | -228            | OR-B228-2560 |
| 3-1/8"                    | GN-R31-0022  | GN-R31-0023      | -                | -                | 3.12 / 7.92         | 2.25 / 5.72       | 8.41 / 3.81          | 11.05 / 5.01       | 2-3/4" 6P ACME-2G        | -230            | OR-B230-2813 |
|                           | -            | -                | GN-R31-0024      | -                | -                   | 2.25 / 5.72       | -                    | 12.74 / 5.78       | 2-3/4" 6P ACME-2G        | -230            | OR-B230-2813 |
| 3-3/8"                    | GN-R33-0022  | GN-R33-0023      | -                | -                | 3.12 / 7.92         | 2.25 / 5.72       | 9.48 / 4.30          | 11.90 / 5.40       | 2-13/16" 6P ACME-2G      | -231            | OR-B231-2870 |
|                           | -            | -                | GN-R33-0024      | -                | -                   | 2.00 / 5.08       | -                    | 13.13 / 5.96       | 2-13/16" 6P ACME-2G      | -231            | OR-B231-2870 |
| 4"                        | GN-R40-0022  | -                | GN-R40-0023      | -                | 3.00 / 7.62         | 3.00 / 7.62       | 13.21 / 5.99         | 19.61 / 8.89       | 3-7/16" 6P ACME-2G       | -236            | OR-B236-3497 |
| 4-1/2"                    | GN-R45-0022  | -                | GN-R45-0023      | -                | 3.00 / 7.62         | 2.50 / 6.35       | 18.62 / 8.45         | 22.66 / 10.28      | 3-15/16" 6P ACME-2G      | -342            | OR-B342-3997 |
| & 4-5/8"                  | -            | -                | -                | GN-R45-0024      | -                   | 2.25 / 5.72       | -                    | 23.93 / 10.85      | 3-15/16" 6P ACME-2G      | -342            | OR-B342-3997 |
| 4-3/4"                    | GN-R475-0022 | -                | GN-R475-0023     | -                | 3.00 / 7.62         | 2.50 / 6.35       | 19.68 / 8.93         | 23.55 / 10.68      | 3-15/16" 6P ACME-2G      | -342            | OR-B342-3997 |
| 5"                        | GN-R50-0022  | -                | GN-R50-0023      | -                | 3.00 / 7.62         | 2.75 / 6.99       | 25.03 / 11.35        | 29.38 / 13.33      | 4-1/2" 6P ACME-2G        | -346            | OR-B346-4559 |
| 5-1/8"                    | GN-R51-0022  | -                | GN-R51-0023      | -                | 3.00 / 7.62         | 2.75 / 6.99       | 25.56 / 11.59        | 29.86 / 13.54      | 4-1/2" 6P ACME-2G        | -346            | OR-B346-4559 |
| 6-3/4"                    | GN-R675D22   | -                | GN-R675D23       | -                | 3.00 / 7.62         | 2.75 / 6.99       | 42.89 / 19.45        | 45.93 / 20.83      | 5-3/4" 6P ACME-2G        | -357            | OR-B357-5873 |
| 7"                        | GN-R70-0022  | -                | GN-R70-0023      | -                | 3.00 / 7.62         | 2.75 / 6.99       | 48.64 / 22.06        | 51.49 / 23.36      | 6-1/4" 5P ACME-2G        | -360            | OR-B360-6309 |
|                           | -            | -                | -                | GN-R70-0024      | -                   | 2.75 / 6.99       | -                    | 54.79 / 24.85      | 6-1/4" 5P ACME-2G        | -360            | OR-B360-6309 |

Select o-ring material based on fluid compatibility and wellbore temperature.

†Nitrile (OR-N569-\*\*) is the standard option. Viton (OR-V95-\*\*) with back-up rings required at temperatures above 325°F.

# Centralizing Gun Connectors (Booster to Booster)

## 3.125" and 3.375" Conventional Gun Systems



GEODynamics' centralizing gun connectors are used to position the perforating string in the wellbore. The centralizers reduce friction between the perforating guns and the casing, which minimizes the risk of the string getting caught while running into or pulling out of the well. Centralizers enhance deployment capabilities of slickline, wireline, coiled tubing, and jointed pipe. In TCP operations with deviated wells, the centralized connectors provide greater assurance that the guns will fall to total depth after they have been released.

### FEATURES/BENEFITS

- Economical, simple, safe, and reliable.
- Can be run in conjunction with most GEODynamics gun systems.
- Enhances deployment capability of gun systems in highly-deviated and horizontal wells.
- Enhances ability of perforating guns to fall when used in conjunction with mechanical and automatic releases in highly-deviated wells.
- No post-detonation swell.
- Tensile strength is equivalent to standard gun connectors.
- Centralizer options available from 3.88 to 6.38 inches OD. Custom sizes available by special order.

### SPECIFICATIONS

| Part Number    | Description   | Makeup Length |      | Overall Length |       | Weight |      |
|----------------|---|---------------|------|----------------|-------|--------|------|
|                |   | (in)          | (cm) | (in)           | (cm)  | (lbs)  | (kg) |
| GN-R31-0021HB  | 3-1/8" Centralizing Tandem Sub                        | 3.20          | 8.13 | 8.96           | 22.76 | 14.52  | 6.59 |
| GN-R33-0021HB  | 3-3/8" Centralizing Tandem Sub                        | 3.20          | 8.13 | 8.96           | 22.76 | 15.28  | 6.93 |
| GN-R33-0023HB  | 3-3/8" Centralizing Bull Plug, 2-3/8" EUE Pin         | 2.75          | 6.99 | 8.38           | 21.29 | 12.11  | 5.49 |
| GN-R33HB-R442S | 3-1/8" and 3-3/8" Ring Centralizer, 4.42" OD          | N/A           |      | 2.00           | 5.08  | 2.17   | 0.98 |
| GN-R33HB-R442E | 3-1/8" and 3-3/8" Extended Ring Centralizer, 4.42" OD | N/A           |      | 3.00           | 7.62  | 3.04   | 1.38 |
| GN-R3121-C638  | 3-1/8" Finned Centralizing Tandem, 6-3/8" OD          | 3.20          | 8.13 | 8.96           | 22.76 | 19.13  | 8.68 |
| GN-R3321-C388  | 3-3/8" Finned Centralizing Tandem, 3-7/8" OD          | 3.20          | 8.13 | 8.96           | 22.76 | 16.49  | 7.48 |
| GN-R3321-C638  | 3-3/8" Finned Centralizing Tandem, 6-3/8" OD          | 3.20          | 8.13 | 8.96           | 22.76 | 20.24  | 9.18 |
| GN-R3322-C388  | 3-3/8" Finned Centralizing Bull Plug, 3-7/8" OD       | 3.12          | 7.92 | 6.00           | 15.24 | 9.91   | 4.50 |

Select o-ring material based on fluid compatibility and wellbore temperature. Nitrile (OR-N569-\*\*) is the standard option.

Viton (OR-V95-\*\*) with back-up rings required at temperatures above 325°F.

Centralizer rings have internal 3.20 in -6P Stub ACME 2G internal threads (2.0 in. wide)



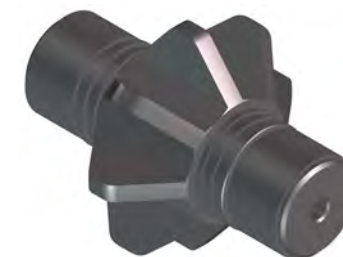
CENTRALIZING TANDEM SUB  
GN-R33-0021HB

SHOWN WITH

4.42" OD EXTENDED RING CENTRALIZER  
GN-R33HB-R442E



4.42" OD RING CENTRALIZER  
GN-R33HB-R442S



6-3/8" OD CENTRALIZING TANDEM  
GN-R3321-C638

# Centralizing Gun Connectors (Booster to Booster)

## 4.500" and 4.625" Conventional Gun Systems

GEODynamics' centralizing gun connectors are used to position the perforating string in the wellbore. The centralizers reduce friction between the perforating guns and the casing, which minimizes the risk of the string getting caught while running into or pulling out of the well. Centralizers enhance deployment capabilities of slickline, wireline, coiled tubing, and jointed pipe. In TCP operations with deviated wells, the centralized connectors provide greater assurance that the guns will fall to total depth after they have been released.

### FEATURES/BENEFITS

- Economical, simple, safe, and reliable.
- Can be run in conjunction with most GEODynamics gun systems.
- Enhances deployment capability of gun systems in highly-deviated and horizontal wells.
- Enhances ability of perforating guns to fall when used in conjunction with mechanical and automatic releases in highly-deviated wells.
- No post-detonation swell.
- Tensile strength is equivalent to standard gun connectors.
- Centralizer options available from 5.50 to 8.50 inches OD.  
Custom sizes available by special order.



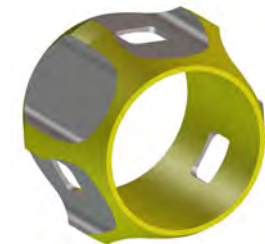
CENTRALIZING TANDEM SUB  
GN-R45-0021HB

SHOWN WITH

6-1/4" OD EXTENDED RING CENTRALIZER  
GN-RH450-R625-EXT

### SPECIFICATIONS

| Part Number       | Description  | Makeup Length  |      | Overall Length |       | Weight |       |
|-------------------|--|--|------|----------------|-------|--------|-------|
|                   |  | (in)   | (cm) | (in)           | (cm)  | (lbs)  | (kg)  |
| GN-R45-0021HB     | 4-1/2" Centralizing Tandem Sub                       | 2.90   | 7.37 | 9.90           | 25.15 | 33.52  | 15.20 |
| GN-R45-0022HB     | 4-1/2" Centralizing Bull Plug                        | 3.00   | 7.62 | 6.50           | 16.51 | 17.93  | 8.13  |
| GN-R45-0023HB     | 4-1/2" Centralizing Bull Plug, 2-7/8" EUE Pin        | 2.76   | 7.01 | 10.62          | 26.97 | 27.65  | 12.54 |
| GN-RH450-R625-EXT | 4-1/2" Extended Ring Centralizer, 6-1/4" OD          | N/A  |      | 4.50           | 11.43 | 5.62   | 2.55  |
| GN-RH45CR1-R****  | 4-1/2" Ring Centralizer, 5-1/2" to 8-1/2" OD         | Refer to Ring Centralizer Specifications (next page) |      |                |       |        |       |
| GN-R4621-C600     | 4-5/8" Finned Cent. Tandem, 6-1/4" OD, 1/2" Drift    | 2.90   | 7.37 | 9.90           | 25.15 | 36.38  | 16.50 |
| GN-R4622-C600     | 4-5/8" Finned Cent. Bull Plug, 6-1/4" OD, 1/2" Drift | 3.56   | 9.04 | 7.06           | 17.93 | 22.96  | 10.41 |



Select o-ring material based on fluid compatibility and wellbore temperature. Nitrile (OR-N569-342) is the standard option.  
Viton (OR-V95-342) with back-up rings (OR-B342-3997) required at temperatures above 325°F.

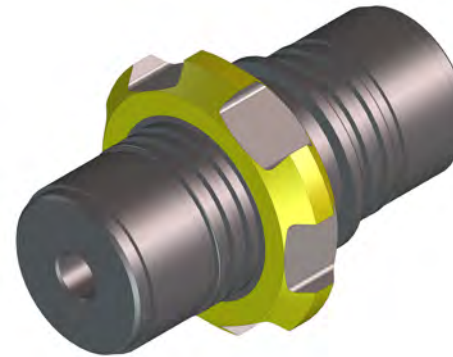
# Centralizing Gun Connectors (Booster to Booster)

## 4.500" and 4.625" Conventional Gun Systems

### RING CENTRALIZER SPECIFICATIONS

| Part Number<br>4140 Material | OD   |       | Weight |      |
|------------------------------|------|-------|--------|------|
|                              | (in) | (cm)  | (lbs)  | (kg) |
| GN-RH45CR1-R550              | 5.50 | 13.97 | 2.4    | 1.09 |
| GN-RH45CR1-R575              | 5.75 | 14.61 | 2.5    | 1.13 |
| GN-RH45CR1-R594              | 5.94 | 15.09 | 2.6    | 1.18 |
| GN-RH45CR1-R600              | 6.00 | 15.24 | 2.6    | 1.18 |
| GN-RH45CR1-R612              | 6.12 | 15.54 | 3.1    | 1.41 |
| GN-RH45CR1-R625              | 6.25 | 15.88 | 3.6    | 1.63 |
| GN-RH45CR1-R637              | 6.37 | 16.18 | 4.1    | 1.86 |
| GN-RH45CR1-R650              | 6.50 | 16.51 | 4.6    | 2.09 |
| GN-RH45CR1-R675              | 6.75 | 17.15 | 5.7    | 2.59 |
| GN-RH45CR1-R700              | 7.00 | 17.78 | 6.8    | 3.08 |
| GN-RH45CR1-R725              | 7.25 | 18.42 | 8.0    | 3.63 |
| GN-RH45CR1-R750              | 7.50 | 19.05 | 9.2    | 4.17 |
| GN-RH45CR1-R775              | 7.75 | 19.69 | 10.4   | 4.72 |
| GN-RH45CR1-R800              | 8.00 | 20.32 | 11.7   | 5.31 |
| GN-RH45CR1-R825              | 8.25 | 20.96 | 13.0   | 5.90 |
| GN-RH45CR1-R850              | 8.50 | 21.59 | 14.4   | 6.53 |

1018 material also available; add an "M" to the part number, e.g. GN-RH45CR1-R650M.  
Centralizer rings are 1.60 in. wide with 4.30 in. -6P Stub ACME 2G internal threads.



