

PERFORATING CATALOG



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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: Charge performance data updates throughout the catalog for 3-1/8" FracIQ (removed LD charges) and EC2-33A1921-E (perforating conditions). Updated Detonators, Detonating Cord, and Accessories topic (removed inactive part numbers; added new items). 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. Removed slickwall carriers. 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. Added GIC31-SOO2 and GIC31-SOO3 gun details (STRATX SandIQ). Added several new part numbers to Centralizing Gun Connectors. Added new catalog pages for the 4.50" Centralizing Break-Apart Tandem Sub. Added new Super Good Hole (SGH) charge, EC2-40S4551, performance data to 7" 12 SPF catalog topic.



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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]
	4 spf / 0°				FC4 4540000	In Fluid or Dry	
1-9/16" GA Series, RTG	6 spf / 60°	20,000 [138]	88,100 [392]	3.2g, HMX, Razor® XDP	EC1-15A0322	Fluid	1.69 [42.93]
	6 spf / 0°	-		2.9g, HMX, Razor XDP	EC1-15A0322-L	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]
	6 spf / 60°			6.8g, HMX, Razor XDP	EC1-20A0722	Fluid	2.14 [54.36]
	6 spf / 60°	20,000 [420]	452 400 [(04]	6.5g, HMX, Razor XLS XDP	EC1-20B0722	In Fluid or Dry (6.5g)	2.22 [56.39]
2 GA Series, RTG	6 spf / 60°	20,000 [138]	153,100 [681]	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	El.: J	
2-3/8" GA Series, RTG	6 spf / 60°	20,000 [138]	153,100 [681]	11.0g, HMX, Connex	EC2-23A1122-RC	Fluid	2.36 [63.02]
	6 spf / 60°	-		10.5g, HMX, Connex XLS	EC2-23A1122-RC-LS	‡ Fluid or Dry (10.5g)	2.62 [66.55]
	6 spf / 60°	20,000 [120]	107 500 [(10]	11.5g, HMX, Razor XDP	EC2-25A1122	El.: J	
2-1/2" GA Series, RTG	6 spf / 60°	20,000 [138]	137,500 [612]	11.5g, HMX, Connex	EC2-25A1122-RC	Fluid	2.00 [07.30]
2.2/A" CLD27 Series	$4 \operatorname{cmf} / (0)$	25 000 [172]	176,600 [785]		FC0 0741500	Fluid	2.90 [73.66]
2-3/4 GLBZ7 Series	o spi / ou	25,000 [172]		15.0g, HMA, Razor ADP	ECZ-Z/AIJZZ	Dry	3.02 [76.71]
	6 spf / 60°				EC0 0741500	Fluid	2.90 [73.66]
2-3/4" GA Series	6 spf / 60°	25,000 [172]	176,600 [785]	13.0g, HMA, RAZOI ADP	ECZ-Z/AIJZZ	Dry	3.02 [76.71]
	6 spf / 60°			15.0g, HMX, Connex	EC2-27A1522-RC	Fluid	2.91 [73.91]
	6 spf / 60°			15.0g, HMX, Razor XDP	EC2-27A1522	Eluid or Dra	2 1 2 [70 50]
2.7/0" CA Series Standard	6 spf / 60°	20,000 [120]		15.0g, HMX, Connex	EC2-27A1522-RC	Fiuld of Dry	3.13 [79.30]
2-7/6 GA Series, Standard	6 spf / 60°	20,000 [136]	212 700 [050]	18.0g, HMX, Connex	EC2-28A1822-RC	Fluid	2 02 [20 22]
	6 spf / 60°		213,700 [950]	18.0g, HMX, Razor XDP	EC2-28A1822	Fluid	3.07 [77.96]
2.7/0" CA Series LID	6 spf / 60°	25 000 [172]		15.0g, HMX, Razor XDP	EC2-27A1522		2 4 2 [70 50]
2-776 GA Series, HP	6 spf / 60°	25,000 [172]		15.0g, HMX, Connex	EC2-27A1522-RC	Fiuld of Dry	3.13 [79.50]
	6 spf / 60°	20,000 [129]		Various Charge Options	Soo Catalog Dagas	Fluid (22.7g)	3.46 [87.88]
3-1/0 GIC31, STRATX®	6 spf / 60°	20,000 [138]	140,000 [622]	various Charge Options	See Catalog Pages	‡ 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.

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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]
	6 spf / 60°			22.7g, HMX, Razor® XDP	EC2-33A2322	Fluid	3.41 [86.61]
0.1/0" CA Caria	6 spf / 60°		2002 2002 [0002]	22.7g, HMX, Connex®	EC2-33A2322-RC	Fluid	3.41 [86.61]
3-1/8 GA Series	6 spf / 60°	22,500 [155]	202,300 [900]		FC2 2244022	Fluid	3.46 [87.88]
	5 spf / 60°			19.0g, HMA, Razor ADP	ECZ-33A1922	‡ Fluid or Dry	3.60 [91.44]
0.1/0" CLD01 Caria	6 spf / 60°			Mariana Channa Ontiana	Car Catalan Dana	Fluid (22.7g)	3.46 [87.88]
3-1/8 GLB31 Series	6 spf / 60°	22,500 [155]	202,300 [900]	Various Charge Options	See Catalog Pages	‡ 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	3-HF, STRATX 6 shot HELLFire 15,0		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]
	6 spf / 60°	22 700 [154]		25.0g, HMX, Razor XDP	EC2-33B2522	Fluid	3.56 [90.42]
2.2/0" CA Series	6 spf / 60°		221 000 [1474]	22.7g, HMX, Razor XDP	EC2-33A2322	Fluid or Dry	3.62 [91.95]
3-3/6 GA Series	6 spf / 60°	22,700 [156]	331,900 [1470]	25.0g, HMX, Connex	EC2-33B2522-RC	Fluid	3.56 [90.42]
	6 spf / 60°			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]
2.2/0" CLD22 Carias	6 spf / 60°	22 700 [154]	221 000 [1474]	Various Charge Ontions	See Catalag Dagaa	Fluid (25.0g)	3.56 [90.42]
3-3/6 GLB33 Series	6 spf / 60°	22,700 [156]	331,900 [1476]	various Charge Options	See Catalog Pages	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]
A" CA Series	4 spf / 60°	10 700 [125]	424 400 [1022]	39.0g, HMX, Razor XDP	EC2-40A3922	Fluid	4 4 4 [405 4 4]
4 GA Series	4 spf / 60°	19,700 [135]	434,400 [1932]	39.0g, HMX, Connex	EC2-40A3922-RC	Fluid	4.10 [105.00]
	5 spf / 60°	47700[400]		39.0g, HMX, Razor XDP	EC2-40A3922		4 (7 [440 (0]
4 4 /0" CA Caria	5 spf / 60°	17,700 [122]	F17 000 [0000]	39.0g, HMX, Connex	EC2-40A3922-RC	El.: J	4.67 [118.62]
4-1/2 GA Series	12 spf / 135°-45°	17 200 [110]	517,800 [2303]	22.7g, HMX, Razor XDP	EC2-33A2322	Fluid	4.64 [117.86]
	12 spf / 135°-45°	17,200 [118]		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.

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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]
4-5/8" GA Series, Standard	F (//00	18,900 [130]	454 (00 [0000]		FC0 4040000	EL 1.1	4.047 [400.00]
4-5/8" GA Series, HP	5 spt / 60°	25,000 [172] @ 250°F	454,600 [2022]	39.0g, HMX, Razor® XDP	EC2-40A3922	Fluid	4.816 [122.33]
1 E/O" CA Series Standard	12 spf / 135°-45°	10,000 [120]	454 (00 [2022]	22.7g, HMX, Razor XDP	EC2-33A2322	Fluid	4.69 [119.13]
4-5/8 GA Series, Standard	16 spf / 140°-20°	18,900 [130]	454,600 [2022]		FC0 4/40/01	El.: J	4.04 [400.47]
4-5/8" GA Series, HP	16 spf / 140°-20°	20,000 [138] @ 235°F	465,300 [2069]	20.0g, RDA, Razor SBH	EC2-40A2031	Fluid	4.81 [122.17]
1.2/1"CA Series	12 spf / 135°-45°	25,000 [172] @ 260°F	454 (00 [2022]	22.7g, HMX, Razor XDP	EC2-33Z2322-RC	Fluid	4.867 [123.62]
4-3/4 GA Series	16 spf / 140°-20°	23,000 [158] @ 260°F	454,000 [2022]	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]
	12 spf / 135°-45°	17 200 [110]		19.0g, RDX, Razor DP/GH	See Catalog Pages	Fluid	5.34 [135.64]
5-1/8" GA Series	16 spf / 140°-20°	17,200 [116]	461,800 [2054]	32.0g, RDX, Razor SBH	EC2-51A3231	El.: J	5.33 [135.38]
	22 spf / 140°-20°	15,400 [106]		19.0g, RDX, Razor DP/GH	See Catalog Pages	Fluid	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" CA Series	10 and (1000 AE)	12 500 [02]		39.0g, RDX, Razor DP/GH	EC2-40A3922	Eluid	7.28 [184.91]
7 GA Series	12 spi / 155 -45	13,300 [73]		52.0g, RDX, Razor SBH	EC2-70C5231	Fiulu	7.15 [181.61]
7" GA Series, Standard	15 and (1409, 209)	13,500 [93]				Eluid	7 00 [400 (4]
7" GA Series, HP	15 Spi / 140°-20°	14,600 [100]		JZ.Ug, KDA, Kazor JBH	EC2-70C5231	Fiuld	7.23 [103.04]
7" GA Series, 360°	18 spf / 90°	11 500 [70]	770,700 [3428]	39.0g, RDX, Razor SBH	EC2-70K3931	Eluid	7 22 [402 20]
Channel Finder	Rotated Cluster	11,500 [79]		52.0g, RDX, Razor SBH	EC2-70K5232	Fluid	7.22 [183.39]
7" Eclipso	$20 \text{ cmf} / 00^{\circ} / 5^{\circ}$	11 500 [70]		39.0g, RDX, Razor SBH	EC2-70K3931	Fluid	7 22 [102 20]
/ Eclipse	20 spi / 90°-45°	11,300 [79]		52.0g, RDX, Razor SBH	EC2-70K5232	Fiuld	7.22 [183.39]

*Hardware calculated breaking point

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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. Highperforming 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	Shaped Charge Part Number		Perforating	Shot Density /	^Casing O.D.	Performance	e in Concrete	Performance in Stressed Berea		
O.D.	Snaped Charge	Part Number	Condition	Explosive	Phasing	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"	2715 Conney VEL	EC2-27A1541-RC	In Fluid or Dra	15.0g, RDX	$4 \operatorname{cnf} / 40^{\circ}$	4-1/2"			0.30 [0.76]	12.30 [31.24]
15g	2/15 Connex AEH	EC2-27A1542-RC	III Fluid of Dry	15.0g, HMX	o spr / 60°				0.35 [0.89]	11.60 [29.46]
	3319 Connex XEH	EC2-33A1941-RC	‡ Fluid or Dry	19.0g, RDX	5 spf / 60° (Dry) 6 spf / 60° (Fluid)				0.41 [1.04]	14.20 [36.07]
3-1/8"		EC2-33A1942-RC		19.0g, HMX		4 1/2" 1 90			0.42 [1.07]	14.37 [36.50]
19g		EC2-33A1941		19.0g, RDX) 4-1/2 L-00	0.60 [1.52]	28.55 [72.52]		
	SS13 DASIX GH	EC2-33A1942		19.0g, HMX						
	2222 Conney VEL	EC2-33A2341-RC		22.7g, RDX		4 1/0"			0.43 [1.09]	15.60 [39.62]
3-1/8"	3323 COILIEX VEH	EC2-33A2342-RC	EI . I	22.7g, HMX	$4 \operatorname{cnf} / 40^{\circ}$	4-1/2			0.43 [1.09]	15.89 [40.36]
23g	2222 Pacity CH	EC2-33A2341-E	Fiuld	22.7g, RDX	0 Shi / 00	5-1/2" L-80	0.48 [1.22]	31.40 [79.76]		
	3323 Basix GH	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.