CENTRALIZING TANDEM SUB  
GN-R45-0021HB  
SHOWN WITH  
RING CENTRALIZER  
GN-RH45CR1-R625





# Centralizing Gun Connectors (Booster to Booster)

## 4.750" Conventional Gun Systems

GEODynamics' centralizing gun connectors are used to position the perforating string in the wellbore. The centralizers reduce friction between the perforating guns and the casing, which minimizes the risk of the string getting caught while running into or pulling out of the well. Centralizers enhance deployment capabilities of slickline, wireline, coiled tubing, and jointed pipe. In TCP operations with deviated wells, the centralized connectors provide greater assurance that the guns will fall to total depth after they have been released.

### FEATURES/BENEFITS

- Economical, simple, safe, and reliable.
- Can be run in conjunction with most GEODynamics gun systems.
- Enhances deployment capability of gun systems in highly-deviated and horizontal wells.
- Enhances ability of perforating guns to fall when used in conjunction with mechanical and automatic releases in highly-deviated wells.
- No post-detonation swell.
- Tensile strength is equivalent to standard gun connectors.
- Available centralizers are 6.25 inches OD. Custom sizes available by special order.



CENTRALIZING TANDEM SUB  
GN-R475-0021HB

SHOWN WITH

6-1/4 OD EXTENDED RING CENTRALIZER  
GN-RH475-R625-EXT

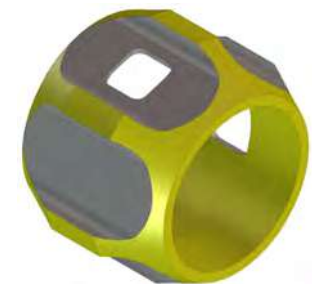
### SPECIFICATIONS

| Part Number       | Description  | Makeup Length |      | Overall Length |       | Weight |       |
|-------------------|--|---------------|------|----------------|-------|--------|-------|
|                   |  | (in)          | (cm) | (in)           | (cm)  | (lbs)  | (kg)  |
| GN-R475-0021HB    | 4-3/4" Centralizing Tandem Sub                           | 2.90          | 7.37 | 9.90           | 25.15 | 33.86  | 15.36 |
| GN-R47523-C625    | 4-3/4" Finned Centralizing BP, 6-1/4" OD, 2-7/8" EUE Pin | 3.75          | 9.53 | 10.00          | 25.40 | 32.12  | 14.57 |
| GN-RH475-R625-EXT | 4-3/4" Extended Ring Centralizer, 6-1/4" OD              | N/A           |      | 4.50           | 11.43 | 6.72   | 3.05  |

Select o-ring material based on fluid compatibility and wellbore temperature. Nitrile (OR-N569-342) is the standard option.

Viton (OR-V95-342) with back-up rings (OR-B342-3997) required at temperatures above 325°F.

Centralizer rings have internal 4.30 in. -6P Stub ACME 2G internal threads (1.61 in. wide)



6-1/4" OD EXTENDED RING CENTRALIZER  
GN-RH475-R625-EXT



# Centralizing Gun Connectors (Booster to Booster)

## 5.000" and 5.125" Conventional Gun Systems



GEODynamics' centralizing gun connectors are used to position the perforating string in the wellbore. The centralizers reduce friction between the perforating guns and the casing, which minimizes the risk of the string getting caught while running into or pulling out of the well. Centralizers enhance deployment capabilities of slickline, wireline, coiled tubing, and jointed pipe. In TCP operations with deviated wells, the centralized connectors provide greater assurance that the guns will fall to total depth after they have been released.

### FEATURES/BENEFITS

- Economical, simple, safe, and reliable.
- Can be run in conjunction with most GEODynamics gun systems.
- Enhances deployment capability of gun systems in highly-deviated and horizontal wells.
- Enhances ability of perforating guns to fall when used in conjunction with mechanical and automatic releases in highly-deviated wells.
- No post-detonation swell.
- Tensile strength is equivalent to standard gun connectors.
- Centralizer options available from 5.90 to 8.129 inches OD. (Refer to specifications on next page.) Custom sizes available by special order.



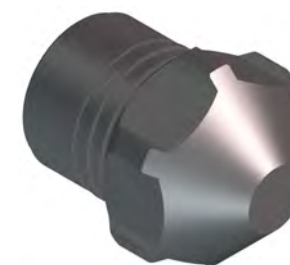
CENTRALIZING TANDEM SUB  
GN-R51-0021HB

SHOWN WITH

6-3/8 OD EXTENDED RING CENTRALIZER  
GN-RH51-R638-EXT

### SPECIFICATIONS

| Part Number    | Description   | Makeup Length |       | Overall Length |       | Weight |       |
|----------------|---|---------------|-------|----------------|-------|--------|-------|
|                |   | (in)          | (cm)  | (in)           | (cm)  | (lbs)  | (kg)  |
| GN-R5021-C600  | 5" Finned Centralizing Tandem Sub, 6" OD                  | 2.90          | 7.37  | 9.90           | 25.15 | 46.02  | 20.87 |
| GN-R5022-C600  | 5" Finned Centralizing Bull Plug, 6" OD                   | 3.75          | 9.53  | 7.25           | 18.42 | 29.75  | 13.49 |
| GN-R5023-C600  | 5" Finned Centralizing BP, 6" OD, 2-7/8" EUE Pin          | 3.20          | 8.13  | 9.50           | 24.13 | 33.95  | 15.40 |
| GN-R51-0021HB  | 5-1/8" Centralizing Tandem Sub                            | 2.90          | 7.37  | 9.90           | 25.15 | 44.46  | 20.17 |
| GN-R51-0022HB  | 5-1/8" Centralizing Bull Plug                             | 1.39          | 3.53  | 6.50           | 16.51 | 24.90  | 11.29 |
| GN-R51-0023HES | 5-1/8" Centralizing Bull Plug, 2-7/8" 8 EU RD STD API Pin | 4.20          | 10.67 | 10.58          | 26.87 | 34.00  | 15.42 |
| GN-R5121-C625  | 5-1/8" Finned Centralizing Tandem Sub, 6-1/4" OD          | 2.90          | 7.37  | 9.90           | 25.15 | 46.36  | 21.03 |
| GN-R5122-C625  | 5-1/8" Finned Centralizing Bull Plug, 6-1/4" OD           | 3.81          | 9.68  | 7.31           | 18.57 | 30.03  | 13.62 |
| GN-R5123-C625  | 5-1/8" Finned Centralizing BP, 6-1/4" OD, 2-7/8" EUE Pin  | 3.25          | 8.26  | 9.50           | 24.13 | 34.71  | 15.74 |



6" OD CENTRALIZING BULL PLUG  
GN-R5022-C600

Select o-ring material based on fluid compatibility and wellbore temperature. Nitrile (OR-N569-346) is the standard option. Viton (OR-V95-346) with back-up rings (OR-B346-4559) required at temperatures above 325°F.

Revised: August 31, 2023 9:46 PM

# Centralizing Gun Connectors (Booster to Booster)

## 5.000" and 5.125" Conventional Gun Systems

### RING CENTRALIZER SPECIFICATIONS

| Part Number  | OD    |       | Weight |      |
|--------------|-------|-------|--------|------|
|              | (in)  | (cm)  | (lbs)  | (kg) |
| GN-RH51-R590 | 5.90  | 14.99 | 1.70   | 0.77 |
| GN-RH51-R638 | 6.375 | 16.19 | 2.89   | 1.31 |

Centralizer rings are 1.62 in. wide with 5.0 in. -6P Stub ACME 2G internal threads.

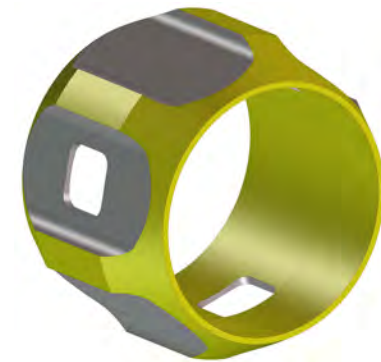


6-3/8" OD RING CENTRALIZER  
GN-RH51-R638

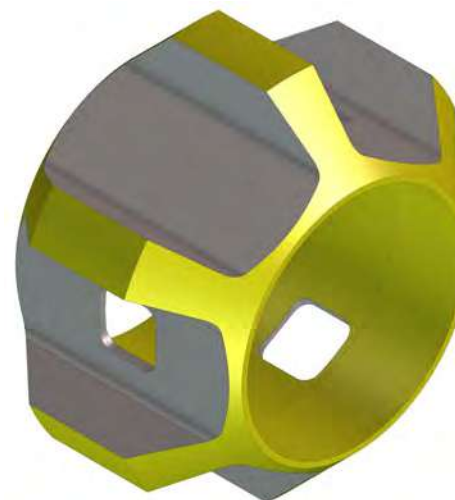
### EXTENDED RING CENTRALIZER SPECIFICATIONS

| Part Number      | OD    |       | Width |       | Weight |      |
|------------------|-------|-------|-------|-------|--------|------|
|                  | (in)  | (cm)  | (in)  | (cm)  | (lbs)  | (kg) |
| GN-RH51-R625-EXT | 6.25  | 15.88 | 4.50  | 11.43 | 6.00   | 2.72 |
| GN-RH51-R638-EXT | 6.375 | 16.19 | 4.50  | 11.43 | 6.19   | 2.81 |
| GN-RH51-R813-EXT | 8.129 | 20.65 | 5.00  | 12.70 | 11.67  | 5.29 |

Centralizer rings have internal 5.0 in. -6P Stub ACME 2G internal threads (1.58 in. wide).



6-3/8" OD EXTENDED RING CENTRALIZER  
GN-RH51-R638-EXT



8.129" OD EXTENDED RING CENTRALIZER  
GN-RH51-R813-EXT

# Centralizing Gun Connectors (Booster to Booster)

## 6.750" Conventional Gun Systems

GEODynamics' centralizing gun connectors are used to position the perforating string in the wellbore. The centralizers reduce friction between the perforating guns and the casing, which minimizes the risk of the string getting caught while running into or pulling out of the well. Centralizers enhance deployment capabilities of slickline, wireline, coiled tubing, and jointed pipe. In TCP operations with deviated wells, the centralized connectors provide greater assurance that the guns will fall to total depth after they have been released.

### FEATURES/BENEFITS

- Economical, simple, safe, and reliable.
- Can be run in conjunction with most GEODynamics gun systems.
- Enhances deployment capability of gun systems in highly-deviated and horizontal wells.
- Enhances ability of perforating guns to fall when used in conjunction with mechanical and automatic releases in highly-deviated wells.
- No post-detonation swell.
- Tensile strength is equivalent to standard gun connectors.
- Available centralizers are 8.25 inches OD. Custom sizes available by special order.



SUB WRENCH  
GN-R675D21-ZTL

8-1/4" RING CENTRALIZER  
GN-RH675-R827



2-PC. TANDEM BOTTOM  
GN-R675D21-Z2

O-RINGS:  
OR-V95G-342, OR-V95G-357

BACK-UPS:  
OR-B342-3997, OR-B357-5873



2-PC. TANDEM TOP  
GN-R675D21-Z1

O-RINGS:  
OR-V95G-237, OR-V95G-357

BACK-UPS:  
OR-B357-5873

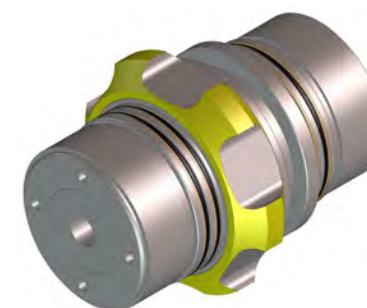


### SPECIFICATIONS

| Part Number        | Description   | Makeup Length |      | Overall Length |       | Weight |       |
|--------------------|---|---------------|------|----------------|-------|--------|-------|
|                    |   | (in)          | (cm) | (in)           | (cm)  | (lbs)  | (kg)  |
| GN-R675-0020-EXP   | 6-3/4" Centralizing Top Sub (5-3/4" 6P Acme 2G THD)                           | 3.47          | 8.81 | 9.00           | 22.86 | 54.93  | 24.92 |
| GN-R675D21-Z827-CT | 6-3/4" 2 pc. Tandem Sub with 8-1/4" Ring Centralizer                          | 3.90          | 9.91 | 10.90          | 27.69 | 90.98  | 41.27 |
| GN-RH675-R827      | 6-3/4" Ring Centralizer, 8-1/4" OD, 2-1/4" wide (6-5/16" 6P Stub Acme 2G THD) | N/A           |      | N/A            |       | 7.42   | 3.37  |
| GN-R67523-C825     | 6-3/4" Bull Plug w/8-1/4" Centralizer, 2-7/8" EUE Pin                         | 3.75          | 9.53 | 10.00          | 25.40 | 53.00  | 24.04 |
| GN-R67524-C825     | 6-3/4" Bull Plug w/8-1/4" Centralizer, 3-1/2" EUE Pin                         | 3.75          | 9.53 | 10.25          | 26.04 | 59.00  | 26.16 |
| GN-R675D21-ZTL     | 6-3/4" 2 pc. Tandem Sub Wrench  | N/A           |      | 24.00          | 60.96 | 5.50   | 2.49  |

Select o-ring material based on fluid compatibility and wellbore temperature.

Nitrile (OR-N569-\*\*) is the standard option. Viton (OR-V95-\*\*) with back-up rings required at temperatures above 325°F.



2-PC. TANDEM WITH  
8-1/4" OD RING CENTRALIZER  
GN-R675D21-Z827-CT

# Centralizing Gun Connectors (Booster to Booster)

## 7.000" Conventional Gun Systems

GEODynamics' centralizing gun connectors are used to position the perforating string in the wellbore. The centralizers reduce friction between the perforating guns and the casing, which minimizes the risk of the string getting caught while running into or pulling out of the well. Centralizers enhance deployment capabilities of slickline, wireline, coiled tubing, and jointed pipe. In TCP operations with deviated wells, the centralized connectors provide greater assurance that the guns will fall to total depth after they have been released.

### FEATURES/BENEFITS

- Economical, simple, safe, and reliable.
- Can be run in conjunction with most GEODynamics gun systems.
- Enhances deployment capability of gun systems in highly-deviated and horizontal wells.
- Enhances ability of perforating guns to fall when used in conjunction with mechanical and automatic releases in highly-deviated wells.
- No post detonation swell.
- Tensile strength is equivalent to standard gun connectors.
- Centralizer options available from 7.0 to 12.0 inches OD. Custom sizes available by special order.



SUB WRENCH  
GN-R70-0021-ZTL



8-1/4" OD RING CENTRALIZER  
GN-RH70-R825

2-PC. TANDEM BOTTOM  
GN-R70-0021-Z2

**O-RINGS:**  
OR-V95G-346, OR-V95G-360

**BACK-UPS:**  
OR-B346-4559, OR-B360-6309



2-PC. TANDEM TOP  
GN-R70-0021-Z1

**O-RINGS:**  
OR-V95G-241, OR-V95G-360

**BACK-UPS:**  
OR-B360-6309



2-PC. TANDEM WITH  
8-1/4" OD RING CENTRALIZER  
GN-R70-0021-Z825

### SPECIFICATIONS

| Part Number       | Description                                      | Makeup Length  |      | Overall Length |       | Weight |       |
|-------------------|--|--|------|----------------|-------|--------|-------|
|                   |  | (in)   | (cm) | (in)           | (cm)  | (lbs)  | (kg)  |
| GN-R70-0021-Z825  | 7" 2 pc. Tandem Sub with 8-1/4" Ring Centralizer | 2.50   | 6.35 | 9.90           | 25.15 | 90.52  | 41.06 |
| GN-RH70-R****     | 7" Ring Centralizer, 7" to 9" OD                 | Refer to Ring Centralizer Specifications (next page) |      |                |       |        |       |
| GN-RH70-R****-EXT | 7" Extended Ring Centralizer, 8-1/4" to 12" OD   | Refer to Extended Ring Centralizer Specs (next page) |      |                |       |        |       |
| GN-R70-0021-ZTL   | 7" 2 pc. Tandem Sub Wrench                       | N/A  |      | 24.00          | 60.96 | 6.00   | 2.72  |

Select o-ring material based on fluid compatibility and wellbore temperature.

Nitrile (OR-N569-\*\*\* ) is the standard option. Viton (OR-V95-\*\*\* ) with back-up rings required at temperatures above 325°F.

# Centralizing Gun Connectors (Booster to Booster)

## 7.000" Conventional Gun Systems

### RING CENTRALIZER SPECIFICATIONS

| Part Number  | OD   |       | Weight |      |
|--------------|------|-------|--------|------|
|              | (in) | (cm)  | (lbs)  | (kg) |
| GN-RH70-R700 | 7.00 | 17.78 | 2.89   | 1.31 |
| GN-RH70-R825 | 8.25 | 20.96 | 4.63   | 2.10 |
| GN-RH70-R850 | 8.50 | 21.59 | 6.09   | 2.76 |
| GN-RH70-R900 | 9.00 | 22.86 | 6.89   | 3.13 |

Centralizer rings are 1.72 in. wide with 6.533 in. -6P Stub ACME 2G internal threads.



9" OD RING CENTRALIZER  
GN-RH70-R900

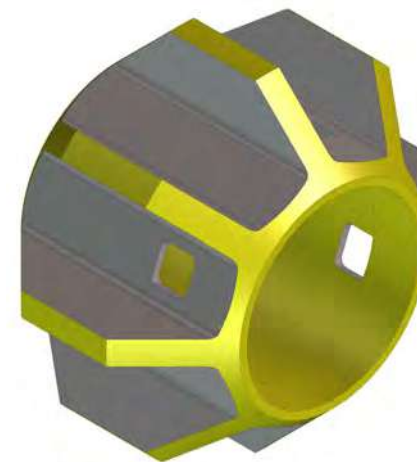


8-1/4" OD EXTENDED RING CENTRALIZER  
GN-RH70-R825-EXT

### EXTENDED RING CENTRALIZER SPECIFICATIONS

| Part Number         | OD    |       | Width |       | Weight |       |
|---------------------|-------|-------|-------|-------|--------|-------|
|                     | (in)  | (cm)  | (in)  | (cm)  | (lbs)  | (kg)  |
| GN-RH70-R825-EXT    | 8.25  | 20.96 | 4.50  | 11.43 | 11.35  | 5.15  |
| GN-RH70-R1037-EXT   | 10.37 | 26.34 | 7.50  | 19.05 | 31.43  | 14.26 |
| GN-RH70-R1195-EXT   | 11.95 | 30.35 | 8.00  | 20.32 | 40.67  | 18.45 |
| GN-RH70-R1195-4-EXT | 11.95 | 30.35 | 8.00  | 20.32 | 29.55  | 13.40 |

Centralizer rings have internal 6.533 in. -6P Stub ACME 2G internal threads (1.72 in. wide)



12" OD EXTENDED RING CENTRALIZER  
GN-RH70-R1195-EXT



# Centralizing Break-Apart Tandem Sub (Booster to Booster)

## 4.500", 4.625", and 4.75" Conventional Gun Systems

GEODynamics' centralizing break-apart tandem sub connectors are used to position the perforating string in the wellbore while providing the capability to separate the perforating guns should it become necessary. While offering all the benefits of centralizing tandems, the break-apart option provides a secondary benefit. The break-apart tandem allows us to separate long gun assemblies into shorter sections if they become stuck (sanded up). This feature facilitates fishing/wash over operations. Right-hand rotation, with the appropriate torque, separates the tandem at the left-hand thread. If the perforating guns are not stuck, the break-apart feature cannot be deployed.

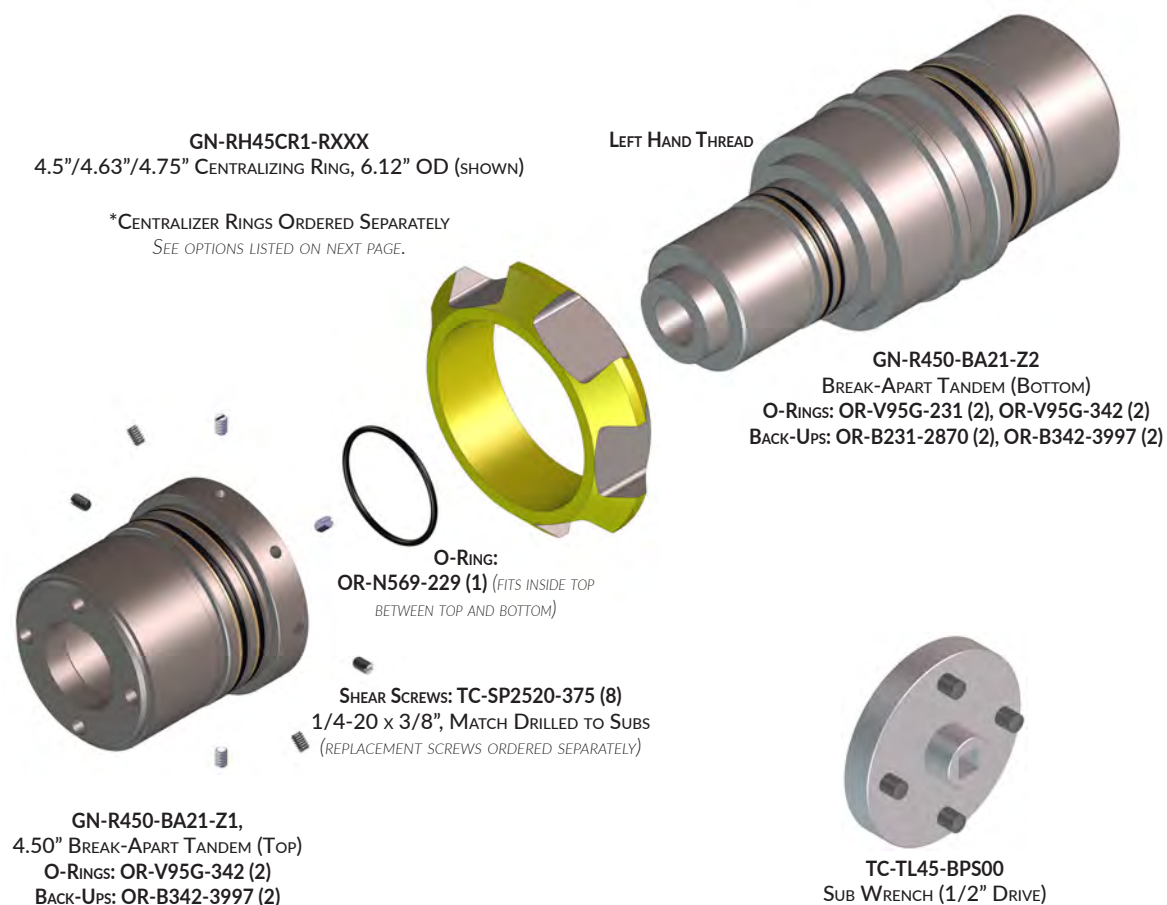
### FEATURES/BENEFITS

- Economical, simple, safe, and reliable.
- Can be run with most GEODynamics gun systems.
- Enhances deployment capability of gun systems in highly-deviated and horizontal wells.
- Enhances ability of perforating guns to fall when used in conjunction with mechanical and automatic releases in highly-deviated wells.
- No post-detonation swell.
- Custom centralizer sizes (OD) available by special order.

### SPECIFICATIONS

|  |  |
|--|--|
| Part Number                            | GN-R45BA21-ZR                                  |
| Booster Kit Part Number                | GN-000-0035                                    |
| Makeup Length                          | 3.90 in / 9.91 cm                              |
| Overall Length                         | 10.90 in / 27.69 cm                            |
| Weight                                 | 41.01 lbs / 18.60 kg                           |
| Tensile Rating                         | 450,000 lbs ( <i>higher than the carrier</i> ) |
| Torque Required to Shear<br>(8 Screws) | 4,000 - 4,500 ft/lbs                           |
| Rotations Required to Shear            | 11 Rotations ( <i>to the right</i> )           |
| Upper/Lower Thread Connections         | 3-15/16" 6P ACME-2G                            |

Select o-ring material based on fluid compatibility and wellbore temperature.  
Nitrile (OR-N569-\*\*\*) is the standard option.  
Viton (OR-V95-\*\*\*) w/back-up rings required at temperatures above 325°F.



\*GN-R45-R001-450, THREAD PROTECTOR RING (NOT SHOWN)  
ALSO AVAILABLE WHEN A CENTRALIZER RING IS NOT REQUIRED.



# Centralizing Break-Apart Tandem Sub (Booster to Booster)

## Centralizing Rings, 5.50" - 8.50" O.D.

### RING CENTRALIZER SPECIFICATIONS

| Part Number<br>4140 Material | Part Number<br>1018 Material | OD   |       | Weight |      |
|------------------------------|------------------------------|------|-------|--------|------|
|                              |                              | (in) | (cm)  | (lbs)  | (kg) |
| GN-RH45CR1-R550              | GN-RH45CR1-R550M             | 5.50 | 13.97 | 2.4    | 1.09 |
| GN-RH45CR1-R575              | GN-RH45CR1-R575M             | 5.75 | 14.61 | 2.5    | 1.13 |
| GN-RH45CR1-R594              | GN-RH45CR1-R594M             | 5.94 | 15.09 | 2.6    | 1.18 |
| GN-RH45CR1-R600              | GN-RH45CR1-R600M             | 6.00 | 15.24 | 2.6    | 1.18 |
| GN-RH45CR1-R612              | GN-RH45CR1-R612M             | 6.12 | 15.54 | 3.1    | 1.41 |
| GN-RH45CR1-R625              | GN-RH45CR1-R625M             | 6.25 | 15.88 | 3.6    | 1.63 |
| GN-RH45CR1-R637              | GN-RH45CR1-R637M             | 6.37 | 16.18 | 4.1    | 1.86 |
| GN-RH45CR1-R650              | GN-RH45CR1-R650M             | 6.50 | 16.51 | 4.6    | 2.09 |
| GN-RH45CR1-R675              | GN-RH45CR1-R675M             | 6.75 | 17.15 | 5.7    | 2.59 |
| GN-RH45CR1-R700              | GN-RH45CR1-R700M             | 7.00 | 17.78 | 6.8    | 3.08 |
| GN-RH45CR1-R725              | GN-RH45CR1-R725M             | 7.25 | 18.42 | 8.0    | 3.63 |
| GN-RH45CR1-R750              | GN-RH45CR1-R750M             | 7.50 | 19.05 | 9.2    | 4.17 |
| GN-RH45CR1-R775              | GN-RH45CR1-R775M             | 7.75 | 19.69 | 10.4   | 4.72 |
| GN-RH45CR1-R800              | GN-RH45CR1-R800M             | 8.00 | 20.32 | 11.7   | 5.31 |
| GN-RH45CR1-R825              | GN-RH45CR1-R825M             | 8.25 | 20.96 | 13.0   | 5.90 |
| GN-RH45CR1-R850              | GN-RH45CR1-R850M             | 8.50 | 21.59 | 14.4   | 6.53 |

Centralizer rings are 1.60 in. wide with 4.30 in. -6P Stub ACME 2G internal threads.