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

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

Carrier	Shawad Charge	Dent Number	Perforating	Evalaciva	Shot Density /	^Casing O.D.	Performance	e in Concrete	Performance in	Stressed Berea
O.D.	Shapeu Charge	Part Nulliper	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD^ (in)[cm]	TTP (in)[cm]
3-3/8"	2210 Conney VEL	EC2-33A1941-RC	In Fluid or Dry	19.0g, RDX					0.41 [1.04]	14.20 [36.07]
19g	3317 COILIEX VEH	EC2-33A1942-RC	III Fluid of Dry	19.0g, HMX					0.42 [1.07]	14.37 [36.50]
	2222 Connov VEL	EC2-33A2341-RC		22.7g, RDX					0.43 [1.09]	15.60 [39.62]
3-3/8"	3323 Connex AEH	EC2-33A2342-RC		22.7g, HMX		4-1/2" L-80			0.43 [1.09]	15.89 [40.36]
23g	3323 Basix GH	EC2-33A2341	In Fluid of Dry	22.7g, RDX	6 spf / 60°		0.52 [1.32]	33.58 [85.29]		
		EC2-33A2342		22.7g, HMX						
3-3/8" 25g -	3325 Connex XEH	EC2-33B2541-RC		25.0g, RDX						
		EC2-33B2542-RC	Fluid	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]
4-1/2"	2222 Conney VEL	EC2-33A2341-RC	Fluid	22.7g, RDX	$4 \operatorname{cnf} / 40^{\circ}$	7.0"			0.34 [0.86]	14.72 [37.39]
23g	3323 COILIEX VEH	EC2-33A2342-RC	Fiulu	22.7g, HMX	0 shi / 00	7.0			0.43 [1.09]	15.89 [40.36]
	2210 Datar CU	EC2-33A1941-G		† 19.0g, RDX					0.37 [0.94]	12.10 [30.73]
5-1/8"	SS17 Razor GH	EC2-33A1942-G	Fluid	† 19.0g, HMX	$22 \text{ cmf} / 140^{\circ} 20^{\circ}$	7 5/0"				
19g	2210 Pacin CL	EC2-33A1941-EG	Fiulu	† 19.0g, RDX	22 Spi / 140 -20	/-5/8	0.37 [0.94]	25.20 [64.01]		
	331A RASIX CH	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. FLUID: Qualified for shooting in FLUID only with perforating systems qualified by GEODynamics.

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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	Shanad Charge	Dart Number	Perforating	Evalesive	Shot Density /	^Casing O.D.	Performance in Concrete		Performance in Stressed Berea	
O.D.	Shaped Charge	Part Number	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD [^] (in)[cm]	TTP (in)[cm]
3-1/8"	2222 Deally DU	EC2-33A2331	Fluid	22.7g, RDX	6 spf / 60°	4-1/2" L-80	0.78 [1.98]	7.60 [19.30]		
23g	23g 3323 Basix BH	EC2-33A2332	Fiuld	22.7g, HMX			0.79 [2.01]	7.80 [19.81]		
3-3/8"	2222 Paciv DU	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]
23g	SSZS BASIX BH	EC2-33A2332		22.7g, HMX						
4-1/2"	2222 Dealy DU	EC2-33A2331	Fluid	22.7g, RDX		7.0% 1.00	0.81 [2.06]	5.28 [13.41]	0.78 [1.98]	5.00 [12.70]
23g	3323 Basix BH	EC2-33A2332	Fiuld	22.7g, HMX	12 spi/155 -45	7.0 L-00			0.80 [2.03]	5.30 [13.46]
4-1/2"	4020 Desity DLL	EC2-40A3931	Eluid	39.0g, RDX	E conf / 40°	7.0"1.90	0.86 [2.18]	6.13 [15.57]		
39g	4037 DASIX DIT	EC2-40A3932	Fiuld	39.0g, HMX	5 spi / 60*	7.0 L-00				

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

Carrier	Chanad Charge	Part Number	Perforating	Evelocive	Shot Density /	^Casing O.D.	Performance	e in Concrete	Performance in Stressed Berea	
O.D.	Snaped Charge	Part Number	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD^ (in)[cm]	TTP (in)[cm]
3-1/8"	2112 Dealy CDU	EC2-31B1231	Fluid	12.0g, RDX	12 spf/150°	E 0" L 00	0.70 [1.78]	5.60 [14.22]	0.65 [1.65]	4.60 [11.68]
12g	STIZ BASIX SBH	EC2-31B1232	Fluid	12.0g, HMX	12 spf/135°-45°	J.0 L-00				
3-3/8"	2112 Pacin CDL	EC2-31B1231	Eluid	12.0g, RDX	$12 cnf/150^{\circ}$	5-1/2"1-90	0.71 [1.80]	5.88 [14.94]	0.66 [1.68]	4.70 [11.94]
12g	g JIIZ DASIX JDH	EC2-31B1232	Fiuld	12.0g, HMX	12 shi/120	J-1/2 L-00				
4-1/2"	1/2" 4526 Basix SBH TL	EC2-45B2631	Eluid	26.0g, RDX	12 spf/135°-45° 16 spf/ 140°-20°	7.0" L-80	0.87 [2.21]	5.67 [14.40]		
26g		EC2-45B2632	Fluid	26.0g, HMX			0.93 [2.36]	5.77 [14.66]		
		¹ EC2-46A2631		26.0g, RDX 26.0g, HMX		7.0" L-80	0.90 [2.29]	5.50 [13.97]		
	4626 Razor SBH TL LD	¹ EC2-46A2632								
4 5 (0)		¹ EC2-46A2631		26.0g, RDX		7-3/4" C-110	0.96 [2.44]	5.40 [13.72]		
4-5/8	4526 Dealy CDUITI	EC2-45B2631	Fluid	26.0g, RDX	16 spf/ 140°-20°		0.94 [2.39]	6.27 [15.93]		
20g	4520 BASIX SEH TL	EC2-45B2632		26.0g, HMX		7.0" 90				
		¹ EC2-46B2631]	26.0g, RDX		7.0° L-80	0.94 [2.39]	6.27 [15.93]		
	4626 Basix SBH TL	¹ 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.

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

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Shaped Charges Super Big Hole

GEODynamics

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 Shaped Cha	Chanad Charge	Deut Number	Perforating	Explosivo	Shot Density /	^Casing O.D.	^Casing O.D. Performance in Concrete		Performance in Stressed Berea	
O.D.	Snaped Charge	Part Number	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD [^] (in)[cm]	TTP (in)[cm]
4.0 (4)		EC2-48K1831		18.0g, RDX		7.0" 90				
4-3/4	4818 Razor SBH	FC2 40K1022	Fluid		24 spf/ 90°-45°	7.0 L-80	0.73 [1.85]	4.81 [12.22]		
Tog		EC2-40K1032		10.0g, HIMA		† 7-3/4" Q-125	0.63 [1.60]	3.70 [9.40]		
		² EC2-51A3231		32.0g, RDX	$16 \operatorname{enf} (1409.209)$		1.07 [2.72]	6.60 [16.76]		
5-1/8"	5132 Razor SBH TE ED	² EC2-51A3232		32.0g, HMX	10 Spi / 140°-20°	7 5 (0" 1 00				
32g	5132 Razor SBH LD	2 500 5100001	Fiuld	32.0g, RDX	12 spf/135°-45°	7-3/8 L-80	1.05 [2.67]	7.08 [17.98]		
		- ECZ-31B3231		32.0g, RDX	16 spf / 140°-20°		1.05 [2.67]	6.88 [17.48]		
6-3/4" 52g	6852 Razor SBH	EC2-68K5231		52.0g, RDX		0-5/0"1-00				
		EC0 401/5000	Fluid	52 0g HMX	22 spf/ 90°-45°	9-J/0 L-00	1.08 [2.74]	5.62 [14.27]		
		ECZ-00KJZJZ		52.0g, HMA		‡ 9-7/8" Q-125	0.97 [2.46]	5.35 [13.59]		
		EC2-70C3931		39.0g, RDX	15 cpf / 1400 200	0 5/0"1 00	1.24 [3.15]	7.08 [17.98]		
7"	7037 Kazor 3DH TE ED	EC2-70C3932	Eluid	39.0g, HMX	15 spi / 140 -20	9-J/0 L-00				
39g	7020K Dator CDU	EC2-70K3931	Fiulu	39.0g, RDX	$20 \text{ cmf} / 200 \text{ AE}^{\circ}$	0 5/0"1 00	1.04 [2.64]	6.31 [16.03]	1.10 [2.79]	4.40 [11.18]
		EC2-70K3932		39.0g, HMX	20 spi / 90 -43	9-J/0 L-00			1.18 [3.00]	4.60 [11.68]
		EC2 70C5221				9-5/8" L-80	1.39 [3.53]	6.50 [16.51]		
-7"	7052 Razor SBH TL LD	ECZ-70CJZ31		JZ.Ug, KDA	15 spf / 140°-20°	^^10-1/8" SM-125S	1.12 [2.84]	6.60 [16.76]		
/ 52g		EC2-70C5232	Fluid	52.0g, HMX		9-5/8"				
JZg		EC2-70K5231]	52.0g, RDX	$20 \text{ cmf} / 200 \text{ AF}^{\circ}$	0 5/0"1 00	1.41 [3.58]	5.67 [14.40]		
		EC2-70K5232		52.0g, HMX	20 spi / 70 -43	7-5/0 L-00	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. ² 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	Chanad Charge	Dout Number	Perforating	Explosive Shot Density /		^Casing O.D.	Performance in Concrete		Performance in Stressed Berea	
O.D.	Snaped Charge	Part Number	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD^ (in)[cm]	TTP (in)[cm]
	1502 Compay CDD	EC1-15A0321-RC	Fluid	3.2g, RDX	$6 \operatorname{enf} / (0)$				0.17 [0.43]	4.90 [12.45]
	1505 Connex SDP	EC1-15A0322-RC	Fiuld	3.2g, HMX	o spi / ou				0.17 [0.43]	6.80 [17.27]
1-9/16"		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]
3.2g	1500 D VDD	FC1 1540000	In Fluid or Dry		4 spf / 0°		0.19 [0.48]	13.09 [33.25]		
	1503 Kazor XDP	EC1-15A0322	El.: J	3.2g, HIMX	(f / / 00	2-7/8 L-80	0.19 [0.48]	13.09 [33.25]	0.13 [0.33]	5.23 [13.28]
		EC1-15A0323	Fiuld	3.2g, HNS	6 spt / 60°				0.11 [0.28]	5.00 [12.70]
1-9/16"		EC1-15A0321-L	Duri	2.9g, RDX	(f (00					
2.9g	1503 Razor XDP LS	EC1-15A0322-L	Dry	2.9g, HMX	6 spf / 0°		0.19 [0.48]	12.80 [32.51]	0.18 [0.46]	6.50 [16.51]
	1705 Come on CDD	EC1-17A0521-RC		5.1g, RDX	(f / / 00				0.21 [0.53]	7.40 [18.80]
	1705 Connex SDP	EC1-17A0522-RC		5.1g, HMX	6 spt / 60°				0.21 [0.53]	8.70 [22.10]
4 0 (4)	4" 1705 Razor XDP	EC1-17A0521		5.1g, RDX						
1-3/4"		EC1-17A0522	Fluid	5.1g, HMX	6 spf / 0°	4-1/2" L-80	0.26 [0.66]	21.63 [54.94]	0.20 [0.51]	7.70 [19.56]
J.18		EC1-17A0523		5.1g, HNS					0.19 [0.48]	6.20 [15.75]
		EC1-17A0521-E		5.1g, RDX	(f / / 00					
	TIOSE BASIX XDP	EC1-17A0522-E		5.1g, HMX	6 spt / 60°					