**GN-RH45CR1-R625**  
CENTRALIZING RING, 6.25" OD (SHOWN)

# Gun System Thread Protectors

## Handling Protectors Only - Not for Lifting

Thread protectors with handles facilitate easy and safe handling of assembled gun systems, carriers, tandems, and bull plugs.

Double o-rings provide a reliable moisture seal. The melt plug is equipped with an o-ring and sealed in place with silicone. When the melt plug or its o-ring becomes damaged, GEODynamics recommends replacement of the entire melt plug.

Thread protectors are **not for lifting and rigging; lift subs are required** for these operations.

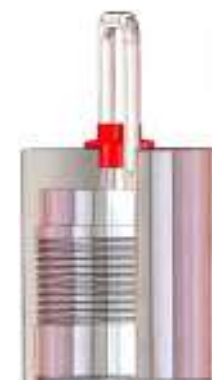
### STANDARD THREAD PROTECTORS, O-RINGS, and MELT PLUGS

| System Size | Carrier (Gun) Protector | Top Sub (Top Pin) Protector | Tandem/Switch Sub and Bull Plug Protector | O-Ring (Two per Sub (Pin End)) | Melt Plug      |
|-------------|-------------------------|-----------------------------|---|--------------------------------|----------------|
| 1-9/16"     | GN-THD-156-000          | GN-THD-156-020              | GN-THD-156-020                            | OR-N569-215                    | GN-THD-000-020 |
| 1-3/4"      | GN-THD-175-000          | GN-THD-156-020              | GN-THD-175-020                            | OR-N569-218                    | GN-THD-000-020 |
| 2"          | GN-THD-200-000          | GN-THD-156-020              | GN-THD-200-020                            | OR-N569-221                    | GN-THD-000-020 |
| 2-3/8"      | GN-THD-239-030          | GN-THD-156-020              | GN-THD-239-040                            | OR-N569-225                    | GN-THD-000-028 |
| 2-1/2"      | GN-THD-250-030          | GN-THD-156-020              | GN-THD-250-040                            | OR-N569-225                    | GN-THD-000-028 |
| 2-3/4"      | GN-THD-275-030          | GN-THD-QC27-020             | GN-THD-275-040                            | OR-N569-227                    | GN-THD-000-028 |
| 2-7/8"      | GN-THD-288-030          | GN-THD-QC27-020             | GN-THD-288-040                            | OR-N569-228                    | GN-THD-000-028 |
| 3-1/8"      | GN-THD-312-030          | GN-THD-312-020              | GN-THD-312-040                            | OR-N569-230                    | GN-THD-000-028 |
| 3-3/8"      | GN-THD-338-030          | GN-THD-312-020              | GN-THD-338-040                            | OR-N569-231                    | GN-THD-000-028 |
| 4"          | GN-THD-400-030          | GN-THD-312-020              | GN-THD-400-040                            | OR-N569-236                    | GN-THD-000-028 |
| 4-1/2"      | GN-THD-450-030          | GN-THD-312-020              | GN-THD-450-040                            | OR-N569-342                    | GN-THD-000-028 |
| 4-5/8"      | GN-THD-450-030          | GN-THD-312-020              | GN-THD-450-040                            | OR-N569-342                    | GN-THD-000-028 |
| 5"          | GN-THD-512-030          | GN-THD-312-020              | GN-THD-512-040                            | OR-N569-346                    | GN-THD-000-028 |
| 5-1/8"      | GN-THD-512-030          | GN-THD-312-020              | GN-THD-512-040                            | OR-N569-346                    | GN-THD-000-028 |
| 7"          | GN-THD-700-030          | GN-THD-312-020              | GN-THD-700-040                            | OR-N569-360                    | GN-THD-000-028 |



CARRIER (GUN) PROTECTOR  
EQUIPPED WITH MELT PLUG AND O-RINGS

**HANDLING PROTECTORS ONLY  
NOT FOR LIFTING**



TOP SUB (TOP PIN), TANDEM/SWITCH  
SUB, AND BULL PLUG PROTECTOR  
EQUIPPED WITH MELT PLUG



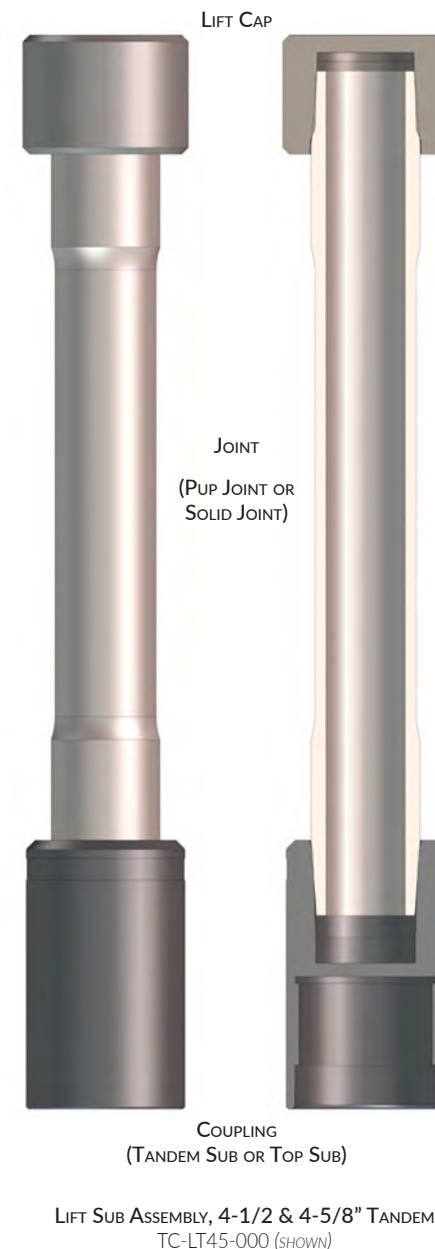
MELT PLUG  
GN-THD-000-020  
SIZES 1-9/16" - 2"



MELT PLUG w/O-RING  
GN-THD-000-028  
SIZES 2-3/8" - 7"  
INCLUDES 70-DURO #120 O-RING

### LIFT SUB ASSEMBLY COMPONENTS

| Assembly P/N | Description   | Lift Cap P/N | Joint P/N                               | Coupling P/N |
|--------------|---|--------------|---|--------------|
| TC-LT15-000  | Lift Sub Assembly, 1-9/16" Tandem, 1-3/4", 2-1/8", and 2-1/2" Top Sub | TC-LT00-238  | TC-PUP23-002N<br>2-3/8", 4.7#/ft, N-80  | TC-LT15-003  |
| TC-LT175-000 | Lift Sub Assembly, 1-3/4" Tandem                                      |              |   | TC-LT175-003 |
| TC-LT21-000  | Lift Sub Assembly, 2-1/8" Tandem                                      |              |   | TC-LT21-003  |
| TC-LT25-000  | Lift Sub Assembly, 2-1/2" Tandem                                      |              |   | TC-LT25-003  |
| TC-LT27-QC0  | Lift Sub Assembly, 2-3/4" & 2-7/8" Top Sub                            |              |   | TC-LT27-QC3  |
| TC-LT27-000  | Lift Sub Assembly, 2-3/4" Tandem                                      |              |   | TC-LT27-003  |
| TC-LT28-000  | Lift Sub Assembly, 2-7/8" Tandem                                      |              |   | TC-LT28-003  |
| TC-LT31-000  | Lift Sub Assembly, 3-1/8" Tandem & Top Sub                            | TC-LT00-288  | TC-PUP23-602P<br>2-3/8", 6.5#/ft, P-110 | TC-LT31-003  |
| TC-LT33-000  | Lift Sub Assembly, 3-3/8" Tandem                                      |              |   | TC-LT33-003  |
| TC-LT40-000  | Lift Sub Assembly, 4" Tandem  |              | TC-PUP28-902P<br>2-7/8", 8.7#/ft, P-110 | TC-LT40-003  |
| TC-LT45-000  | Lift Sub Assembly, 4-1/2" & 4-5/8" Tandem                             |              |   | TC-LT45-003  |
| TC-LT51-000  | Lift Sub Assembly, 5-1/8" Tandem                                      |              |   | TC-LT51-003  |
| TC-LT675-000 | Lift Sub Assembly, 6-3/4" Tandem                                      |              |   | TC-LT675-003 |
| TC-LT70-000  | Lift Sub Assembly, 7" Tandem  |              |   | TC-LT70-003  |



### COUPLING SPECIFICATIONS

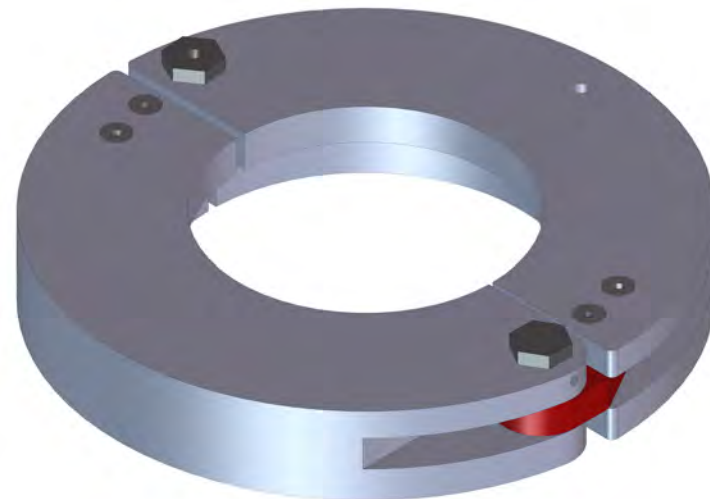
| Coupling P/N | Description                            | Uphole Thread     | Downhole Thread            |
|--------------|--|-------------------|----------------------------|
| TC-LT15-003  | Coupling, Tandem Lift Sub, 1-9/16"     | 2-3/8" EU (8 Rnd) | 1-9/32" 12P STUB ACME-2G   |
| TC-LT175-003 | Coupling, Tandem Lift Sub, 1-3/4"      |                   | 1-7/16" 12P STUB ACME-2G   |
| TC-LT21-003  | Coupling, Tandem Lift Sub, 2-1/8"      |                   | 1-11/16" - 8P STUB ACME-2G |
| TC-LT25-003  | Coupling, Tandem Lift Sub, 2-1/2"      |                   | 2-1/8" - 8P ACME-2G        |
| TC-LT27-QC3  | Coupling, 2-3/4" & 2 7/8" Top Lift Sub |                   | 2-1/8" - 6P ACME-2G        |
| TC-LT27-003  | Coupling, Tandem Lift Sub, 2-3/4"      |                   | 2-3/8" - 6P ACME-2G        |
| TC-LT28-003  | Coupling, Tandem Lift Sub, 2-7/8"      |                   | 2-1/2" - 6P ACME-2G        |
| TC-LT31-003  | Coupling, Tandem Lift Sub, 3-1/8"      |                   | 2-3/4" - 6P ACME-2G        |
| TC-LT33-003  | Coupling, Tandem Lift Sub, 3-3/8"      |                   | 2-13/16" - 6P ACME-2G      |
| TC-LT40-003  | Coupling, Tandem Lift Sub, 4"          |                   | 3-9/16" - 6P ACME-2G       |
| TC-LT45-003  | Coupling, Tandem Lift Sub, 4-1/2"      | 2-7/8" EU (8 Rnd) | 3-15/16" - 6P ACME-2G      |
| TC-LT51-003  | Coupling, Tandem Lift Sub, 5-1/8"      |                   | 4-1/2" - 6P ACME-2G        |
| TC-LT675-003 | Coupling, Tandem Lift Sub, 6-3/4"      |                   | 5-3/4" - 6P ACME-2G        |
| TC-LT70-003  | Coupling, Tandem Lift Sub, 7"          |                   | 6-1/4" - 5P ACME 2G        |

### LIFTING CLAMP ASSEMBLIES

| Assembly P/N    | Description                    | † Safe Working Load (lbs) | † Shear Rating (lbs) |
|-----------------|--------------------------------|---------------------------|----------------------|
| TC-LC-0288-0000 | Lifting Clamp Assembly, 2-7/8" | 105,000                   | 345,000              |
| TC-LC-0313-0000 | Lifting Clamp Assembly, 3-1/8" | 115,000                   | 375,000              |
| TC-LC-0338-0000 | Lifting Clamp Assembly, 3-3/8" | 125,000                   | 400,000              |
| TC-LC-0400-0000 | Lifting Clamp Assembly, 4"     | 150,000                   | 480,000              |
| TC-LC-0450-0000 | Lifting Clamp Assembly, 4-1/2" | 170,000                   | 540,000              |
| TC-LC-0462-0000 | Lifting Clamp Assembly, 4-5/8" | 174,000                   | 550,000              |
| TC-LC-0475-0000 | Lifting Clamp Assembly, 4-3/4" | 175,000                   | 575,000              |
| TC-LC-0513-0000 | Lifting Clamp Assembly, 5-1/8" | 190,000                   | 620,000              |
| TC-LC-0675-0000 | Lifting Clamp Assembly, 6-3/4" | 255,000                   | 815,000              |
| TC-LC-0700-0000 | Lifting Clamp Assembly, 7"     | 265,000                   | 845,000              |
| TC-LC-0700-T000 | Lifting Clamp Assembly, 7"     | 249,000                   | 795,000              |

† All ratings are based on 4145 steel with a minimum 32 Rockwell C (Rc). Contact GEODynamics Engineering for other materials.

6.75" LIFTING CLAMP ASSY  
TC-LC-0675-0000 (SHOWN)



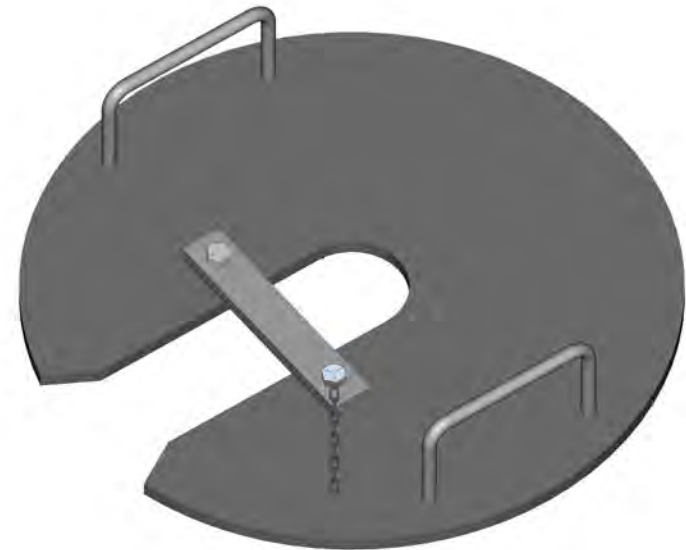
# Support Plates

## Offshore Support Plates

Support plates hold the perforating guns in place on the rig floor. Offshore Support Plates feature a large outer diameter (22" OD) for compatibility with offshore applications.

### SPECIFICATIONS

| Gun O.D.        | Part Number | Description                     | Yield Rating |        | Weight |      |
|-----------------|-------------|---------------------------------|--------------|--------|--------|------|
|                 |             |                                 | (lbf)        | (daN)  | (lb)   | (kg) |
| 1-9/16"         | TC-SP16-000 | 1-9/16" Support Plate           | 25,000       | 11,121 | 28     | 12.7 |
| 2"              | TC-SP20-000 | 2" Support Plate                | 30,000       | 13,345 | 31     | 14.1 |
| 2-1/2"          | TC-SP25-000 | 2-1/2" Support Plate            | 32,000       | 14,234 | 31     | 14.1 |
| 2-3/4" & 2-7/8" | TC-SP27-000 | 2-3/4" and 2-7/8" Support Plate | 31,000       | 13,789 | 31     | 14.1 |
| 3-1/8"          | TC-SP31-000 | 3-1/8" Support Plate            | 38,000       | 16,903 | 53     | 24.0 |
| 3-3/8"          | TC-SP33-000 | 3-3/8" Support Plate            | 41,000       | 18,238 | 53     | 24.0 |
| 4"              | TC-SP40-000 | 4" Support Plate                | 70,000       | 31,138 | 53     | 24.0 |
| 4-1/2"          | TC-SP45-000 | 4-1/2" Support Plate            | 75,000       | 33,362 | 51     | 23.1 |
| 5-1/8"          | TC-SP51-000 | 5-1/8" Support Plate            | 80,000       | 35,586 | 50     | 22.7 |
| 7"              | TC-SP70-000 | 7" Support Plate                | 100,000      | 44,482 | 86     | 39.0 |



GEODynamics' EPIC™ Command shooting panel interfaces between the wireline and a logging system to deliver state-of-the-art efficiency in perforating operations. Seamless integration with GEODynamics' EPIC switches and the EPIC Test box makes for a feature-rich plug-and-perf shooting panel for today's high speed, multi-well, zipper frac completion techniques. Command's advanced electronic telemetry makes for trouble-free conveyance and POOH, while shooting on the fly is a breeze.

Depending upon the switch configuration, the EPIC Command shooting panel can inventory the string at a rate of up to 5 switches per second, reducing risk in shooting-on-the-fly operations.



**EM-ASSP-0001**

## FEATURES

- Shot plot display on panel for real-time review; shot plot data stored for future review
- All switch interactions stored in an easily readable text file with simple USB download
- Auto-adjust telemetry requires no user intervention; successfully tested on over 35k' greaseless wireline
- CCL hosting capabilities for on-panel display, audible CCL alarm, and output to logging system
- LOG and AUX line routing to host non-ballistic services
- Check-fire capabilities

## BENEFITS

- Clean, intuitive, touch-screen user interface
- Drop-in replacement for existing panels
- Shot power controlled via button fire sequence
- Panel delivers only enough power to initiate the ignitor or detonator, then ends the shot to minimize abuse on wireline and collector rings
- No separate panel required for CCL hosting or check-fire functions

## SPECIFICATIONS

- Firing voltage up to 350V, software limited to 2A maximum
- Variable Correlation Voltage (Switch Mode vs. WRT Mode)
- Correlation current hardware limited to 125mA
- Safe Key termination per RP-67
- 2ru rackmount height
- Compatible with GEODynamics EPIC™ Switches and wireline release tools





## FUNCTIONAL OVERVIEW

|   |  |
|---|--|
| <b>ARM</b>                                | Used with the FIRE button to enable shooting power supply.   |
| <b>CCL GAIN &amp; VOLUME</b>              | Adjust CCL gain and signal volume when key is in CCL mode.   |
| <b>KEY POSITION<br/>(Operating Modes)</b> | <p><b>AUX</b> Signal feedthrough via the AUX jack on back. Typical connection to another wireline panel.</p> <p><b>LOG</b> Signal feedthrough via the LOG connection on back.</p> <p><b>SAFE</b> No power on the line; line is terminated per RP-67. Safe key is removable.</p> <p><b>CCL</b> Displays the virtual CCL meter. Signal is routed through the rear CCL port to CCL logging system.</p> <p><b>ARM</b> Enables inventory, arming, and shooting functions.</p> |
| <b>TOUCH SCREEN</b>                       | Input commands and view system/function responses.   |
| <b>USB</b>                                | Download job-specific data files or perform panel software update.   |
| <b>POWER SWITCH</b>                       | Controls both AC and DC power.   |
| <b>FIRE</b>                               | Used along with the ARM button to enable shooting power supply.  |



## REAR INPUTS and OUTPUTS

|                  |  |
|------------------|--|
| <b>AC INPUTS</b> | 120VAC input (5A, 3AG fused)   |
| <b>DC INPUTS</b> | 12V truck battery input (2A, 3AG fused)                              |
| <b>LIGHTS</b>    | 2A, 3AG fuse for safe light circuit                                  |
| <b>CCL</b>       | CCL output to logging system   |
| <b>LIGHTS</b>    | Standard output to truck safe lights                                 |
| <b>AUX</b>       | ¼" phone connection; LINE is routed here when key is in AUX position |
| <b>LOG</b>       | PL-259 connection; LINE is routed here when key is in LOG position   |
| <b>LINE</b>      | Wireline connection  |

GEODynamics' EPIC™ Test delivers an all-in-one testing, diagnostics, and configuration solution for perforating toolstrings equipped with EPIC™ Switch technologies. The test box acknowledges the presence of switches and detonators, facilitates pre-run validation and switch configuration, and reports any problems detected.

## FEATURES

- Allows switch configuration to operate as a Set/Fire or BRT switch
- Real-time indication of detonator/ignitor presence on surface
- All switch interactions stored in an easily readable text file with simple USB download
- Rugged and water-resistant for field operational environments
- Automatic sleep/shutdown after idle periods to minimize battery consumption
- Easy replacement of rechargeable battery for minimal downtime
- Magnet supplied for easy ground connection

## BENEFITS

- Clean, intuitive, touch-screen user interface
- Test traceability from the gun shop to the wellsite
- No offline downtime for battery charging
- Battery status indicator displayed on every screen

## SPECIFICATIONS

- Facilitates switch string interrogation and switch configuration
- Redundant current limit on interrogation supply
- RP-67 compliant; certified per Franklin Applied Physics
- Powered by a single rechargeable battery (spare battery included)
- Communicates with all GEODynamics EPIC™ Switches and wireline release tools



**EM-ASTB-0001-0000**

GEODynamics' EPIC™ Switches offer the industry's only digital switches capable of being field configurable to rapid firing mode, allowing them to function more like a pressure switch while preserving the safety and intelligence of an addressable system.

The EPIC™ Flying Leads five (5) wired switch facilitates compatibility with standard pass-through bulkheads and non-ported subs, offering unparalleled flexibility.

On surface, the EPIC™ Test box is used to inventory the perforating string. The inventory process is repeatable while running in hole as a verification of viable switches.

|                 | ADDRESSABLE FIRING MODE   | RAPID FIRING MODE (Field Configurable)  |
|-----------------|---|---|
| Capabilities    | <ul style="list-style-type: none"> <li>● Intrinsically safe</li> <li>● Shoot on the fly</li> <li>● Dual fire (switch types: normal or Set/Fire)</li> <li>● Viable switch count before each shot—checks connections to detonator, feed-through, and ground</li> <li>● Reassign address on surface without disassembly</li> <li>● Skip gun capability (skip a problematic gun and prevent non-productive time (NPT))</li> </ul> | <ul style="list-style-type: none"> <li>● Intrinsically safe</li> <li>● Shoot on the fly</li> <li>● Dual fire (switch types: normal or Set/Fire)</li> <li>● Viable switch count before each shot—checks connections to detonator, feed-through, and ground</li> <li>● No software requirement</li> <li>● Inventory and arm bottom-most circuit with one touch</li> </ul> |
| Inventory Rates | One (1) switch per second   | Five (5) switches per second  |



EL1-AL-1000  
EPIC™ FLYING LEADS

## COMMON FEATURES

|                     |   |
|---------------------|---|
| Performance         | Stable communications protocol capable on over 34,000ft (10,363m) of 0.288in (0.7315cm) greaseless line cable   |
| Set/Fire Efficiency | Plug set and fire first gun from a single switch (dual fire capability)   |
| Safety              | <ul style="list-style-type: none"> <li>● Independent Third Party Organization (ITPO) certified RF Safe, ESD Safe, and API RP-67 compliant</li> <li>● All wired connections, including detonator, safely tested with the EPIC™ Test box</li> </ul> |
| Quality             | Fully tested post-manufacturing; Quality Assured to ISO:9001:2015   |

## COMPATIBILITY

|                    |   |
|--------------------|---|
| Release Tools      | Compatible with GEODynamics Release™, Canatex® BRT, ICSI® BRT, and the Hunting® release tool. |
| Required Equipment | GEODynamics EPIC™ Command Shooting Panel  |

Canatex® is a registered trademark of Canatex Completions Solutions, Inc.  
 ICSI® is a registered trademark of Innovative Completion Systems, Inc.  
 Hunting® is a registered trademark of Hunting PLC

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### EPIC™ FLYING LEADS

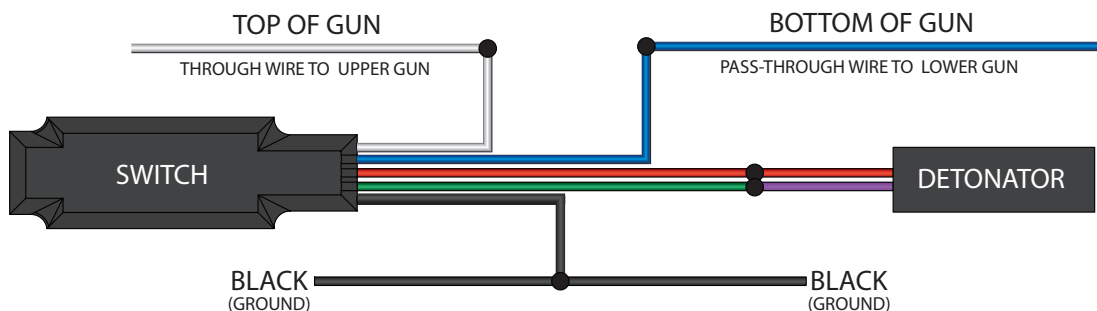
| Mechanical Specifications |                      |
|---------------------------|----------------------|
| 5-Wire Switch Dimensions  | 2-1/4" x 5/8" x 1/4" |

| Accessories   | Part Number |
|---|-------------|
| UY2 Scotchlok Connector<br><i>(recommended)</i>   | AP-M-26224  |
| UY Scotchlok Connector<br><i>(may be substituted for the above UY2, but use on switch wires only)</i> | AP-M-26214  |
| UR2 Scotchlok Connector<br><i>(three-gang for ground wires)</i>                                       | AP-M-26201  |

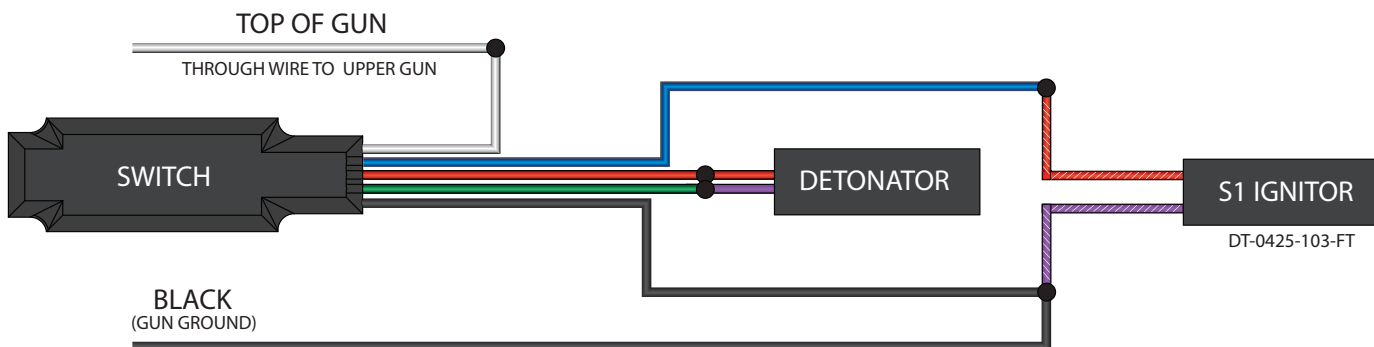
| Color | Function                           |
|-------|------------------------------------|
| WHITE | THROUGH WIRE TO UPPER GUN          |
| BLACK | GROUND WIRE (ALWAYS DOUBLE-GROUND) |
| BLUE  | PASS-THROUGH WIRE TO LOWER GUN     |
| RED   | DETONATOR WIRE                     |
| GREEN | DETONATOR WIRE                     |

| Electrical Specifications   |                    |
|-----------------------------|--------------------|
| Firing Voltage Polarity     | Negative           |
| Operating Voltage           | -20 VDC to -70 VDC |
| Dump Fire Voltage           | > -140 VDC         |
| Operating Temperature Range | -70°F to 350°F     |

### WIRING CONNECTIONS - GUN TO GUN



### WIRING CONNECTIONS - SET/FIRE CONFIGURATION WITH S1 IGNITOR



# Advanced E-Line Solutions

## Cableheads

Cableheads are used to create a mechanical and electrical connection between the wireline and tool string. The cablehead is also intended to be the weak link if the tool string become stuck within the wellbore. The wireline will pull out of the cablehead when the set force is applied.