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

Carrier	Shaped Charge	Dart Number	umber Perforating Explosive Shot Density /		^Casing O.D.	Performance	e in Concrete	Performance in Stressed Berea		
O.D.	Shapeu Charge	Part Nulliper	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD^ (in)[cm]	TTP (in)[cm]
		EC2-20A0721-RC		6.8g, RDX					0.22 [0.56]	8.94 [22.71]
	2007 Connex SDP	EC2-20A0722-RC	Fluid	6.8g, HMX	6 spf / 60°	2-7/8"			0.22 [0.56]	9.37 [23.80]
		EC2-20A0723-RC		6.8g, HNS					0.20 [0.51]	7.30 [18.54]
2"		EC1-20A0721		6.8g, RDX		3-1/2" L-80	0.25 [0.64]	21.83 [55.45]	0.22 [0.56]	9.55 [24.26]
6.8g	2007 Razor XDP	EC1-20A0722	Fluid	6.8g, HMX	6 spf / 60°	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 Pacin VDD	EC1-20A0721-E	Eluid	6.8g, RDX	$4 \operatorname{conf} / 40^{\circ}$	2 1/2" 00	0.25 [0.64]	16.42 [41.71]		
	2007 E DASIX ADP	EC1-20A0722-E	Fluiu	6.8g, HMX	0 shi / 00	3-1/2 L-00	0.25 [0.64]	20.70 [52.58]	0.24 [0.61]	8.40 [21.34]
	2007 Connov SDD VI S	EC2-20B0721-RC		6.5g, RDX					0.23 [0.58]	8.70 [22.10]
2"	2007 COILIEX SDP ALS	EC2-20B0722-RC	In Eluid or Dru	6.5g, HMX	$4 \operatorname{conf} / 40^{\circ}$	2 7/0" 1 00			0.21 [0.53]	9.80 [24.89]
6.5g		EC1-20B0721	III Fluid of Dry	6.5g, RDX	0 shi / 00	2-7/0 L-00				
	2007 Razor ALS ADP	EC1-20B0722		6.5g, HMX			0.25 [0.64]	22.30 [56.64]	0.19 [0.48]	10.80 [27.43]
		EC2-23A1121-RC		11.0g, RDX					0.25 [0.64]	11.40 [28.96]
2311 Connex SDP	EC2-23A1122-RC]	11.0g, HMX					0.31 [0.79]	11.35 [28.83]	
		EC2-23A1123-RC		11.0g, HNS	(f (/ 00				0.23 [0.58]	8.70 [22.10]
2-3/8"		EC2-23A1121	Fluid	11.0g, RDX		2-1/2"1-90			0.25 [0.64]	12.70 [32.26]
11g	2311 Razor XDP	EC2-23A1122	Fluiu	11.0g, HMX	0 spi / 00	3-1/2 L-00	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]
	2211 Pacity VDD	EC2-23A1121-E		11.0g, RDX					0.30 [0.76]	9.00 [22.86]
		EC2-23A1122-E		11.0g, HMX						
		EC2-23A1121-LS	Dmr	11.0g, RDX	$+ E conf / 0^{\circ}$					
2-3/8"	2211 Pazor VDDLS	EC2-23A1122-LS	DIy	11.0g, HMX	+ 3 shi / 0	2-1/2"1-90	0.31 [0.79]	30.11 [76.48]		
11g	2-3/0 11g 2311 Razor XDP LS	EC2-23A1121-LS	Fluid	11.0g, RDX	$6 \operatorname{cpf} / 0^{\circ}$	3-1/2 L-00				
		EC2-23A1122-LS	Fluiu	11.0g, HMX	0 spi / 0		0.31 [0.79]	30.11 [76.48]		
		EC2-23A1121-RC-LS	Dny	10.5g, RDX	$+ 5 conf / 60^{\circ}$				0.25 [0.64]	11.40 [28.96]
2-3/8"	2211 Connov SDD VI S	EC2-23A1122-RC-LS	Dīy	10.5g, HMX	+ 3 shi / 00	3-1/2"			0.31 [0.79]	11.35 [28.83]
10.5g	2011 COUNEX ODP VED	EC2-23A1121-RC-LS	Fluid	10.5g, RDX	$6 \operatorname{cnf} / 40^{\circ}$				0.25 [0.64]	11.40 [28.96]
		EC2-23A1122-RC-LS	riulu	10.5g, HMX	0 spi / 00				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.



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

Carrier	Shanad Charge	Dart Number	Perforating	Evplosivo	Shot Density / ^Casing O.D. Performance in Concrete Performance in		Performance in Concrete		Stressed Berea	
O.D.	Shapeu Charge	Part Number	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD^ (in)[cm]	TTP (in)[cm]
	2511 Conney SDD	EC2-25A1121-RC		11.5g, RDX					0.28 [0.71]	11.50 [29.21]
	2511 Connex SDP	EC2-25A1122-RC		11.5g, HMX					0.29 [0.74]	12.00 [30.48]
2-1/2"		EC1-25A1121	Eluid	11.5g, RDX	(and ((0)	2 1/2" 20			0.26 [0.66]	13.00 [33.02]
11.5g	ZOTT RAZOF ADP	EC1-25A1122	Fluid	11.5g, HMX	o spi /ou	3-1/2 L-60	0.32 [0.81]	31.10 [78.99]	0.24 [0.61]	12.23 [31.06]
		EC2-25A1121-E		11.5g, RDX	-				0.30 [0.76]	9.10 [23.11]
	ZOTT BASIX VDP	EC2-25A1122-E		11.5g, HMX						
	2715 Common CDD	EC2-27A1521-RC		15.0g, RDX					0.30 [0.76]	11.70 [29.72]
	2715 Connex SDP	EC2-27A1522-RC		15.0g, HMX	6 spf /60°				0.31 [0.79]	12.18 [30.94]
0.0/4"		EC2-27A1521		15.0g, RDX			0.39 [0.99]	37.45 [95.12]		
2-3/4"	2715 Razor XDP	EC2-27A1522	In Fluid or Dry	15.0g, HMX		4-1/2" L-80	0.39 [0.99]	37.45 [95.12]		
TDB		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]
		EC2-27A1521-RC		15.0g, RDX					0.30 [0.76]	11.70 [29.72]
	2715 Connex SDP	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]
2-7/8"		EC2-27A1521	In Fluid on Drag	15.0g, RDX	(and ((0)	4 1 / 2" 1 90			0.26 [0.66]	13.50 [34.29]
15g	2715 Razor XDP	EC2-27A1522	In Fluid or Dry	15.0g, HMX	o spi /ou	4-1/2 L-60	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]
		EC2-27A1521-E		15.0g, RDX					0.32 (0.81)	9.40 [23.88]
	2715 Basix XDP	EC2-27A1522-E		15.0g, HMX						
		EC2-28A1821-RC		18.0g, RDX					0.42 [1.07]	13.00 [33.02]
	2818 Connex SDP	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]
2-7/8"		EC2-28A1821		18.0g, RDX	((//00	4.4.(0)11.00	0.43 [1.09]	40.05 [101.73]	0.41 [1.04]	14.10 [35.81]
18g	2818 Razor XDP	EC2-28A1822	Fluid	18.0g, HMX	6 spt / 60*	4-1/2 L-80	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]
		EC2-28A1821-E		18.0g, RDX					0.47 [1.19]	10.70 [27.18]
2818 Basix X	2010 Basix YDA	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. 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.

- 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.

Carrier	Chanad Charge	Dout Number	Perforating	Evaluative	Shot Density /	^Casing O.D.	Performanc	e in Concrete	Performance in	Stressed Berea
O.D.	Shaped Charge	Part Number	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD^ (in)[cm]	TTP (in)[cm]
	2210 Caman DV	EC2-33A1991-RX		19.0g, RDX					0.32 [0.81]	11.30 [28.70]
	3319 Connex RX	EC2-33A1992-RX	+ Fluid or Dry	19.0g, HMX					0.32 [0.81]	11.60 [29.46]
		EC2-33A1921		19.0g, RDX			0.51 [1.30]	42.07 [106.86]		
0.4.(0)	3319 Razor XDP	EC2-33A1922	‡ Fluid or Dry	19.0g, HMX	$5 \operatorname{cnf} (40° (Dm))$	4-1/2" L-80	0.49 [1.24]	41.10 [104.39]	0.43 [1.09]	14.60 [37.08]
3-1/8 10a		EC2-33A1921-E		19.0g, RDX	$5 \text{ spf} / 60^{\circ} (\text{Dry})$		0.43 [1.09]	35.80 [90.93]		
3319 E 3319 E 3319	3319 Basix XDP	EC2-33A1922-E	‡ Fluid or Dry	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]		
	3319 Basix DP	EC2-33A1952	+ Fluid or Dry	19.0g, HMX						
		EC2-33A2321-RC		22.7g, RDX					0.40 [1.02]	15.60 [39.62]
	3323 Connex SDP	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]
3-1/8"	3323 Razor XDP	EC2-33A2322	Eluid	22.7g, HMX	$6 \operatorname{enf} (400)$	4 1 /0" 1 00	0.42 [1.07]	39.02 [99.11]	0.44 [1.12]	15.68 [39.83]
3-1/8" 23g		EC2-33A2323	Fiuld	22.7g, HNS	0 SPI / 00	4-1/2 L-00	0.35 [0.89]	26.05 [66.17]	0.37 [0.94]	12.12 [30.78]
		EC2-33A2321-E		22.7g, RDX			0.42 [1.07]	46.01 [116.87]	0.39 [0.99]	12.30 [31.24]
	3323 BASIX ADP	EC2-33A2322-E		22.7g, HMX			0.43 [1.09]	46.37 [117.78]		
	2222 Dealy CLI	EC2-33A2321-EG		22.7g, RDX					0.41 [1.04]	11.90 [30.23]
	JJZJ BASIX GH	EC2-33A2322-EG		22.7g, HMX			0.43 [1.09]	45.70 [116.08]	0.40 [1.02]	11.90 [30.23]

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

‡ 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. 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.



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

Carrier	Chanad Chanas	ge Part Number	Perforating	E-mlash-	Shot Density /	Density / ^Casing O.D.		e in Concrete	Performance in Stressed Berea	
O.D.	Shaped Charge	Part Number	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD [^] (in)[cm]	TTP (in)[cm]
	2210 Common DV	EC2-33A1991-RX		19.0g, RDX		E 1/0"			0.32 [0.81]	11.30 [28.70]
3-3/8"	3319 CONNEX KX	EC2-33A1992-RX		19.0g, HMX	6 amf / 600	5-1/2			0.32 [0.81]	11.60 [29.46]
19g		EC2-33A1921		19.0g, RDX	0 spi / 00	1 1 / 2"	0.51 [1.30]	42.07 [106.86]		
	3319 Razor ADP	EC2-33A1922		19.0g, HMX		4-1/2			0.43 [1.09]	14.60 [37.08]
		EC2-33A2321-RC		22.7g, RDX					0.40 [1.02]	15.60 [39.62]
	3323 Connex SDP	EC2-33A2322-RC		22.7g, HMX	6 spf / 60°	4-1/2" 1-80			0.46 [1.17]	15.31 [38.89]
		EC2-33A2323-RC		22.7g, HNS					0.36 [0.91]	11.85 [30.10]
		EC2-33A2321	In Fluid or Dry	22.7g, RDX					0.41 [1.04]	16.40 [41.66]
	3-3/8"	EC2-33A2322		22.7g, HMX			0.45 [1.14]	46.32 [117.65]	0.44 [1.12]	15.68 [39.83]
3-3/8"		EC2-33A2323		22.7g, HNS					0.37 [0.94]	12.12 [30.78]
23g 3323 Ba		EC2-33A2321-E	In Fluid on Dur	22.7g, RDX		4-1/2 L-60	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]		
	2222 Pacity CL	EC2-33A2321-EG	Fluid	22.7g, RDX					0.41 [1.04]	11.90 [30.23]
	3323 DASIX GH	EC2-33A2322-EG	Fluiu	22.7g, HMX					0.40 [1.02]	11.90 [30.23]
	2222 Pasiv DD	EC2-33A2351	In Fluid or Drag	22.7g, RDX			0.47 [1.19]	32.10 [81.53]		
	JJZJ DASIX DP	EC2-33A2352	III Fluid of Dry	22.7g, HMX						
		EC2-33B2521-RC		25.0g, RDX					0.40 [1.02]	15.10 [38.35]
	3325 Connex SDP	EC2-33B2522-RC		25.0g, HMX					0.48 [1.22]	15.45 [39.24]
	3325 Connex SDP	EC2-33B2523-RC		25.0g, HNS					0.35 [0.89]	12.30 [31.24]
3-3/8"		EC2-33B2521	Eluid	25.0g, RDX	$4 \operatorname{cnf} / 40^{\circ}$	4 1/2" 1 90	0.45 [1.14]	44.58 [113.23]	0.39 [0.99]	17.10 [43.43]
25g	3325 Razor XDP	EC2-33B2522	Fiulu	25.0g, HMX	0 spi / 00	4-1/2 L-00	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. 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.