## SPECIFICATIONS

|                    |   |
|--------------------|---|
| Temperature Rating | 500°F                                     |
| Pressure Rating    | 20,000 psi                                |
| Diameter Range     | 3/4" to 1-11/16"                          |
| Tool Length        | Varies                                    |
| Type               | "GO" Brass Cone and Washer and Clamp Ring |
| Fishnecks          | 1" O.D and 1-3/8" O.D.                    |
| Connections        | Gearhart "GO"                             |

## CABLEHEADS

| O.D.    | Part Number       | Description                          |
|---------|-------------------|--------------------------------------|
| 5/8"    | AEL-CHD0001-5/16" | Cablehead, 5/8in (5/16in Line)       |
| 11/16"  | AEL-CHD1001-5/16" | Cablehead, 11/16in (5/16in Line)     |
| 3/4"    | AEL-CHD2001-7/32" | Cablehead, 3/4, (7/32 Line)          |
|         | AEL-CHD2001-9/32" | Cablehead, 3/4, (9/32 Line)          |
| 1"      | AEL-CHD3001-5/16" | Cablehead 1in X 5/16in               |
|         | AEL-CHD3001-7/32" | Cablehead, 1in (7/32in Line)         |
|         | AEL-CHD3001-9/32" | Cablehead, 1in (9/32in Line)         |
| 1-3/8"  | AEL-CHD4001-3/8"  | Cablehead, 1-3/8in                   |
|         | AEL-CHD4001-9/32" | Cablehead, 1-3/8in, GO (9/32in Line) |
| 1-7/16" | AEL-CHD5001-1/4"  | Cablehead 1-7/16in, GO (1/4in Line)  |
|         | AEL-CHD5001-3/8"  | Cablehead 1-7/16in GO Style x 3/8in  |
|         | AEL-CHD5001-5/16" | Cablehead 1-7/16in GO Style x 5/16in |
|         | AEL-CHD5001-7/32" | Cablehead 1-7/16in GO Style x 7/32in |
|         | AEL-CHD5001-9/32" | Cablehead 1-7/16in GO Style x 9/32in |

Please contact your sales representative for redress kits and pricing.



# Advanced E-Line Solutions

## Collar Locators (CCL)

Collar locators are based on the principle that changing magnetic flux within the instruments sensor coil generates voltage across the terminals of that sensor coil. A collar or joint in the tubing changes the magnetic flux field including the flux passing through the sensor coil ends adjacent to the magnets, causing a signal to be generated at surface.



### SPECIFICATIONS

|                    |   |
|--------------------|---|
| Temperature Rating | 500°F   |
| Pressure Rating    | 20,000 psi  |
| Diameter Range     | 5/8" to 3-1/8"                                    |
| Tool Length        | Varies  |
| Type               | Grounded (Shooting) and Non-Grounded (Free Point) |
| Connections        | Gearhart "GO"                                     |

### COLLAR LOCATORS (CCL)

| O.D.     | Part Number  | Description                                    |
|----------|--------------|--|
| 5/8"     | AEL-CCL0001  | CCL, 5/8in                                     |
| 11/16"   | AEL-CCL1001  | CCL, 11/16in (Non-Grounded)                    |
| 3/4"     | AEL-CCL2001  | CCL, 3/4in                                     |
| 1"       | AEL-CCL3001  | CCL, 1in, GO Style                             |
|          | AEL-CCL3002  | CCL, 1in, Non-Grounded                         |
| 1-3/8"   | AEL-CCL4001  | CCL, 1-3/8in, Grounded                         |
|          | AEL-CCL4002  | CCL, 1-3/8in, Non-Grounded                     |
| 1-7/16"  | AEL-CCL5001  | CCL, 1-7/16in, GO Style                        |
| 1-11/16" | AEL-CCL6002  | CCL, 1-11/16in, GO Style                       |
|          | AEL-CCL6003  | CCL, 1-11/16in, Grounded                       |
| 1-5/8"   | AEL-CCL6006  | CCL, 1-5/8in, (Non-Grounded)                   |
| 2-1/8"   | AEL-CCL-7002 | CCL, 2-1/8", (Grounded)                        |
| 2-3/4"   | AEL-CCL8001  | CCL, 2-3/4" (Grounded)                         |
| 3-1/4"   | AEL-CCL9001  | CCL, 3-1/4in, GO Style (GO Box Top-QC Box Btm) |
| 3-1/8"   | AEL-CCL9002  | CCL, 3-1/8in, GO Style (GO Box Top-QC Box Btm) |
|          | AEL-CCL9004  | CCL, 3-1/8in, with Fishneck (Grounded)         |
|          | AEL-CCL9006  | CCL, 3-1/8in, with Baker Fishneck              |

Please contact your sales representative for redress kits and pricing.





# Advanced E-Line Solutions

## Sinker Bars

Sinker bars, sometimes referred to as “weight bars”, are designed to run above your tool string to overcome forces created by well pressure within the wellbore. Sinker bars are available in various diameters and lengths and are supplied with industry-standard box/pin connections.

## SPECIFICATIONS

|                    |  |
|--------------------|--|
| Temperature Rating | 500°F  |
| Pressure Rating    | 20,000 psi                                       |
| Diameter Range     | 5/8" to 2-3/4"                                   |
| Tool Length        | 3', 5', and 7'                                   |
| Type               | Steel, Lead, and Tungsten                        |
| Connections        | Gearhart “GO”, Sucker Rod, and Quick Change “GO” |

## SINKER BARS

| O.D.     | Part Number  | Description   |
|----------|--------------|---|
| 5/8"     | AEL-SBS0002  | Sinker Bar, Steel 5/8in x 3'  |
| 3/4"     | AEL-SBS2001  | Sinker Bar, Steel 3/4in x 5'  |
| 1"       | AEL-SBS3001  | Sinker Bar, Steel 1in x 5'  |
|          | AEL-SBS-3003 | Sinker Bar Steel 1in x 3'   |
|          | AEL-SBS3002  | Sinker Bar Steel, 1in x 7'  |
|          | AEL-SBT3001  | Sinker Bar, Tungsten, 1in x 5'  |
| 1-3/8"   | AEL-SBS4002  | Sinker Bar, 1-3/8in x 7'  |
| 1-7/16"  | AEL-SBL5001  | Sinker Bar, Lead 1-7/16in x 5'  |
|          | AEL-SBL5002  | Sinker Bar, Lead 1-7/16in x 7'  |
|          | AEL-SBS5001  | Sinker Bar, Steel 1-7/16in x 5'   |
|          | AEL-SBS5002  | Sinker Bar, Steel 1-7/16in x 7'   |
|          | AEL-SBT5002  | Sinker Bar, Tungsten, 1-7/16in x 7'                                     |
| 1-1/2"   | AEL-SBS5003  | Sinker Bar, Steel 1-1/2in x 5' with 5/8in Sucker Rod                    |
| 1-11/16" | AEL-SBL6001  | Sinker Bar, Lead 1-11/16in x 5'   |
|          | AEL-SBL6002  | Sinker Bar, Lead 1-11/16in x 7'   |
|          | AEL-SBS6001  | Sinker Bar, Steel 1-11/16in x 5'  |
|          | AEL-SBS6002  | Sinker Bar, Steel 1-11/16in x 7'  |
|          | AEL-SBT6002  | Sinker Bar, Tungsten, 1-11/16in x 7'                                    |
| 2"       | AEL-SBL9001  | Sinker Bar, Lead 2in x 5'   |
|          | AEL-SBL9002  | Sinker Bar, Lead 2in x 7'   |
| 2-3/4"   | AEL-SBS9003  | Sinker Bar, Steel, 2-3/4in x 7', OTL                                    |
|          | AEL-SBT9004  | Sinker Bar, Tungsten, 2-3/4in x 7' (Over the line FN THDS), Wt. 280 Lbs |



Please contact your sales representative for additional sizes and connections.

# Advanced E-Line Solutions

## Adaptors

Adaptors are used for various applications in the field. The most common applications are to:

- Adapt to different types and sizes of connections.
- Connect perforating tools to the rest of the tool string.

## SPECIFICATIONS

|                    |  |
|--------------------|--|
| Temperature Rating | 500°F  |
| Pressure Rating    | 20,000 psi   |
| Diameter Range     | 5/8" to 3-1/8"   |
| Tool Length        | Varies   |
| Type               | Crossover Subs, Teardrops, Firing Heads, Quick Changes               |
| Connections        | Gearhart "GO", Schlumberger, Baker Sucker Rod, and Quick Change "GO" |

## ADAPTORS

| Part Number    | Description                                 |
|----------------|---|
| AEL-ADA-150005 | Insulator, Button                           |
| AEL-ADA-312001 | Quick Change Bell                           |
| AEL-ADA-325003 | Detonator Block for GO Style Quick Change   |
| AEL-ADA-325014 | 3-1/4in CCL Top Sub for 2in Fishing Neck    |
| AEL-ADA-325015 | Bull Plug (for QC Box)                      |
| AEL-ADA0001    | Tear Drop 5/8in OD                          |
| AEL-ADA0002    | Shot Rod Hanger                             |
| AEL-ADA0003    | Shot Rod Bull Plug, 5/8in                   |
| AEL-ADA0007    | 5/8in Pin x 1in GO Box                      |
| AEL-ADA0010    | 5/8in Double Pin                            |
| AEL-ADA10001   | Baker #20 QC/Baker IGN                      |
| AEL-ADA10002   | Baker #10 / GO Quick Change                 |
| AEL-ADA10003   | Baker #10 / GO Quick Change (Halb. Ign.)    |
| AEL-ADA10004   | Baker #20 / GO Quick Change                 |
| AEL-ADA10005   | Baker #20 / GO Quick Change (Halb. Ign.)    |
| AEL-ADA10006   | Baker #20 / GO Quick Change (with contacts) |
| AEL-ADA10007   | Baker #10 / GO Quick Change (with contacts) |
| AEL-ADA2002    | Tear Drop, 3/4in                            |
| AEL-ADA2003    | 3/4in Shot Rod Hanger                       |
| AEL-ADA2004    | 3/4in Double GO Box                         |
| AEL-ADA2013    | Shot Rod Bull Plug, 3/4in                   |
| AEL-ADA3001    | 1in GO Tear Drop                            |



Please contact your sales representative for redress kits and pricing.

### ADAPTORS, cont.

| Part Number    | Description                                      |
|----------------|--|
| AEL-ADA3002    | Shot Rod Hanger, 1in                             |
| AEL-ADA3003    | 1in Double GO Pin                                |
| AEL-ADA3004    | FPT Bull Plug, 1in                               |
| AEL-ADA3005    | Button Sub, 1in                                  |
| AEL-ADA3006    | 1in Double GO Box                                |
| AEL-ADA3011    | Shot Rod Bull Plug, 1in                          |
| AEL-ADA3016    | Box, 1in / Pin, 3/4in                            |
| AEL-ADA3017    | Pin, 1in / Pin, 3/4in                            |
| AEL-ADA3021    | Shot Rod Assembly, 1in x 5'                      |
| AEL-ADA3024    | Double Sealed Tear Drop, 1in                     |
| AEL-ADA4001    | Tear Drop x GO Pin, 1-3/8in                      |
| AEL-ADA4002    | Shot Rod Hanger 1-3/8in                          |
| AEL-ADA4003S   | Double Pin, 1-3/8in                              |
| AEL-ADA4005    | Bull Plug Box, 1-3/8in                           |
| AEL-ADA4006    | Bull Plug Pin, 1-3/8in                           |
| AEL-ADA4007    | 1-3/8in Schlumberger Box GO Pin                  |
| AEL-ADA4011    | Freepoint Bull Plug, 1-3/8in                     |
| AEL-ADA4015    | SR Pin, 5/8in X GO Box, 1-3/8in                  |
| AEL-ADA4016    | SR Box 5/8in X GO Pin, 1-3/8in                   |
| AEL-ADA4037    | Shot Rod Assembly Complete                       |
| AEL-ADA4038    | Sucker Rod Box 3/4in - GO Pin, 1-3/8in           |
| AEL-ADA4039    | SR Pin, 3/4in / GO Box, 1-3/8in                  |
| AEL-ADA4041    | Shot Rod Bull Plug, 1-3/8in                      |
| AEL-ADA4042    | GO Box, 1-3/8in x GO Pin, 1in                    |
| AEL-ADA4043    | GO Box, 1in x GO Pin, 1-3/8in                    |
| AEL-ADA5001    | GO Box 1in / 1-7/16in GO Pin                     |
| AEL-ADA5002    | GO Pin 1in / 1-7/16in GO Box                     |
| AEL-ADA5003    | Tear Drop / GO Pin 1-7/16in, Long                |
| AEL-ADA5003S   | Tear Drop / GO Pin 1-7/16in, Short               |
| AEL-ADA5004-HV | Tear Drop / GO Pin 1-7/16in High Voltage Contact |
| AEL-ADA5005    | Double GO Pin 1-7/16in                           |
| AEL-ADA5005S   | Double GO Pin 1-7/16in Short                     |
| AEL-ADA5006    | Double GO Box 1-7/16in                           |

| Part Number    | Description  |
|----------------|--|
| AEL-ADA5007    | Sealed Tear Drop / GO Pin 1-7/16in                       |
| AEL-ADA5007S   | Double Sealed Tear Drop / GO Pin 1-7/16in (short)        |
| AEL-ADA5008    | GO Box / Tear Drop Pin 1-7/16in                          |
| AEL-ADA5009    | GO Pin / Sealed Tear Drop 1-7/16in                       |
| AEL-ADA5010    | Double GO Pin 1-7/16in (with phasing ring)               |
| AEL-ADA5011    | GO Tear Drop Sub 1-7/16in (with phasing ring)            |
| AEL-ADA5012    | GO Sealed Tear Drop / GO Box 1-7/16in                    |
| AEL-ADA6001    | Schlumberger Box 1-11/16in / GO Pin                      |
| AEL-ADA6002    | 1-11/16" Double Sealed Tear Drop, Go Pin                 |
| AEL-ADA6003    | Schlumberger Pin 1-11/16in / GO Pin                      |
| AEL-ADA6006S   | Teardrop Pin / GO Pin, 1-11/16in                         |
| AEL-ADA6007    | RTG Tandem 1-9/16in                                      |
| AEL-ADA6008    | RTG Top Sub 1-9/16in                                     |
| AEL-ADA6009    | RTG Blast Sub 1-9/16in                                   |
| AEL-ADA6010    | RTG Bull Plug 1-9/16in                                   |
| AEL-ADA6011    | RTG Lower Decentralizer Adapter 1-9/16in                 |
| AEL-ADA6013    | GO Box Double, 1-11/16in                                 |
| AEL-ADA6015    | GO Pin Double, 1-11/16in                                 |
| AEL-ADA6024    | Shot Rod Assembly, 1-5/8in x 5'                          |
| AEL-ADA6030    | Shot Rod Hanger, 1-5/8in                                 |
| AEL-ADA6100    | Tag Shooting Sub, 1-11/16in                              |
| AEL-ADA7004    | QC Pin GO 3-1/4in, GO Pin 1-7/16in                       |
| AEL-ADA7010    | QC Box / GO Box, 2-1/2in                                 |
| AEL-ADA8001    | Button Firing Sub 1-1/2in                                |
| AEL-ADA8004    | Button Firing Sub 1-1/2in (high pressure)                |
| AEL-ADA9001    | Quick Change GO Style 3-1/4in OD Less Det Blk            |
| AEL-ADA9001-DB | Quick Change GO Style 3-1/4in or 3-1/8in OD With Det Blk |
| AEL-ADA9004    | Quick Change GO Style 3-1/8in OD Less Det Blk            |
| AEL-ADA9004-DB | Quick Change GO, 3-1/8in (with detonator block)          |
| AEL-ADA9007    | Top Sub, 2-3/4in (Over the line, 2/3/8in FN)             |
| AEL-ADA9007-2  | Top Sub, 2-3/4in (Over the line, 2in FN)                 |
| AEL-ADA9008    | 2in Fishing Neck for 3-1/8in or 3-1/4in CCL              |
| AEL-ADA9009    | Fish Neck Pin/Box, 2-3/4in                               |

# Advanced E-Line Solutions

## Centralizers and De-Centralizers



Centralizers are used within the tool string to keep the tools centralized within the tubing. They are manufactured with either bow springs or roller arms. Centralizers with roller arms are used in deviated wells to help guide the tool string down hole without any hang-ups.

De-centralizers are used within the tool string to keep the tools de-centralized against casing wall. They usually run in conjunction with perforating guns (orient the guns to a specific side of the casing) or with neutron logging (to keep the radioactive source against the casing wall).

### SPECIFICATIONS

|                    | CENTRALIZERS                        | DE-CENTRALIZERS                            |
|--------------------|-------------------------------------|--|
| Temperature Rating | 500°F                               | 500°F                                      |
| Pressure Rating    | 20,000 psi                          | 20,000 psi                                 |
| Diameter Range     | 1-7/16" to 2-3/4"                   | 1-3/8" to 2"                               |
| I.D. Range         | 1-5/8" to 22"                       | N/A  |
| Tool Length        | Varies                              | Varies                                     |
| Type               | Bowspring and Roller Arm            | Channel or Button Magnets                  |
| Connections        | Gearhart "GO" and Quick Change "GO" | Gearhart "GO" and RTG (bolt-together type) |

### CENTRALIZERS

| Part Number   | Description                                   |
|---------------|---|
| AEL-CEN5002-6 | 1 7/16in Centralizer, 3 Blades w/ 6in Springs |
| AEL-CEN6001-6 | 1-11/16in Centralizer, 6in Springs            |
| AEL-CEN9001   | 2-3/4" Centralizer (Spring Type)              |

### DE-CENTRALIZERS

| Part Number | Description   |
|-------------|---|
| AEL-DEC4001 | Decentralizer 1-3/8in GO Pin Phase RNG (Channel Magnet)   |
| AEL-DEC6001 | Decentralizer 1-11/16in GO Pin Phase RNG (Channel Magnet) |
| AEL-DEC6002 | Decentralizer 1-9/16in RTG (Channel Magnet)               |
| AEL-DEC6003 | Decentralizer 1-11/16in RTG (Channel Magnet)              |
| AEL-DEC6004 | Decentralizer 1-9/16in GO (Channel Magnet)                |
| AEL-DEC9001 | Decentralizer 2-1/8in GO (Channel Magnet)                 |
| AEL-DEC9002 | Decentralizer 2in RTG (Channel Magnet)                    |

Please contact your sales representative for redress kits and pricing.



Revised: August 31, 2023 9:46 PM

# Advanced E-Line Solutions

## Freepoint Tools

Freepoint tools are designed to measure torque and stretch in tubing, casings, and drill pipes to provide accurate free pipe indication. The Advanced Freepoint tool works in conjunction with the Warrior Logging System. The freepoint tool string consists of the following:

- Slack Joint (16", 24", or 36" stroke)
- Top Anchor (Magnet or Bowstring) Sensor
- Bottom Anchor (Magnet or Bowstring)



## SPECIFICATIONS

|                    |  |
|--------------------|--|
| Temperature Rating | 500°F  |
| Pressure Rating    | 20,000 psi                                   |
| Diameter Range     | 1" to 1-3/8" O.D.                            |
| Tool Length        | Varies                                       |
| Anchor Type        | Magnets or Bowspring                         |
| Sensor Type        | Piston or Boot                               |
| Slack Joint Stroke | 6" (24" and 36" available on 1-3/8" OD tool) |
| Connections        | Gearhart "GO"                                |

## FREEPOINT TOOLS

| Part Number | Description                     | Part Number | Description                     |
|-------------|---------------------------------|-------------|---------------------------------|
| AEL-FBS1001 | FPT Upper Bowspring, 11/16in    | AEL-FMG6003 | FPT Lower Magnet, 1-5/8in       |
| AEL-FBS1002 | FPT Lower Bowspring, 11/16in    | AEL-FPT1000 | 11/16in Freepoint Tool Complete |
| AEL-FBS3001 | FPT Bowspring, 1in              | AEL-FPT3000 | 1in Freepoint Tool Complete     |
| AEL-FMG1001 | Magnet, Upper Section 11/16in   | AEL-FPT3001 | Freepoint Tool, 1in W/Magnets   |
| AEL-FMG1002 | Magnet, Spacer Section, 11/16in | AEL-FPT4000 | 1-3/8in Freepoint Tool Complete |
| AEL-FMG1003 | Magnet, Lower Section, 11/16in  | AEL-FPT6000 | 1-5/8in Freepoint Tool Complete |
| AEL-FMG3001 | Magnet, Upper Section, 1in      | AEL-FSJ1001 | FPT Slack Joint, 11/16in        |
| AEL-FMG3002 | Magnet, Spacer Section 1in      | AEL-FSJ3001 | Slack Joint, 1in                |
| AEL-FMG3003 | Magnet, Lower Section 1in       | AEL-FSJ4001 | Slackjoint, 1-3/8in x 16in      |
| AEL-FMG4001 | Magnet FPT Upper 1-3/8in        | AEL-FSJ6001 | Slack Joint, 1-5/8in x 16in     |
| AEL-FMG4002 | Magnet, FPT Spacer, 1-3/8in     | AEL-FSN1001 | FPT Sensor, 11/16in             |
| AEL-FMG4003 | Magnet FPT Lower 1-3/8in        | AEL-FSN3001 | FPT Sensor, 1in                 |
| AEL-FMG6001 | FPT Upper Magnet, 1-5/8in       | AEL-FSN6001 | FPT Sensor, 1-5/8in             |
| AEL-FMG6002 | FPT Magnet Spacer, 1-5/8in      |             |                                 |

Please contact your sales representative for redress kits and pricing.



# Part Number Descriptions

## Loaded Gun Systems, STRATX®



### Examples: STRATX Loaded Gun Part Numbers and Descriptions

|                           |  |
|---------------------------|--|
| LGIC31A06-06I2321-EX-AXN  | STRATX® Loaded, 3.13" x 19.5", 06 Shots, 60° (6 spf), DET-80R111, EC2-33A2321-E, 06 Loaded, 0 Blank, D-Tandem-T076A, No Switch, Nitrile-OR |
| LGIC33HF06-03I0771-30-AXV | STRATX® Loaded, 3.38" x 9.5", 06 Shots, 120/60° (HF), DET-80R111, EC2-33K0771-30, 03 Loaded, 3 Blank, D-Tandem-T076A, No Switch, Viton-OR  |

| Gun Assembly |            | Gun Series | Carrier OD | Phasing | # Shots | — | # Loaded Shots | Detonating Cord | Charge P/N<br><i>(w/out EC2-33X prefix)</i> | — | Charge P/N<br><i>(suffix)</i> | — | Sub | Switch | O-Ring Material |
|--------------|------------|------------|------------|---------|---------|---|----------------|-----------------|---|---|-------------------------------|---|-----|--------|-----------------|
| LG           | Loaded Gun | XX         | NN         | XX      | NN      | — | NN             | X               | NNNN  | — | XX thru XXXXX                 | — | X   | X      | X               |

| Gun Series |     |         |
|------------|-----|---------|
| IC         | GIC | STRATX® |

| Carrier OD              |
|-------------------------|
| Two-Digit OD (e.g., 31) |

| Phasing |             |
|---------|-------------|
| A       | 60°         |
| B       | 90°         |
| C       | 135°-45°    |
| D       | 140°-20°    |
| G       | 120°        |
| J       | 180°        |
| O       | 0°          |
| P       | 72°         |
| V       | 51.4°       |
| R       | Rotated     |
| HF      | 120°/60°    |
| SA      | 45° T, 60°  |
| SB      | 45° T, 90°  |
| SC      | 45° T, 135° |
| SD      | 45° T, 140° |
| SG      | 45° T, 120° |
| SJ      | 45° T, 180° |
| SO      | 45° T, 0°   |
| SP      | 45° T, 72°  |
| A0      | 60°         |
| O0      | 0°          |
| J0      | 180°        |
| G0      | 120°        |
| B0      | 90°         |
| R0      | Rotated     |
| P0      | 51.4°       |

| # Shots   |
|---|
| Total shots available in the carrier (e.g., 06, 12) |

| #Loaded Shots   |
|---|
| Actual number of loaded shots (e.g., carrier holds 06, but 05 loaded per order) |

| Detonating Cord |                  |
|-----------------|------------------|
| F               | DET-80H212 (HMX) |
| I               | DET-80R111 (RDX) |

| Charge P/N  |
|---|
| The 4-digit charge part number followed by -XX or a 2- to 5-character suffix; e.g., EC2-33A1371 = <b>1371-XX</b><br>EC2-33A2371-BF45 = <b>2371-BF45</b> |

| Sub |                            |
|-----|----------------------------|
| X   | No Sub                     |
| A   | STRATX® T076-A             |
| C   | Disposable XVR T172A       |
| E   | STRATX® T279-A (Orienting) |

| Switch |  |
|--------|--|
| X      | No Switch (EPIC Module Shipped Separately) |
| D      | STRATX® PIC Module (A140 Detonator)        |

| O-Ring Material |                     |
|-----------------|---------------------|
| X               | No O-Rings (No Sub) |
| N               | Nitrile             |
| V               | Viton               |