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

Carrier	Shanad Charge	Davt Number	Perforating	Evalacivo	Shot Density /	^Casing O.D.	D.D. Performance in Concrete		Performance in Stressed Berea	
O.D.	Shaped Charge	Part Number	Condition	Explosive	Phasing	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					0.46 [1.17]	15.31 [38.89]
		EC2-33B2521	In Fluid on Dur	25.0g, RDX						
4"	3323 Razor ADP	EC2-33B2522	In Fluid of Dry	25.0g, HMX	6 spf / 60°	5-1/2" L-80	0.47 [1.19]	46.11 [117.12]		
25g	2225 Pacity VDD	EC2-33B2521-E	Eluid	25.0g, RDX					0.44 [1.18]	12.50 [31.75]
	JJZJ DASIX ADP	EC2-33B2522-E	Fluiu	25.0g, HMX					0.44 [1.18]	12.70 [32.26]
		EC2-40A3921-RC		39.0g, RDX					0.41 [1.04]	17.15 [43.56]
	4039 Connex SDP	EC2-40A3922-RC		39.0g, HMX	4 spf / 60°				0.43 [1.09]	17.80 [45.21]
A.1)		EC2-40A3923-RC		39.0g, HNS					0.36 [0.91]	15.20 [38.61]
4 20a		EC2-40A3921	Fluid	39.0g, RDX	4 spf / 60°	5-1/2" L-80	0.39 [0.99]	53.00 [134.62]	0.38 [0.97]	18.60 [47.24]
57g	4039 Razor ADP	EC2-40A3922		39.0g, HMX	4 spf / 90°		0.39 [0.99]	53.00 [134.62]	0.37 [0.94]	19.10 [48.51]
		EC2-40A3921-E		39.0g, RDX	1 and / 609				0.56 [1.42]	16.10 [40.89]
	4039 Basix ADP	EC2-40A3922-E		39.0g, HMX	4 spi / 60°				0.44 [1.12]	16.30 [41.40]
		EC2-33A2321-RC		22.7g, RDX					0.34 [0.86]	14.75 [37.47]
	3323 Connex SDP	EC2-33A2322-RC	Fluid	22.7g, HMX	6 spf / 60°	5-1/2"			0.46 [1.17]	15.31 [38.89]
4 1 /0"		EC2-33A2323-RC		22.7g, HNS					0.36 [0.91]	10.50 [26.67]
4-1/2 23α	2222 Conney CDD	EC2-33A2321-RC		22.7g, RDX						
2.5g	3323 COILIEX SDP	EC2-33A2322-RC	Eluid	22.7g, HMX	10 cmf / 1050 AE0	7 0" 1 90			0.46 [1.17]	15.31 [38.89]
		EC2-33A2321	Fluiu	22.7g, RDX	12 spi / 155 -45	7.0 L-00			0.43 [1.09]	15.70 [39.88]
	JJZJ KAZULADP	EC2-33A2322		22.7g, HMX			0.38 [0.97]	34.90 [88.65]		
4-1/2"		EC2-33B2521	In Fluid or Drag	25.0g, RDX	$4 \operatorname{cnf} / 40^{\circ}$	7.0"			0.44 [1.12]	16.30 [41.40]
25g	JJZJ KAZULADP	EC2-33B2522	III Fluid of Dry	25.0g, HMX	0 SPI / 00	7.0			0.34 [0.86]	15.70 [39.88]
		EC2-40A3921-RC		39.0g, RDX					0.41 [1.04]	17.15 [43.56]
	4039 Connex SDP	EC2-40A3922-RC		39.0g, HMX					0.43 [1.09]	17.80 [45.21]
4.4.(0))		EC2-40A3923-RC		39.0g, HNS					0.36 [0.91]	15.20 [38.61]
4-1/2 20σ		EC2-40A3921	Fluid	39.0g, RDX	5 spf / 60°	7.0" L-80	0.44 [1.12]	58.59 [148.82]	0.38 [0.97]	18.60 [47.24]
57g	4039 Kazor ADP	EC2-40A3922		39.0g, HMX			0.45 [1.14]	72.93 [185.24]	0.37 [0.94]	19.10 [48.51]
		EC2-40A3921-E		39.0g, RDX					0.56 [1.42]	16.10 [40.89]
4039 Basix XDP	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. 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.



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

Carrier	Chanad Change	Daut Number	Perforating	E ural a situa	Shot Density /	^Casing O.D.	D.D. Performance in Concrete		Performance in Stressed Berea	
O.D.	Snaped Charge	Part Number	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD^ (in)[cm]	TTP (in)[cm]
		EC2-33A2321-RC		22.7g, RDX						
4-5/8"	3323 Connex SDP	EC2-33A2322-RC		22.7g, HMX	10 € / 1050 450	7.0" 0.0			0.46 [1.17]	15.31 [38.89]
23g		EC2-33A2321	Fluid	22.7g, RDX	12 spt / 135*-45*	7.0 L-80				
	3323 Razor XDP	EC2-33A2322		22.7g, HMX			0.37 [0.94]	35.03 [88.98]		
		EC2-40A3921-RC		39.0g, RDX					0.41 [1.04]	17.15 [43.56]
	4039 Connex SDP	EC2-40A3922-RC		39.0g, HMX					0.43 [1.09]	17.80 [45.21]
		EC2-40A3923-RC		39.0g, HNS		7.0"			0.36 [0.91]	15.20 [38.61]
4-5/8"		EC2-40A3921		39.0g, RDX					0.38 [0.97]	18.60 [47.24]
39g	4039 Razor XDP	EC2-40A3922	Fluid	39.0g, HMX	5 spt / 60*				0.37 [0.94]	19.10 [48.51]
	4039 Basix XDP	EC2-40A3923		39.0g, HNS	-				0.33 [0.84]	16.40 [41.66]
		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"		EC2-33A2321	Eluid.	† 22.7g, RDX	10 onf / 1250 /50	7 5 /0"				
23g	3323 Razor ADP	EC2-33A2322	Fluid	† 22.7g, HMX	12 spi / 135*-45*	/-5/6			0.38 [0.97]	12.60 [32.00]
	4020 Compay CDD	EC2-40A3921-RC		39.0g, RDX					0.46 [1.17]	16.50 [41.91]
	4039 Connex SDP	Connex SDP EC2-40A3922-RC		39.0g, HMX					0.42 [1.07]	17.50 [44.45]
7"		EC2-40A3921		39.0g, RDX	10 omf / 1250 /50	0 5/0" 1 00			0.38 [0.97]	16.90 [42.93]
39g	4039 Kazor ADP	EC2-40A3922	Fiula	39.0g, HMX	12 Spi / 100-40	9-5/8" L-80	0.41 [1.04]	53.59 [136.12]	0.44 [1.12]	17.65 [44.83]
		EC2-40A3921-E		39.0g, RDX					0.50 [1.27]	15.70 [39.88]
	4039 Basix XDP	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. 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.

Shaped Charges Constant Entry Hole and Penetration



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

- FraclQ[®] 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. FraclQ provides superior perforation efficiency during fracture stimulation when compared to conventional perforators which traditionally exhibit a higher entry hole diameter variance across shot phasings.
- FraclQ[®] Connex[®] combines FraclQ 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

Carrior			Dorforating		Shot Donsity /		Performance in Stressed Berea (API RP19B Sec. 2)			
O.D.	Shaped Charge	Part Number	Condition	Explosive	Phasing	Targeted Pipe*	EHD [*] (in)[cm]	EHD Variation Decentralized	TTP (in)[cm]	
2.2/4"	FracIQ 30	EC2-27A1171		11.0g, RDX			0.30 [0.76]	2.7 %		
2-3/4 11a-15a	FracIQ 35	EC2-27A1271	Fluid	12.0g, RDX	6 spf / 60°	4.5" OD, P110	0.35 [0.89]	5.9 %	5.0 [12.70]	
11g-15g	FracIQ 40	EC2-27A1571		15.0g, RDX			0.40 [1.02]	6.3 %		
	Freed O 25	EC2-28A1171		11.0g, RDX			0.36 [0.91]	3.3 %		
2-7/8"	FraciQ 35	EC2-28A1172	Fluid	11.0g, HMX	(anf / (0)		0.36 [0.91]	2.1 %	E O [10 70]	
11g-16g	Freed 0 40	EC2-28A1671	Fluid	16.0g, RDX	6 spt / 60°	4.5 OD, P110	0.40 [1.02]	2.7 %	5.0 [12.70]	
	FraciQ 40	EC2-28A1672		16.0g, HMX			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.

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

Carrier			Derforating		Shot Density /		Performance in	n Stressed Berea (AP	I RP19B Sec. 2)
O.D.	Shaped Charge	Part Number	Condition	Explosive	Phasing	Targeted Pipe*	EHD^ (in)[cm]	EHD Variation Decentralized	TTP (in)[cm]
2 1 /0"	FracIQ 20	EC2-33A1271		12.0g, RDX			0.22 [0.56]	5.5%	5.0 [12.70]
3-1/0 12a-12a	Basix Frac 25	EC2-33A1271-BF	Fluid	12.0g, RDX	6 spf / 60°	4.5"-5.5" OD, P110	0.26 [0.66]	2.4 %	4.0 [10.16]
128-138	FracIQ 25	EC2-33A1371		13.0g, RDX			0.26 [0.66]	4.1 %	5.0 [12.70]
	FracIQ Connex 30	EC2-33A1471-FRX		14.0g, RDX			0.31 [0.79]	6.0 %	5.0 [12.70]
3-1/8"	Basix Frac 30	EC2-33A1471-BF	Eluid	14.0g, RDX	6 and 1 400		0.31 [0.79]	4.0 %	4.0 [10.16]
13g-16g	FracIQ 30	EC2-33A1671	Fiuld	16.0g, RDX	o spi / ou	4.5 -5.5 OD, P110	0.31 [0.79]	3.1 %	E O [10 70]
	FracIQ 30	EC2-33A1672		16.0g, HMX			0.34 [0.86]	3.8 %	5.0 [12.70]
	FracIQ Connex 35	EC2-33A1671-FRX		16.0g, RDX			0.36 [0.91]	5.0 %	5.0 [12.70]
3-1/8"	Basix Frac 35	EC2-33A1871-BF	Eluid	18.0g, RDX	6 amf / 600		0.36 [0.91]	3.4 %	4.0 [10.16]
16g-20g	FracIQ 35	EC2-33A2071	Fiuld	20.0g, RDX	o spi / ou	4.5 -5.5 OD, P110	0.36 [0.91]	2.5 %	E O [10 70]
	FracIQ 35	EC2-33A2072		20.0g, HMX			0.37 [0.94]	3.0 %	5.0 [12.70]
	FracIQ Connex 40	EC2-33A1971-FRX		19.0g, RDX			0.41 [1.04]	6.5 %	
2.4.(0)"	FracIQ 40	EC2-33A2371		23.0g, RDX			0.40 [1.02]	3.3 %	5.0 [12.70]
3-1/8 19a-22a	FracIQ 40	EC2-33A2372	Fluid	23.0g, HMX	6 spf / 60°	4.5 -5.5 OD, P110	0.41 [1.04]	3.8 %	
178-238	Basix Frac 40	EC2-33A2371-BF		23.0g, RDX			0.40 [1.02]	6.6 %	40[1014]
	Basix Frac 40	EC2-33A2371-BF		23.0g, RDX		6.0" OD, P110	0.40 [1.02]	7.5 %	4.0 [10.10]
2 1 /0"	FracIQ 45	EC2-33A2071-45		20.0g, RDX			0.45 [1.14]	5.6 %	5 0 [12 70]
3-1/0 20a-23a	FracIQ Connex 45	EC2-33A2371-FRX	Fluid	21.0g, RDX	6 spf / 60°	4.5"-5.5" OD, P110	0.45 [1.14]	3.2 %	5.0 [12.70]
208-238	Basix Frac 45	EC2-33A2371-BF45		23.0g, RDX			0.45 [1.14]	5.9 %	4.0 [10.16]
0.4 (0.1)	FracIQ 50	EC2-33A2371-50 † EC2-33A2371-50G		23.0g, RDX		4.5"-5.5" OD, P110	0.50 [1.27]	1.5 %	5.0 [12.70]
3-1/8"	FracIQ 50	EC2-33A2372-RX	Fluid	23.0g, HMX	6 spf / 60°	5.5" OD, P110	0.50 [1.27]	4.6 %	
Z3g	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"	FracIQ 20	EC2-33A1271	Fluid	12.0g, RDX	6 and / 600	4.5"-5.5" OD, P110	0.22 [0.56]	5.5%	E O [10 70]
12g-13g	FracIQ 25	EC2-33A1371	Fiula	13.0g, RDX	o spi / ou	6.0" OD, P110	0.26 [0.66]	2.3 % 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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^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 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

		Part Number	Derforating		Shot Density /	۸DI 10B	Performance in Stressed Berea (API RP19B Sec. 2)			
Carrier O.D.	Shaped Charge	Part Number	Condition	Explosive Phasing		Targeted Pipe	EHD^ (in)[cm]	EHD Variation Decentralized	TTP (in)[cm]	
	HELLFire 26	EC2-31K0671-26		6.0g, RDX			0.26 [0.66]	7.4 %		
3-1/8"	HELLFire 28	EC2-31K0671-28		6.0g, RDX	1 to 6 shots per cluster	4.5" OD, P110	0.28 [0.71]	5.5 %		
External	HELLFire 33	EC2-31K0771-33	Fluid	7.0g, RDX			0.33 [0.84]	2.9 %	3.2 [8.13]	
Scallops 6g-7g	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"	HELLFire 25	EC2-33K0571		5.0g, RDX			0.25 [0.64]	4.3 %		
Internal	HELLFire 30	EC2-33K0771	Fluid	7.0g, RDX	1 to 6 shots	5.5" - 6.0" OD, P110	0.30 [0.76]	2.7 %	3.5 [8.89]	
Scallops 5g-7g	HELLFire 36	EC2-33K0771-RX		7.0g, RDX	per cluster		0.36 [0.91]	4.6 %		
	HELLFire 25	EC2-33K0671-25		6.0g, RDX			0.25 [0.64]	3.9%		
3-3/8"	HELLFire 30	EC2-33K0771-30		7.0g, RDX	1 to 6 shots		0.30 [0.76]	5.5%	3.5 [8.89]	
External Scallops 6g-7g	HELLFire 33	EC2-33K0771-33	Fiuld	7.0g, RDX	per cluster	5.5 OD, P110	0.33 [0.84]	3.6%		
	HELLFire 34	EC2-33K0771-34		7.0g, RDX		-	0.34 [0.86]	5.8%		
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]	

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.

^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 availified by GEODynamics.

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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

Comion	Chanad Chanas		Perforating	Dhasing (Performance in Stressed Berea (API RP19B Sec. 2)			
O.D.	Shaped Charge	Part Number	Condition	Explosive	Charge Tilt Angle	Targeted Pipe*	EHD^ at 45° (in)[cm]	EHD Variation Decentralized	TTP (in)[cm]
3-1/8" 13g	SandIQ B	EC2-33A1371-SB		13.0g, RDX			0.28 [0.71]	4.2 %	
0.1.(0))	SandIQ C	EC2-33A1671-SC		16.0g RDX			0.31 [0.79]	3.8 %	
3-1/8 16g	SandlO D	EC2-33A1671-SD		16.0g, RDX			0.38 [0.97]	2.6 %	
IUg	SaluiQ D	EC2-33A1672-SD	Fluid	16.0g, HMX	400 / 450		0.35 [0.89]	1.7 %	50[1270]
3-1/8"	SandlO E	EC2-33A2071-SE	Fiulu	20.0g, RDX	00 / 45	J.J OD, P-110	0.42 [1.07]	3.7 %	5.0 [12.70]
20g		EC2-33A2072-SE		20.0g, HMX			0.41 [1.04]	4.8 %	
0.1/0"	CandlO F	EC2-33A2371-SF		23.0g, RDX			0.44 [1.12]	1.0 %	
3-1/8	SandiQ F	EC2-33A2372-SF		23.0g, HMX			0.43 [1.09]	6.0 %	
y	SandIQ G	EC2-33A2371-SG		23.0g, RDX			0.51 [1.30]	5.2 %	

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

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 availified by GEODynamics.

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Shaped Charges Dual Casing

GEODynamics

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	Shawad Charge	Dout Number	Perforating	Evalacivo	Shot Density /	Inne	er Casing	Outer Casing	
O.D.	Shaped Charge	Part Number	Condition	Explosive	Phasing	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"	2711 Refrax	EC2-27A1171-R	Eluid	11.0g, RDX	$4 \operatorname{cnf} / 40^{\circ}$	4 O" D110	0.29-0.30 [0.74-0.76]	5 5" D110	0.37-0.41 [0.94-1.04]
11g-15g	2715 Refrax	EC2-27A1571-R	Fiulu	15.0g, RDX	0 spi / 00	4.0 PII0	0.34-0.36 [0.86-0.91]	J.J PIIU	0.34-0.42 [0.86-1.07]
	3314 Refrax	EC2-33A1471-D		14.0g, RDX		European de di 4 O"	0.33-0.33 [0.84-0.84]		0.30-0.30 [0.76-0.76]
0.4.(0)	3316 Refrax	EC2-33A1671-D		16.0g, RDX	6 spf / 60°	Expanded 4.0	0.37-0.38 [0.94-0.95]	5.5" P110	0.35-0.35 [0.89-0.89]
3-1/8	3320 Refrax	EC2-33A2071-D	Fluid	20.0g, RDX		FIIU	0.41-0.42 [1.04-1.07]		0.40-0.40 [1.02-1.02]
148-298	3316 Refrax	EC2-33A1671-D		16.0g, RDX	6 amf / 60%	4 E" D110	0.30-0.32 [0.76-0.81]	70"0110	0.39-0.41 [0.99-1.04]
	3323 Refrax	EC2-33A2371-D		23.0g, RDX	o shi / 60°	4.5 PII0	0.41-0.42 [1.04-1.07]	7.0 PII0	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. FLUID: Qualified for shooting in FLUID only with perforating systems qualified by GEODynamics.

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Shaped Charges Dynamic Underbalance Punchers, Circulating (Tubing Punchers)

GEODynamics

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	Tubing/Drill Pipe	Entrance Hole	Penetration	Carrier	Due duet Neme	Dout Number	Evplorivo	Exit Hole
Carrier O.D.	Part Number	(g), load	Wall Thickness (in)[cm]	(in)[cm]	(in)[cm]	O.D.	Product Name	Part Number	Explosive	(in)[cm]
			0.190 [0.4826]	0.45 [1.1430]	<=0.100	0.0/4	2708 GEOPunch RDX	EC2-27A0861	8.0g, RDX	
	IG39CS2	2./g, HMX	0.375 [0.9525]	0.31 [0.7874]	[0.254]	2-3/4",	2708 GEOPunch HMX	EC2-27A0862	8.0g, HMX	1.05 [2.67]
			0.275 [0.0525]	0.42[1.0022]		2 // 0	2708 GEOPunch HNS	EC2-27A0863	8.0g, HNS	
	TG39CM2	3.4g, HMX	0.375 [0.9525]	0.43 [1.0922]	<=0.100		2808 GEOPunch RDX	GEOPunch RDX EC2-28A0861 8.0g, RDX		
			0.500 [1.2700]	0.24 [0.6096]	[0.254]	2-7/8" 2808 GEOP	2808 GEOPunch HMX	EC2-28A0862	8.0g, HMX	1.05 [2.67]
1.0/1/"	TCOOCLO		0.500 [1.2700]	0.21 [0.5334]	<=0.100	2808 GEOPunch HNS 3308 GEOPunch RDX	2808 GEOPunch HNS	EC2-28A0863	8.0g, HNS	
1-9/10	IG39CL2	3.4g, HIMX	0.580 [1.4732]	0.18 [0.4572]	[0.254]		EC2-33A0861	8.0g, RDX	1.05 [2.67]	
			0 625 [1 5875]	0 28 [0 7112]	3-1/8", 3308 GE	3308 GEOPunch HMX	EC2-33A0862	8.0g, HMX		
	TG39CM2-78	3.4g, HMX	0.705 [4.0000]	0.17[0.4040]	[0 254]	0 0/0	3308 GEOPunch HNS	EC2-33A0863	8.0g, HNS	
-			0.785 [1.9939]	0.17 [0.4318]	[0:234]	Δ ["] 4008 GEOPunch RDX	4008 GEOPunch RDX	EC2-40A0861	8.0g, RDX	
	TG39CL2-88	3./σ HMX	0.750 [1.9050]	0.20 [0.5080]	<=0.100	4-1/2",	4008 GEOPunch HMX	EC2-40A0862	8.0g, HMX	1.05 [2.67]
	1007012-00	5. ₇₆ , I IIMA	0.885 [2.2479]	0.17 [0.4318]	[0.254]	7"	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



GEUDynamics

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					
	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)					
40	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					
	DET-60H212	Detonating Cord, 60 grain HMX LS (Detotec)					
60	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)					
	DET-80H212	Detonating Cord, 80g HMX LS Zytec					
	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)					
00	DET-80R111	Detonating Cord, 80 grain RDX Nylon (Detotec)					
80	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)					





GEODynamics*

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.

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							

TECHNICAL INFORMATION

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.





Packaging Information								
Quantity (per box)	50 pcs	100 pcs						
Croce Weight (per bey)	2.0 lb	4.0 lb						
GIUSS Weight (per bux)	.90 kg	1.81 kg						
Not Woight (por boy)	.12 lb	.23 lb						
Net weight (per box)	.05 kg	.10 kg						
Net Explosive Quantity	.07 lb	.14 lb						
(NEQ) (per box)	.03 kg	.06 kg						
Poy Dimonsions	12 w x 12 l x 7.5 h (in.)							
DUX DIMENSIONS	30.5 w x 30.5 l x 17.8 h (cm.)							
Droduct Woight	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. 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.

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

TECHNICAL INFORMATION

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.



Packaging Information							
Quantity (per box)	50 pcs	100 pcs					
Cross Weight (per boy)	2.0 lb	4.2 lb					
Gross weight (per box)	.90 kg	1.9 kg					
Not Woight (por boy)	.12 lb	.22 lb					
Net weight (per box)	.05 kg	.10 kg					
Net Explosive Quantity	.07 lb	.13 lb					
(NEQ) (per box)	.03 kg	.06 kg					
Poy Dimonsions	12 w x 12 l x 7.5 h (in.)						
DUX DIMENSIONS	30.5 w x 30.5 l x 17.8 h (cm.)						
Droduct Woight	15.4 grains						
FTOULLE WEIGHT	1 gram						
U.N. Proper Shipping Name	Components, explosi	ve train, n.o.s. (HNS)					
U. N. Number	UNC)384					
DOT Approval Number	EX2008080032						
LLNL Classification Code	1//S						

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 Initiation Point Mode of Fire Detonating Cord Compatible Perforating Charges Maximum Gun Swell (in)[mm]

ENVIRONMENTAL

Maximum Pressure (psi)[MPa] Maximum Tensile* (lbf)[kN] Multiple Shot & Phasing Options, one (1) to 10 shots per carrier Top-fired, wireline Select fire, addressable 80-grain round, factory-loaded FracIQ[®], Connex[®], Razor[®], Basix[™], Basix Frac, Refrax[™] 3.46 [87.88] @ 22.7g In Fluid; 3.60 [91.44] @ 19.0g Dry

20,000 [137.90] 140,000 [622.75] *Hardware Calculated Breaking Point



CARRIER SPECIFICATIONS

Carrier Assembly	Shot & Phasing Options		Gun Lengths Gun English		Gun End to First Sca	o Center of allop @ 0°Distance S to Shot		ce Shot Shot	Gross Weights (Fully Loaded)		Make-Up Lengths with Tandem Subs	
Fait Nulliber	# Shots	Phasing	(in)	(cm)	(in)	(mm)	(in)	(mm)	(lbs)	(kgs)	T076 (in)	T279 (in)
GIC31-001	1 Shot	0°	9.5	24.1		4.25 107.05	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	4.05				16.2	7.4	13.63	14.38-14.55
GIC31-B04	4 Shot	90°	15.5	39.4	4.25	107.95	2.0		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.



BIG HOLE

Carrier	Chanad Charge	Deut Number	Perforating	Evalorivo	Shot Density /	Shot Density / ^Casing O.D.		e in Concrete	Performance in	Stressed Berea	
O.D.	Shaped Charge	Part Number	Condition	dition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD [^] (in)[cm]	TTP (in)[cm]
3-1/8"	2222 Desity DU	EC2-33A2331	Fluid	22.7g, RDX	(anf / (0)	4.4.(0)"1.00	0.78 [1.98]	7.60 [19.30]			
23g	3323 Basix BH	EC2-33A2332	Fluid	22.7g, HMX	6 spt / 60°	4-1/2" L-80	0.79 [2.01]	7.80 [19.81]			

CONSTANT ENTRY HOLE AND PENETRATION

Corrier			Dorforating		Shot Density /		Performance in Stressed Berea (API RP19B Sec. 2)			
O.D.	Shaped Charge	Part Number	Condition	Explosive	Phasing	Targeted Pipe*	EHD^ (in)[cm]	EHD Variation Decentralized	TTP (in)[cm]	
2 1 /0"	FracIQ 20	EC2-33A1271		12.0g, RDX			0.22 [0.56]	5.5%	5.0 [12.70]	
3-1/8	Basix Frac 25	EC2-33A1271-BF	Fluid	12.0g, RDX	6 spf / 60°	4.5"-5.5" OD, P110	0.26 [0.66]	2.4 %	4.0 [10.16]	
128-138	FracIQ 25	EC2-33A1371		13.0g, RDX			0.26 [0.66]	4.1 %	5.0 [12.70]	
	FracIQ Connex 30	EC2-33A1471-FRX		14.0g, RDX			0.31 [0.79]	6.0 %	5.0 [12.70]	
3-1/8"	Basix Frac 30	EC2-33A1471-BF	Fluid	14.0g, RDX	$6 \operatorname{enf} / (0)$		0.31 [0.79]	4.0 %	4.0 [10.16]	
13g-16g	FracIQ 30	EC2-33A1671	Fluid	16.0g, RDX	o spi / ou	4.5 -5.5 OD, P110	0.31 [0.79]	3.1 %	5 0 [10 70]	
	FracIQ 30	EC2-33A1672		16.0g, HMX			0.34 [0.86]	3.8 %	5.0 [12.70]	
	FracIQ Connex 35	EC2-33A1671-FRX	Fluid	16.0g, RDX			0.36 [0.91]	5.0 %	5.0 [12.70]	
3-1/8" 16g-20g	Basix Frac 35	EC2-33A1871-BF		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	Fluid	19.0g, RDX	6 spf / 60°	4.5"-5.5" OD, P110	0.41 [1.04]	6.5 %	5.0 [12.70]	
0.1/0"	FracIQ 40	EC2-33A2371		23.0g, RDX			0.40 [1.02]	3.3 %		
3-1/8 10a-22a	FracIQ 40	EC2-33A2372		23.0g, HMX			0.41 [1.04]	3.8 %		
178-238	Basix Frac 40	EC2-33A2371-BF		23.0g, RDX			0.40 [1.02]	6.6 %	4.0 [40.47]	
	Basix Frac 40	EC2-33A2371-BF		23.0g, RDX		6.0" OD, P110	0.40 [1.02]	7.5 %	4.0 [10.16]	
0.1/0"	FracIQ 45	EC2-33A2071-45		20.0g, RDX			0.45 [1.14]	5.6 %	F 0 [40 70]	
3-1/8 20a-22a	FracIQ Connex 45	EC2-33A2371-FRX	Fluid	21.0g, RDX	6 spf / 60°	4.5"-5.5" OD, P110	0.45 [1.14]	3.2 %	5.0 [12.70]	
208-238	Basix Frac 45	EC2-33A2371-BF45		23.0g, RDX			0.45 [1.14]	5.9 %	4.0 [10.16]	
	FracIQ 50	EC2-33A2371-50 † EC2-33A2371-50G		23.0g, RDX		4.5"-5.5" OD, P110	0.50 [1.27]	1.5 %	5.0 [12.70]	
3-1/8"	FracIQ 50	EC2-33A2372-RX	Fluid	23.0g, HMX	6 spf / 60°	5.5" OD, P110	0.50 [1.27]	4.6 %		
23g	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.