# Part Number Descriptions

## Loaded Gun Systems, HELLFire®, GLB Short Guns

### Examples: Loaded Gun Part Numbers and Descriptions

LGHF33HF06-0310771-XX-XXX

HELLFire® Loaded, 3.38" x 9.5", 06 Shots, 120/60° (HF), DET-80R111, EC2-33K0771, 03 Loaded, 3 Blank, No Sub, No Switch, No O-Rings

| Gun Assembly |            | Gun Series | Carrier OD | Phasing | # Shots | — | # Loaded Shots | Detonating Cord | Charge P/N<br>(w/out EC2-33X prefix) | — | Charge P/N<br>(suffix) | — | Sub | Switch | O-Ring Material |
|--------------|------------|------------|------------|---------|---------|---|----------------|-----------------|--------------------------------------|---|------------------------|---|-----|--------|-----------------|
| LG           | Loaded Gun | XX         | NN         | XX      | NN      | — | NN             | X               | NNNN                                 | — | XX thru XXXXX          | — | X   | X      | X               |

| Gun Series |     |            |
|------------|-----|------------|
| LB         | GLB | Short Guns |
| HF         | HF  | HELLFire®  |

| Carrier OD              |
|-------------------------|
| Two-Digit OD (e.g., 31) |

| Phasing |             | # Shots   |
|---------|-------------|---|
| A       | 60°         | Total shots available in the carrier (e.g., 06, 12)                             |
| B       | 90°         |   |
| C       | 135°-45°    | #Loaded Shots   |
| D       | 140°-20°    |   |
| G       | 120°        | Actual number of loaded shots (e.g., carrier holds 06, but 05 loaded per order) |
| J       | 180°        |   |
| O       | 0°          |   |
| P       | 72°         |   |
| V       | 51.4°       |   |
| R       | Rotated     |   |
| HF      | 120°/60°    |   |
| SA      | 45° T, 60°  |   |
| SB      | 45° T, 90°  |   |
| SC      | 45° T, 135° |   |
| SD      | 45° T, 140° |   |
| SG      | 45° T, 120° |   |
| SJ      | 45° T, 180° |   |
| SO      | 45° T, 0°   |   |
| SP      | 45° T, 72°  |   |
| A0      | 60°         |   |
| O0      | 0°          |   |
| J0      | 180°        |   |
| G0      | 120°        |   |
| B0      | 90°         |   |
| R0      | Rotated     |   |
| P0      | 51.4°       |   |

| Detonating Cord |                  |
|-----------------|------------------|
| X               | No Detcord       |
| F               | DET-80H212 (HMX) |
| I               | DET-80R111 (RDX) |

| Charge P/N  |
|---|
| The 4-digit charge part number followed by -XX or a 2- to 5-character suffix; e.g., EC2-33A1371 = <b>1371-XX</b><br>EC2-33A2371-BF45 = <b>2371-BF45</b> |

| Sub |                      |
|-----|----------------------|
| X   | No Sub               |
| C   | Disposable XVR T172A |

| Switch |                       |
|--------|-----------------------|
| X      | No Switch             |
| A      | EPIC™ Flying Leads    |
| B      | EPIC™ Switch in a Can |

| O-Ring Material |                     |
|-----------------|---------------------|
| X               | No O-Rings (No Sub) |
| N               | Nitrile             |
| V               | Viton               |

# Part Number Descriptions

## Scalloped Gun Systems, Conventional Long Guns

Examples: Conventional Long Gun Part Numbers and Descriptions

|                   |   |
|-------------------|---|
| GA3106-6033A-A084 | Carrier Assembly, 3.13" x 15', 84 Shots, 60° (6 spf)                |
| GA3106-6033A-A120 | Carrier Assembly, 3.13" x 21', 120 Shots, 60° (6 spf)               |
| GA4612-4054A-C253 | Carrier Assembly, 4.63" x 22', 253 Shots, 135/45°, Phased, (12 spf) |

| Gun Assembly Type |                         | Carrier OD | SPF / SPM | — | Coded Load Tube Size | Charge Family P/N Code | — | Phasing | Total # of Shots |
|-------------------|-------------------------|------------|-----------|---|----------------------|------------------------|---|---------|------------------|
| GA                | Gun Assembly - Standard | NN         | NN        | — | NN                   | NNX                    | — | X       | NNN              |
| GM                | Gun Assembly - Metric   |            |           |   |                      |                        |   |         |                  |

| Carrier OD |      |
|------------|------|
| Size       | Code |
| 1-9/16"    | 16   |
| 1-3/4"     | 175  |
| 2"         | 20   |
| 2-3/8"     | 23   |
| 2-1/2"     | 25   |
| 2-3/4"     | 27   |
| 2-7/8"     | 28   |
| 3-1/8"     | 31   |
| 3-3/8"     | 33   |
| 4"         | 40   |
| 4-1/2"     | 45   |
| 4-5/8"     | 46   |
| 4-3/4"     | 47   |
| 5"         | 50   |
| 5-1/8"     | 51   |
| 6-3/4"     | 67   |
| 7"         | 70   |

| Charge Family |                         |
|---------------|-------------------------|
| Size          | Code                    |
| 1-9/16"       | 15A                     |
| 1-3/4"        | 17A                     |
| 2"            | 20A                     |
| 2-3/8"        | 23A                     |
| 2-1/2"        | 25A                     |
| 2-3/4"        | 27A                     |
| 2-7/8"        | 28A                     |
| 3-1/8"        | 31B, 33A                |
| 3-3/8"        | 33A, 33B                |
| 4"            | 40A                     |
| 4-1/2"        | 45A                     |
| 4-5/8"        | 46A, 46B                |
| 4-3/4"        | 48K                     |
| 5"            | 51A, 51B                |
| 5-1/8"        | 51A, 51B                |
| 6-3/4"        | 68K                     |
| 7"            | 70A, 70B, 70C, 70D, 70K |

| Phasing |   |
|---------|---|
| Code    | Phase                                   |
| A       | 60°                                     |
| B       | 90°                                     |
| C       | 135° - 45°                              |
| D       | 140° - 20°                              |
| G       | 120°                                    |
| J       | 180°                                    |
| O       | 0°                                      |
| P       | 72°                                     |
| R       | 90° + 45°<br>60° + 30°<br>51.4° + 25.7° |

# Part Number Descriptions

## Shaped Charges

Examples: Shaped Charge Part Numbers and Descriptions

|                |   |
|----------------|---|
| EC2-33A2341    | 33A Charge Case (carrier OD 3.13/3.38", or larger carrier with 33A load tube), 23 grams, RDX            |
| EC2-33A2322    | 33A Charge Case (carrier OD 3.13/3.38", or larger carrier with 33A load tube), 23 grams, HMX            |
| EC2-40A3922-RC | 40A Charge Case (carrier OD 4.0", or larger carrier with 40A load tube), 39 grams, HMX, Reactive Charge |

| Explosive Charge | Gun Type |                        | — | Carrier OD | Case Type | Explosive Weight | Charge Type | Explosive Type | — | Suffix        |
|------------------|----------|------------------------|---|------------|-----------|------------------|-------------|----------------|---|---------------|
|                  | Code     | Description            |   |            |           |                  |             |                |   |               |
| EC               | 1        | Retrievable Tubing Gun | — | NN         | X         | NN (g)           | N           | N              | — | XX thru XXXXX |
|                  | 2        | Retrievable Casing Gun |   |            |           |                  |             |                |   |               |

| Carrier OD |        |
|------------|--------|
| Size       | Code   |
| 1-9/16"    | 15     |
| 1-3/4"     | 17     |
| 2"         | 20     |
| 2-3/8"     | 23     |
| 2-1/2"     | 25     |
| 2-3/4"     | 27     |
| 2-7/8"     | 28     |
| 3-1/8"     | 31, 33 |
| 3-3/8"     | 33     |
| 4"         | 40     |
| 4-1/2"     | 45     |
| 4-5/8"     | 46     |
| 4-3/4"     | 48     |
| 5"         | 51     |
| 5-1/8"     | 51     |
| 6-3/4"     | 68     |
| 7"         | 70     |

| Case Type  |
|--|
| Represents charge case properties, such as material, case size, case shape, or shot arrangement (in the gun carrier). Used internally. |

| Charge Type  |
|--|
| Represents the type of charge. Some examples are: DP, XDP, BH, SBH, GH, and Equal Hole size charges. |

| Explosive Type |     |
|----------------|-----|
|                |     |
| 1              | RDX |
| 2              | HMX |
| 3              | HNS |

| Charge P/N Suffix   |
|---|
| Extra characters, e.g., EC2-33A2371-BF45 is (Basix Frac, 0.45" entry hole). See list below. |

| Charge P/N Suffixes |                         |
|---------------------|-------------------------|
| -BF                 | Basix™ Frac             |
| -C                  | IsoLoc™ Charges         |
| -D                  | Refrax™ Dual Casing     |
| -E                  | Economy                 |
| -EG                 | Economy Grooved         |
| -FRX                | FracIQ® Connex®         |
| -G                  | Grooved Case            |
| -LD                 | Low Debris              |
| -L, -LS             | Low Swell               |
| -R                  | Refrax™ Dual Casing     |
| -RC                 | Connex® Reactive Charge |
| -RX                 | Reactive Charge         |
| -SB                 | SandIQ®                 |
| -SC                 | SandIQ®                 |
| -SD                 | SandIQ®                 |
| -SE                 | SandIQ®                 |
| -SF                 | SandIQ®                 |
| -SG                 | SandIQ®                 |

See Nomenclature for more details

# Nomenclature

## Abbreviations, Acronyms, and Terms

### A - B - C

|     |                              |
|-----|------------------------------|
| API | American Petroleum Institute |
| BH  | Big Hole                     |
| BRT | Ballistic Release Tool       |
| CCL | Casing Collar Locator        |

### D - E - F

|              |  |
|--------------|--|
| DP           | Deep Penetrating                       |
| DUB          | Dynamic Underbalance                   |
| EH           | Entry Hole                             |
| EHD          | Entry Hole Diameter                    |
| EUE          | External Upset End (tubing connection) |
| FLUID        | Fluid Only                             |
| FLUID or DRY | Fluid or Dry Gas                       |

### G - H - I

|      |   |
|------|---|
| GH   | Good Hole                                 |
| HD   | Heavy Duty                                |
| HF   | HELLFire®                                 |
| HMx  | Cyclotetramethylene Trinitramine          |
| HNS  | Hexanitrosilbene                          |
| HP   | High Pressure                             |
| HPHF | High Pressure, High Flow                  |
| ID   | Internal Diameter                         |
| ISO  | Internal Organization for Standardization |
| ITPO | Independent Third-Party Organization      |

### J - K - L

|     |                                     |
|-----|-------------------------------------|
| LEH | Limited Entry Hole                  |
| LH  | Left Hand (e.g., left-hand threads) |

### M - N - O

|     |                     |
|-----|---------------------|
| NPT | Non-Productive Time |
| OD  | Outer Diameter      |

### P - Q - R

|         |                                       |
|---------|---------------------------------------|
| PSA     | Plug/Shoot Adapter                    |
| QC      | Quick Change                          |
| RDX     | Cyclotrimethylene Trinitramine        |
| RF Safe | Radio Frequency Safe                  |
| RH      | Right Hand (e.g., right-hand threads) |
| RTG     | Retrievable Tubing Gun                |

### S

|     |                    |
|-----|--------------------|
| SBH | Super Big Hole     |
| SPF | Shots Per Foot     |
| SPM | Shots Per Meter    |
| SQC | Short Quick Change |
| STD | Standard           |

### T - U

|     |                             |
|-----|-----------------------------|
| TCP | Tubing-Conveyed Perforating |
| THD | Thread                      |

### V - W - X

|     |                          |
|-----|--------------------------|
| WL  | Wireline                 |
| WRT | Wireline Release Tool    |
| XLS | Extra Low Swell          |
| XDP | Extreme Deep Perforating |

### Y - Z

|     |                        |
|-----|------------------------|
| ZTC | Zero Tension Connector |
|-----|------------------------|

### SHAPED CHARGE ABBREVIATIONS & PART NUMBER SUFFIXES

|                              |  |
|------------------------------|--|
| -45                          | All two-digit numerical suffixes represent the entry hole diameter (EHD), e.g., BF45 is Basix Frac with 0.45" EHD. |
| -B                           | IsoLoc™ Charge   |
| -BF                          | Basix™ Frac  |
| BH                           | Big Hole   |
| -C, -C1, -C3, -C4            | IsoLoc™ Charges (various liner materials and performance)  |
| -D                           | Refrax™ Dual Casing  |
| -DP                          | Deep Penetrating   |
| -E                           | Economy  |
| -EG                          | Economy Grooved Case   |
| -FRX                         | FracIQ® Connex®  |
| -G                           | Grooved Case   |
| GH                           | Good Hole  |
| -L, -LS                      | Low Swell  |
| -LD                          | Low Debris   |
| -LEH                         | Limited Entry Hole   |
| -R                           | Refrax™ Dual Casing  |
| -RC                          | Connex® Reactive Charge  |
| -RX                          | Reactive Charge other than Connex® (can be FracIQ® and other special charges with reactive liner material)         |
| -SB, -SC, -SD, -SE, -SF, -SG | SandIQ®  |
| SBH                          | Super Big Hole   |
| -T                           | IsoLoc™ Charge   |
| TL                           | Twistlock  |
| XDP                          | Extra Deep Penetrating   |
| -XEH                         | Extra Entry Hole   |

## NOTES

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## **CORPORATE HEADQUARTERS**

10400 West Interstate 20  
Millsap, TX 76066

**Office: +1.817.341.5300**

**Toll Free: +1.855.737.3397 (1-855-PERF-EXP)**

Website: [www.perf.com](http://www.perf.com)

Contact Us: [www.perf.com/learn-more](http://www.perf.com/learn-more)