DEEP PENETRATING/EXTREME DEEP PENETRATING

Carrier	Chanad Charge	Dout Number	Perforating	Evalaciva	Shot Density /	^Casing O.D.	Performance	e in Concrete	Performance in Stressed Berea		
O.D.	Snaped Charge	Part Number	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD^ (in)[cm]	TTP (in)[cm]	
	2210 Compay DV	EC2-33A1991-RX		19.0g, RDX					0.32 [0.81]	11.30 [28.70]	
	3319 CONNEX RX	EC2-33A1992-RX	+ Fluid or Dry	19.0g, HMX			0.51 [1.30] 0.49 [1.24]		0.32 [0.81]	11.60 [29.46]	
		EC2-33A1921		19.0g, RDX				42.07 [106.86]			
0.4.(0)	3319 Razor ADP	EC2-33A1922	+ Fluid or Dry	19.0g, HMX				41.10 [104.39]	0.43 [1.09]	14.60 [37.08]	
3-1/8 10a		EC2-33A1921-E		19.0g, RDX	$5 \text{ spt} / 60^{\circ} \text{ (Dry)}$	4-1/2" L-80	0.43 [1.09]	35.80 [90.93]			
17g	3314 BASIX ADP	EC2-33A1922-E	+ Fluid or Dry	19.0g, HMX	o spi / ou ⁻ (riuia)						
	3319 Basix XDP	EC2-33A1921-EG	Fluid	19.0g, RDX			0.43 [1.09]	35.70 [90.68]			
	3319 Basix DP	EC2-33A1951	+ Fluid an Dm/	19.0g, RDX			0.54 [1.37]	29.20 [74.17] 0.40 [1.02]			
		EC2-33A1952	+ Fluid or Dry	19.0g, HMX							
	3323 Connex SDP	EC2-33A2321-RC		22.7g, RDX					0.40 [1.02]	15.60 [39.62]	
		EC2-33A2322-RC		22.7g, HMX 22.7g, HNS					0.46 [1.17]	15.31 [38.89]	
		EC2-33A2323-RC							0.36 [0.91]	11.85 [30.10]	
		EC2-33A2321		22.7g, RDX					0.41 [1.04]	16.40 [41.66]	
3-1/8"	3323 Razor XDP	EC2-33A2322	Eluid	22.7g, HMX	(((00	1 1/2" 00	0.42 [1.07]	39.02 [99.11]	0.44 [1.12]	15.68 [39.83]	
23g		EC2-33A2323	- Fiula	22.7g, HNS	0 shi / 00	4-1/2 L-00	0.35 [0.89]	26.05 [66.17]	0.37 [0.94]	12.12 [30.78]	
		EC2-33A2321-E		22.7g, RDX			0.42 [1.07]	46.01 [116.87]	0.39 [0.99]	12.30 [31.24]	
	3323 BASIX ADP	EC2-33A2322-E		22.7g, HMX			0.43 [1.09]	46.37 [117.78]			
	2222 Pacity CLL	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	Shanad Charge	Dart Number	Perforating	Evolocivo	Shot Density /	Inne	er Casing	Outer Casing	
O.D.	Shapeu Charge	Part Nulliper	Condition	Explosive	Phasing	O.D./Material	EHD (in)[cm]	O.D./Material	EHD (in)[cm]
	3314 Refrax	EC2-33A1471-D		14.0g, RDX	6 spf / 60°	European de di 4 O"	0.33-0.33 [0.84-0.84]		0.30-0.30 [0.76-0.76]
3-1/8" 14g-23g	3316 Refrax	EC2-33A1671-D	Fluid	16.0g, RDX		P110	0.37-0.38 [0.94-0.95]	5.5" P110	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" D110	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		4.5 PII0	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.



GOOD HOLE

Carrier	Shaped Charge	Dout Number	Perforating		Shot Density /	^Casing O.D.	Performance in Concrete		Performance in Stressed Berea	
O.D.		Part Number	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD [^] (in)[cm]	TTP (in)[cm]
	2210 Compay VELL	EC2-33A1941-RC		19.0g, RDX					0.41 [1.04]	14.20 [36.07]
3-1/8" 19g	3319 Connex XEH	EC2-33A1942-RC	‡ Fluid or Dry	19.0g, HMX	5 spf / 60° (Dry) 6 spf / 60° (Fluid)	4 1 /0" 1 00		60 [1.52] 28.55 [72.52]	0.42 [1.07]	14.37 [36.50]
	3319 Basix GH	EC2-33A1941		19.0g, RDX		4-1/2 L-60	0.60 [1.52]			
		EC2-33A1942		19.0g, HMX						
3-1/8" 23g	3323 Connex XEH	EC2-33A2341-RC		22.7g, RDX		4 1 /0"			0.43 [1.09]	15.60 [39.62]
		EC2-33A2342-RC		22.7g, HMX		4-1/2		0.	0.43 [1.09]	15.89 [40.36]
	2222 Dealy CLI	EC2-33A2341-E	Fluid	22.7g, RDX 22.7g, HMX	0 Spi / 00	5-1/2" L-80	0.48 [1.22]	31.40 [79.76]		
	3323 Basix GH	EC2-33A2342-E			1	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

Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel
Round steel tube strip; bend tab retention
Disposable switch tandem sub
3.15 [80.01] / 0.315 [8.00] or 3.125 [79.38] / 0.3125 [7.94]
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. 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.

STRATX® Perforating System 3-1/8 in (79 mm), GIC Spiral

COMPONENTS AND ACCESSORIES

Description	Part Number(s)
3.13" Direct Connect Quick Change Assy (direct connection to top gun tandem)	GN-QC31-GIC31
Intermediate Rebuild Kit (contacts, teflon tubing, screw, spring, insulating ret.)	RKI-GN-QC31-0001
Complete Rebuild Kit with O-Rings (all required parts)	RKC-GN-QC31-0001
3.13" STRATX® Portless Tandem Subs, Disposable Assembly	GN-R31-T076-A
Orienting Disposable Tandem Sub Assembly	GN-R31-T279-A
Lock Ring for Orienting Disposable Tandem (left hand threads)	GN-R31-L75-320
O-Ring Materials and Size, Nitrile (Standard)	OR-N569-230
Viton 95D (optional)	OR-V95G-230
STRATX® PIC Module with Detonator	DT-EPIC-R140
EPIC [™] Gen 2V Detonator Module (alternate shell design)	DT-EPIC2-110-R140
Detonating Cord	DET-80R111 (RDX)
	DET-80H212(HMX)
EPIC™ Module Ignitor (T076-A tandem sub in bottom gun (sub mates with -GIC crossover))	DT-0425-106
3.13" Crossover, GI Box (Bottom Gun Tandem) to Setting Tool	
GI Box x Size 10 Setting Tool	GN-RX31-BK10-GIC
GI Box x Size 20 Setting Tool	GN-RX31-BK20-GIC
GI Box x 3.63" Wireline Compact Setting Tool	GN-RX31-3625-GIC
GI Box x 3.5" Shorty Setting Tool	GN-RX31-3500-GIC
GI Box x Size 20 Diamondback Setting Tool	GN-RX31-DB20-GIC
3.13" Crossover to Pumpdown Sub	
GI Pin x 3.13" Conventional Pin, (connects bottom gun to pumpdown sub	GN-RX31-GIC31-050
3.13" Bull Plug (bottom gun, e.g., for toe preps in vertical wells)	GN-R31HF-0022
3.13" Plastic Thread Protectors, Carrier (Gun) (o-ring: OR-N569-232)	GN-THD-31HF-100
Tandem Sub Protector	GN-THD-31GI-065P
3.13" Disposable Portless Top Sub Assy, 2.75" ACME Pin x GI Pin	CN D21 T172 A
For existing industry standard quick change connections	GN-K31-11/3-A
3.13" Disposable Crossover, GI Pin x 1.63" ACME Box (disposable bottom sub)	GN-R31-T172-A
Thread Protector (1.63" box connection)	EM-EL1-THD-GOCQP
Thread Protector o-ring	OR-N569-222
For existing industry-standard quick change connections	

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



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[®] Perforating System 3-1/8 in (79 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
Initiation Point
Mode of Fire
Perforating Condition
Detonating Cord
Compatible Perforating Charges
Maximum Gun Swell (in)[mm]

ENVIRONMENTAL

Maximum Pressure (psi)[MPa] Maximum Tensile* (lbf)[kN] (shots 1-3: 0°, 120°, 240°; shots 4-6: 60°, 180°, 300°) Top-fired, wireline Select fire, addressable In Fluid 80-grain round, factory-loaded HELLFire® 3.46 [87.88] @ 7.0g

1 to 6 shots per cluster, 120° planar phasing



ure (psi)[MPa] 16,000 [110.32] e* (lbf)[kN] 140,000 [622.75] *Hardware Calculated Breaking Point

CARRIER SPECIFICATIONS

Carrier Assembly Part Number	Shot & Phasing Options Gun L		Gun L	Gun Lengths Gun End to First Scal		o Center of llop @ 0°	Distance Shot to Shot		Approx. Weights (Fully Loaded)		Make-Up Lengths 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	2.07	98.30	N/A				8.13	8.88-9.05
GIC31-HF06	4-6	60°	9.50	24.13	3.07		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.



HELLFire® CONSTANT ENTRY HOLE AND PENETRATION - EXTERNAL SCALLOPS

Carrier			Derforating		Shot Donsity /		Performance in Stressed Berea (API RP19B Sec. 2)			
O.D.	Shaped Charge	Part Number	Condition	Explosive	Phasing	Targeted Pipe	EHD [*] (in)[cm]	EHD Variation Decentralized	TTP (in)[cm]	
3-1/8"	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 %		
Scallons	HELLFire 33	EC2-31K0771-33		7.0g, RDX			0.33 [0.84]	2.9 %		
6g-7g	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.

^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.

STRATX[®] Perforating System 3-1/8 in (79 mm), HELLFire[®] (GIC-HF) Planar

COMPONENTS AND ACCESSORIES

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

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





3.13" Crossover, GI Box x Size 20 Diamondback Setting Tool GN-RX31-DB20-GIC Disposable Portless Tandem Sub Assembly GN-R31-T076-A

Direct Connect Quick Change Assy GN-QC31-GIC31

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.

SandlQ[®] 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 Shot & Phasing Options 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 [:

 Maximum Tensile* (lbf)[kN]
 140,000

20,000 [137.90] 140,000 [622.75] *Hardware Calculated Breaking Point

CARRIER SPECIFICATIONS

Carrier Assembly	Shot & Phasing Options		Gun Lengths		Gun End to Center of First Scallop @ 0°		Distance Shot to Shot		Shipping Assy Weights		Make-Up Lengths with Tandem Subs	
Part Nulliper	# Shots	Phasing	(in)	(cm)	(in)	(mm)	(in)	(mm)	(lbs)	(kgs)	Make-Up with Tande T076 (in) 10.63 15.13 15.13 19.13 18.13 21.63 25.63 29.63 40.13 43.63	T279 (in)
GIC31-SO01	1	0°	10.5	26.7			N/A	N/A	7.9	3.6	10.63	11.38-11.55
GIC31-SO02	2	0°	15.0	38.1		96.65			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			0.50	88.9	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	3.805				17.3	7.9	21.63	22.38-22.55
GIC31-SB04	4	90°	21.5	54.6			3.50		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 Acces	sories for a	ancillary	equipme	ent.							



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SandIQ[®] 45° TILT ANGLE

Carrier			Doutonating		Dhasing /		Performance in Stressed Berea (API RP19B Sec. 2)			
O.D.	Shaped Charge	Part Number	Condition	Explosive	Charge Tilt Angle	Targeted Pipe*	EHD [*] at 45° (in)[cm]	EHD Variation Decentralized	TTP (in)[cm]	
	SandIQ B	EC2-33A1371-SB		13.0g, RDX		5.5" OD, P-110	0.28 [0.71]	4.2 %		
-	SandIQ C	EC2-33A1671-SC		16.0g RDX	60° / 45°		0.31 [0.79]	3.8 %	5.0 [12.70]	
	SandIQ D	EC2-33A1671-SD	Fluid	16.0g, RDX			0.38 [0.97]	2.6 %		
		EC2-33A1672-SD		16.0g, HMX			0.35 [0.89]	1.7 %		
3-1/8"	SandlO E	EC2-33A2071-SE		20.0g, RDX			0.42 [1.07]	3.7 %		
	SandiQ E	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" SandlQ charge performance is compatible in 4.5" 11.6-15.1# and 5.5" 17-23# P-110 casing.

HARDWARE

Gun Body Configuration/MaterialThreaded and scalloped, proprietary gun steel, similar to 41XX alloy steelCharge Tube Type & RetentionRound steel tube strip; bend tab retentionType of Tandem ConnectionDisposable switch tandem subsNominal 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 Connections2.750" 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. 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), SandIQ[®] (GIC-SIQ) Spiral

COMPONENTS AND ACCESSORIES

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

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





3.13" Crossover, GI Box x Size 20 Diamondback Setting Tool GN-RX31-DB20-GIC



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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[®] 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
Initiation Point
Mode of Fire
Perforating Condition
Detonating Cord
Compatible Perforating Charges
Maximum Gun Swell (in)[mm]

ENVIRONMENTAL

Maximum Pressure (psi)[MPa] Maximum Tensile* (lbf)[kN] 1 to 6 shots per cluster, 120° planar phasing (shots 1-3: 0°, 120°, 240°; shots 4-6: 60°, 180°, 300°) Top-fired, wireline Select fire, addressable In Fluid 80-grain round, factory-loaded HELLFire[®] Ø3.48" [88.39] @ 7.0g



15,000 [103.42] 175,000 [778] *Hardware Calculated Breaking Point

CARRIER SPECIFICATIONS

Carrier Assembly	Shot & Phasing Options		Gun Lengths		Gun End to Center of First Scallop @ 0°		Distance Shot to Shot		Approx. Weights (Fully Loaded)		Make-Up Lengths with T076 Tandem Sub	
Part Nulliper	# Shots	Phasing	(in)	(cm)	(in)	(mm)	(in)	(mm)	(lbs)	(kgs)	(in)	(cm)
GIC33-HF06	1-3	120°	0.5	04.4	2.07	00.20	1 4 0	24.07	0.00	4.50	0.42	24 5
(External Scallops)	4-6	60°	9.5	24.1	3.07	90.30	1.42	30.07	9.93	4.50	9.03	24.5
GIC33-HD06	1-3	120°	0.5		l.1 3.87	00.00	1.40	1.42 36.07			0.40	04.5
(Internal Scallops)	4-6	60°	9.5	24.1		98.30	1.42				9.63	24.5
Fully Loaded (Externally Scalloped) 6-Shot Carrier with attached Tandem Sub 13.79 6.26												

Refer to Components and Accessories for ancillary equipment.

GIC33-HD06

MORE CHARGE PERFORMANCE OPTIONS (SEE NEXT PAGE FOR DETAILS)



GIC33-HF06 Externally-Scalloped Carrier

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CONSTANT ENTRY HOLE AND PENETRATION

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

Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel
Round steel tube strip; bend tab retention
Disposable switch tandem sub
3.375" [86] / 0.375" [9.53]
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.

STRATX® Perforating System 3-3/8 in (86 mm), HELLFire® (GIC-HF) Planar

COMPONENTS AND ACCESSORIES

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



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

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Patents: www.perf.com/patents

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			

Assembled View

*Rebuild Kit BOM lists on next page

DIRECT CONNECTION TOP CONNECTOR ASSY GN-QC31-GIC31

Housing Stamped P/N GN-QC31-0041



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

GEODynamics®

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 th	e quick rebuild kit.	

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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	
	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"	
3-1/8"	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"	
	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"	
3-3/8"	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	0-001; O-Ring: OR-N	569-213	



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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
- Initiation Point Mode of Fire Perforating Condition Detonating Cord Compatible Perforating Charges Maximum Gun Swell (in)[mm]

ENVIRONMENTAL

Maximum Pressure (psi)[MPa] Maximum Tensile* (lbf)[kN] 1 to 6 shots per cluster, 120° planar phasing (shots 1-3: 0°, 120°, 240°; shots 4-6: 60°, 180°, 300°) Bottom-fired, wireline Select fire, addressable In Fluid 80-grain round, factory-loaded HELLFire[®] 3.46 [87.88] @7.0g



16,000 [110.32] TBD *Hardware Calculated Breaking Point

CARRIER SPECIFICATIONS

Carrier Assembly Part	Shot & Phas	sing Options	Gun Lengths		Gun End to Center of First Scallop @ 0°		Distance Shot to Shot		Approx. Weights	
NUILIDEI	# Shots	Phasing	(in)	(cm)	(in)	(mm)	(in)	(mm)	(Fully Loaded)	
	1-3	120°	9.50 24.13	9.50 24.13	0.50 04.40	9.50 24.13 3.87	00.00	1.40	24.07	0.05 11. (()
GHF31-06C	4-6	60°			7.50		3.87	98.30	1.42	36.07
Fully Loaded 6-Shot Carrier with attached Tandem Sub20.0 lb/ft										

Refer to Components and Accessories for ancillary equipment.





HELLFire® CONSTANT ENTRY HOLE AND PENETRATION - EXTERNAL SCALLOPS

Corrior	Shaped Charge		Derforating	rating Explosive	Shot Density / Phasing		Performance in Stressed Berea (API RP19B Sec. 2)			
O.D.		Part Number	Condition			Targeted Pipe	EHD [^] (in)[cm]	EHD Variation Decentralized	TTP (in)[cm]	
0.4.(0)	HELLFire 26	EC2-31K0671-26	6.0g, RDX 6.0g, RDX Fluid 7.0g, RDX 7.0g, RDX 7.0g, RDX		6.0g, RDX			0.26 [0.66]	7.4 %	
3-1/8"	HELLFire 28	EC2-31K0671-28		6.0g, RDX	1 + - (+ - + -		0.28 [0.71]	5.5 %		
Scallons	HELLFire 33	EC2-31K0771-33		7.0g, RDX	1 to 0 shots	4.5" OD, P110	0.33 [0.84]	2.9 %	3.2 [8.13]	
- 5callops - 6σ-7σ	HELLFire 36	EC2-31K0771-36		7.0g, RDX	per cluster		0.36 [0.91]	1.6 %		
0575	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) Lower sub connection o-rings, 3-1/8" Bottom sub shoot-thru plug and o-ring for shoot-thru plug	GN-R31HF-T075ST OR-N569-230 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 Carrier (Gun) Protector, 3-1/8" Carrier (Gun) Plastic Plug Protector, 3-1/8" Top Sub (Top Pin) Thread Protector, 3-1/8" Tandem Sub & Bull Plug Thread Protector, 3-1/8" Bottom Sub Thread Protector (lower connection), 3-1/8"	GN-THD-312-030 GN-THD-312-300 GN-THD-312-020 GN-THD-312-040 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 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 Options
- Initiation Point Mode of Fire Perforating Condition Detonating Cord Compatible Perforating Charges Maximum Gun Swell (in)[mm]

ENVIRONMENTAL

Maximum Pressure (psi)[MPa] Maximum Tensile* (lbf)[kN] 1 to 6 shots per cluster, 120° planar phasing (shots 1-3: 0°, 120°, 240°; shots 4-6: 60°, 180°, 300°) Bottom-fired, wireline Select fire, addressable In Fluid 80-grain round, factory-loaded HELLFire® Ø3.48" [88.39] @ 7.0g

80° 120'

15,000 [103.42] 331,900 [1476.36] *Hardware Calculated Breaking Point

CARRIER SPECIFICATIONS

Carrier Assembly Part	Shot & Phas	ing Options	Gun L	engths	Gun End to Center of First Scallop @ 0°		Distance Shot to Shot		Approx. Weights (Fully Loaded)	
Number	# Shots	Phasing	(in)	(cm)	(in)	(mm)	(in)	(mm)	(lbs)	(kgs)
GHF33-06	1-3	120°	0.50	24.13	2.07	98.30	1.42	36.07	10.00	4.54
(Internal Scallops)	4-6	60°	9.50		3.07					
GHF33-06C	1-3	120°	0.50	24.12	2.07	98.30	1.42	36.07	10.00	4.54
(External Scallops)	4-6	60°	9.50	24.13	3.87					
Fully Loaded 6-Shot Carrier with attached Tandem Sub										10.89

Refer to Components and Accessories for ancillary equipment.



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



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

CONSTANT ENTRY HOLE AND PENETRATION

Corrier		Derforating Shot Density /			Performance in	Performance in Stressed Berea (API RP19B Sec. 2)			
O.D.	Shaped Charge	Part Number	Condition Explosive Phasing		Phasing	Targeted Pipe	EHD^ (in)[cm]	EHD Variation Decentralized	TTP (in)[cm]
3-3/8"	HELLFire 25	EC2-33K0571		5.0g, RDX			0.25 [0.64]	4.3 %	
Internal	HELLFire 30	EC2-33K0771	Fluid	7.0g, RDX	1 to 6 shots per cluster	5.5" - 6.0" OD, P110	0.30 [0.76]	2.7 %	3.5 [8.89]
Scallops 5g-7g	HELLFire 36	EC2-33K0771-RX		7.0g, RDX			0.36 [0.91]	4.6 %	
3-3/8"	HELLFire 25	EC2-33K0671-25		6.0g, RDX			0.25 [0.64]	3.9%	
External	HELLFire 30	EC2-33K0771-30	Eluid	7.0g, RDX	1 to 6 shots	5.5" OD,	0.30 [0.76]	5.5%	2 5 [0 00]
Scallops	HELLFire 33	EC2-33K0771-33	Fiuld	7.0g, RDX	per cluster	P110	0.33 [0.84]	3.6%	3.3 [0.07]
6g-7g	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. ^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.

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

GEODynamics®

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 Initiation Point Mode of Fire Perforating Condition Detonating Cord Compatible Perforating Charges

ENVIRONMENTAL

Maximum Gun Swell (in)[mm]

Maximum Pressure (psi)[MPa] Maximum Tensile* (lbf)[kN] 1 to 6 shots per cluster, 120° planar phasing (shots 1-3: 0°, 120°, 240°; shots 4-6: 60°, 180°, 300°) Bottom-fired, wireline Select fire, addressable In Fluid 80-grain round, factory-loaded HELLFire[®] 4.60 [116.84] with bur @ 12.0g



15,000 [103.42]
 318,000 [1,414.53] *Hardware Calculated Breaking Point

CARRIER SPECIFICATIONS

Carrier Assembly Part	Shot & Phasing Options		Gun Lengths		Gun End to Center of First Scallop @ 0°		Distance Shot to Shot		Approx. Weights (Fully Loaded) (lb/ft)	
Number	# 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



CONSTANT ENTRY HOLE AND PENETRATION

			Derforating		Shot Donsity /		Performance in Stressed Berea (API RP19B Sec. 2)			
Carrier O.D.	Shaped Charge	Part Number	Condition	Explosive	Density /	API 17D Targeted Dine		EHD Variation	TTD (in)[cm]	
			Condition		Flidsling	laigeteu Pipe		Decentralized		
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.

^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 Shot & Phasing Options, 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	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)	(Ibs)	(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		va	ries	23.0	10.43
GT31-45-B004A	4	90°	27	68.58	5.036	127.91	va	ries	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[®] 45° TILT ANGLE

Comion		Derforating Design / ADI 10P			Performance in Stressed Berea (API RP19B Sec. 2)				
O.D.	Shaped Charge	Part Number	Condition	Explosive	Charge Tilt Angle	Targeted Pipe*	EHD [*] at 45° (in)[cm]	EHD Variation Decentralized	TTP (in)[cm]
3-1/8" 13g	SandIQ B	EC2-33A1371-SB		13.0g, RDX			0.28 [0.71]	4.2 %	
2.1/0"	SandIQ C	EC2-33A1671-SC		16.0g RDX	60° / 45°	5.5" OD, P-110	0.31 [0.79]	3.8 %	
3-1/8″	SandIQ D	EC2-33A1671-SD	Fluid	16.0g, RDX			0.38 [0.97]	2.6 %	
10g		EC2-33A1672-SD		16.0g, HMX			0.35 [0.89]	1.7 %	E O [10 70]
3-1/8"	SandlO E	EC2-33A2071-SE		20.0g, RDX			0.42 [1.07]	3.7 %	5.0 [12.70]
20g		EC2-33A2072-SE		20.0g, HMX			0.41 [1.04]	4.8 %	
0.1/0"	Candlo F	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 %	
	SandIQ G	EC2-33A2371-SG		23.0g, RDX			0.51 [1.30]	5.2 %	

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

HARDWARE

Gun Body Configuration/MaterialThreaded and scalloped, proprietary gun steel, similar to 41XX alloy steelCharge Tube Type & RetentionRound steel tube strip; bend tab retentionType of Tandem ConnectionSwitch tandem subNominal 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 Connections2.750" 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. 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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Patents: www.perf.com/patents

SandIQ[®] PRO Perforating System 3-1/8 in (79 mm), GT Spiral

COMPONENTS AND ACCESSORIES

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





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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



Bull Plug, Standard GN-R31-0022



Plug/Shoot Adapter GN-R31-ST30

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 Initiation Point Mode of Fire Detonating Cord Compatible Perforating Charges Maximum Gun Swell (in)[mm]

ENVIRONMENTAL

Maximum Pressure (psi)[MPa] Maximum Tensile* (lbf)[kN] Multiple Shot & Phasing Options; one (1) to 19 shots per carrier Bottom-fired, wireline, slickline, or tubing Mechanical or addressable, select fire 80-grain round ← FracIQ[®], Connex[®], Razor[®], Basix[™], Refrax[™] 2.91 [73.91] @ 15.0g In Fluid; 3.02 [76.20] @ 15.0g Dry

25,000 [172.37] 176,600 [785.56] *Hardware Calculated Breaking Point



CARRIER SPECIFICATIONS

Carrier Assembly	Shot & Pl	Shot & Phasing Options		Gun Lengths		o Center of allop @ 0°	Distance S	hot to Shot	Shipping Assembly Weight	
Part Number	# Shots	Phasing	(in)	(cm)	(in)	(mm)	(in)	(mm)	(lbs)	(kgs)
GLB27-0001	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		15	38.10					13.0	10.0
GLB27-A007	7		24	60.96					21.0	10.0
GLB27-A010	10	400	30	76.20	40	152 /	2.0	50.00	27.0	12.0
GLB27-A013	13	00	36	91.44	0.0	132.4	2.0	50.00	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		18	45.72			3.0	76.20	15.0	8.0
GLB27-B004	4		18	45.72					15.0	8.0
GLB27-B007	7		24	60.96					21.0	10.0
GLB27-B010	10	90°	30	76.20	6.0	152.4	2.0	50.00	27.0	12.0
GLB27-B013	13		36	91.44			2.0	50.60	30.0	14.0
GLB27-B016	16		42	106.68					35.0	16.0
GLB27-B019	19		48	121.92	1				39.0	18.0
Refer to Components and Ad	ccessories for	r ancillarv eauipm	ent.							



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CARRIER SPECIFICATIONS, cont.

Carrier Assembly	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		18	45.72			3.0	76.20	15.0	8.0
GLB27-G004	4		18	45.72		5.0 152.4	2.0	50.80	15.0	8.0
GLB27-G007	7		24	60.96					21.0	10.0
GLB27-G010	10	120°	30	76.20	6.0				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			Derforating		Shot Density /		Performance in Stressed Berea (API RP19B Sec. 2)			
O.D.	Shaped Charge	Part Number	Condition	Explosive Phasing		Targeted Pipe*	EHD [^] (in)[cm]	EHD Variation Decentralized	TTP (in)[cm]	
0.0/4	FracIQ 30	EC2-27A1171		11.0g, RDX		4 5" 00	0.30 [0.76]	2.7 %		
2-3/4" 11g-15g	FracIQ 35	EC2-27A1271	Fluid	12.0g, RDX	6 spf / 60°	4.5° UD	0.35 [0.89]	5.9 %	5.0 [12.70]	
	FracIQ 40	EC2-27A1571		15.0g, RDX		P110	0.40 [1.02]	6.3 %		

DEEP PENETRATING/EXTREME DEEP PENETRATING

Carrier	Shanad Charge	Dart Number	Perforating	Evplosivo	Shot Density /	^Casing O.D. Performance in Concre		e in Concrete	Performance in Stressed Berea	
O.D.	Shapeu Charge	Part Number	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD^ (in)[cm]	TTP (in)[cm]
	2715 Connov SDD	EC2-27A1521-RC		15.0g, RDX					0.30 [0.76]	11.70 [29.72]
	2713 Connex 3DP	EC2-27A1522-RC		15.0g, HMX					0.31 [0.79]	12.18 [30.94]
2.2/4"		EC2-27A1521		15.0g, RDX			0.39 [0.99]	37.45 [95.12]		
2-3/4 15a	2-3/4" 2715 Razor XDP	EC2-27A1522	In Fluid or Dry	15.0g, HMX	6 spf /60°	4-1/2" L-80	0.39 [0.99]	37.45 [95.12]		
TOR		EC2-27A1523		15.0g, HNS		-			0.31 [0.79]	10.50 [26.67]
	2715 Pasiv VDD	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.

^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.

DUAL CASING

Carrier Shaped Charge		Dart Number	Perforating	Evalacivo	Shot Density /	Inner Casing		Outer Casing	
O.D.	Shaped Charge	Part Number	Condition	Explosive	Phasing	O.D./Material	EHD (in)[cm]	O.D./Material	EHD (in)[cm]
2-3/4"	2711 Refrax	EC2-27A1171-R	Eluid	11.0g, RDX	(amf / (0)	4.0" D110	0.29-0.30 [0.74-0.76]	E E" D110	0.37-0.41 [0.94-1.04]
11g-15g	2715 Refrax	EC2-27A1571-R	Fiuld	15.0g, RDX	o spi / ou	4.0 P110	0.34-0.36 [0.86-0.91]	5.5 P110	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 Nu	ımber(s)		
Top Subs, 2-3/4"				
Top Sub, TCP	GN-R27-0020			
Top Sub, Wireline	GN-R27-0035			
Top Sub Lift Sub Assembly, 2-3/4" and 2-7/8"	TC-QC	27-000		
Tandem Subs, 2-3/4"				
Tandem Sub, TCP	GN-R2	7-0021		
Switch Tandem Sub, Wireline, Ported, 3" make-up length	GN-R27	-T100-A		
Aligning Switch Sub, LH Lock Ring	GN-R27	-T125-A		
TCP Transfer Kit (2-3/4" through 4")	GN-00	0-0025		
O-Ring Materials and Size Nitrile (standard option) Viton (with back-up rings required for > 325°F) Back-up rings for > 325°F	Top Connection OR-N569-225 OR-V95G-225 OR-B225-2160	Gun Connection OR-N569-227 OR-V95G-227 OR-B227-2405		
Thread Protectors Top Sub (Top Pin) Carrier (Gun) Protector Tandem Sub & Bull Plug Protector	GN-THD- GN-THD GN-THD	QC27-020 -275-030 -275-040		
Bull Plugs 2-3/4" Standard 2-3/4" with 2-3/8" EUE Pin 2-3/4" Shoot-Thru 2-3/4" Shoot-Thru Assembly (GN-R27-T150-A and GN-R27-ST27)	GN-R2 GN-R2 GN-R2 GN-R2	7-0022 7-0023 7-ST27 7-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 Initiation Point Mode of Fire Detonating Cord Compatible Perforating Charges Maximum Gun Swell (in)[mm]

ENVIRONMENTAL

Maximum Pressure (psi)[MPa] Maximum Tensile* (lbf)[kN] Multiple Shot & Phasing Options, one (1) to 14 shots per carrier Bottom-fired, wireline, slickline, or tubing Mechanical or addressable, select 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

22,500 [155.13] 202,300 [900] *Hardware Calculated Breaking Point



CARRIER SPECIFICATIONS

Carrier Assembly	Shot & P	Shot & Phasing Options		Gun Lengths		o Center of allop @ 0°	Distance Shot to Shot		Shipping Assembly Weight	
Fait Nulliper	# Shots	Phasing	(in)	(cm)	(in)	(mm)	(in)	(mm)	(lbs)	(kgs)
GLB31-O002	2	0°	15	38.1					15.0	4.0
GLB31-J002	Z	180°	15	38.1			2.0	74.00	15.0	0.0
GLB31-O003	2	0°	18	45.72			3.0	70.20		
GLB31-G003	3	120°	18	45.72					18.0	8.2
GLB31-B004	4	90°	18	45.72						
GLB31-P005S	F	72°	20	50.80		152.4			20.0	0.0
GLB31-A005	5	60°	20	50.80	4.0				20.0	9.0
GLB31-A006	1	60°	22	55.88	0.0				22.0	10.0
GLB31-O006	0	0°	22	55.88			2.0	50.00	22.0	10.0
GLB31-A007T	7	60°	24	60.96			2.0	50.80	24.0	10.9
GLB31-R008	8	90° + 45°	26	66.04					26.0	11.8
GLB31-A010	10	60°	30	76.20					20.0	10 E
GLB31-R010	10	72°	30	76.20					30.0	13.5
GLB31-A013	13	60°	36	91.44					36.0	16.0

Refer to Components and Accessories for ancillary equipment.



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BIG HOLE

Carrier Shaped Charge	Shanad Charge	Dart Number	Perforating	Perforating Evaluative	Shot Density /	^Casing O.D.	Performance in Concrete		Performance in Stressed Berea	
O.D.	Shaped Charge	Part Number	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD [^] (in)[cm]	TTP (in)[cm]
3-1/8"	2222 Desity DU	EC2-33A2331	Fluid	22.7g, RDX	(anf / (0)	4.4.(0)"1.00	0.78 [1.98]	7.60 [19.30]		
23g	JJZJ BASIX BH	EC2-33A2332	Fluid	22.7g, HMX	0 SPI / 00	4-1/2 L-60	0.79 [2.01]	7.80 [19.81]		

CONSTANT ENTRY HOLE AND PENETRATION

Corrier			Dorforating		Shot Donsity /		Performance in	n Stressed Berea (AP	RP19B Sec. 2)	
O.D.	Shaped Charge	Part Number	Condition	Explosive	Phasing	Targeted Pipe*	EHD^ (in)[cm]	EHD Variation Decentralized	TTP (in)[cm]	
2 1 /0"	FracIQ 20	EC2-33A1271		12.0g, RDX			0.22 [0.56]	5.5%	5.0 [12.70]	
3-1/0 12σ-13σ	Basix Frac 25	EC2-33A1271-BF	Fluid	12.0g, RDX	6 spf / 60°	4.5"-5.5" OD, P110	0.26 [0.66]	2.4 %	4.0 [10.16]	
12g-13g	FracIQ 25	EC2-33A1371		13.0g, RDX			0.26 [0.66]	4.1 %	5.0 [12.70]	
	FracIQ Connex 30	EC2-33A1471-FRX		14.0g, RDX			0.31 [0.79]	6.0 %	5.0 [12.70]	
3-1/8"	Basix Frac 30	EC2-33A1471-BF	Fluid	14.0g, RDX	6 spf / 60°	4 5"-5 5" OD P110	0.31 [0.79]	4.0 %	4.0 [10.16]	
13g-16g	FracIQ 30	EC2-33A1671	Fluiu	16.0g, RDX		4.J -J.J OD, FII0	0.31 [0.79]	3.1 %	50[1270]	
	FracIQ 30	EC2-33A1672		16.0g, HMX			0.34 [0.86]	3.8 %	5.0 [12.70]	
	FracIQ Connex 35	EC2-33A1671-FRX		16.0g, RDX			0.36 [0.91]	5.0 %	5.0 [12.70]	
3-1/8"	Basix Frac 35	EC2-33A1871-BF	Eluid	18.0g, RDX	g, RDX		0.36 [0.91]	3.4 %	4.0 [10.16]	
16g-20g	FracIQ 35	EC2-33A2071	Fluiu	20.0g, RDX	0 shi / 00	4.3 - 5.3 OD, P110	0.36 [0.91]	2.5 %	5 0 [12 70]	
	FracIQ 35	EC2-33A2072		20.0g, HMX			0.37 [0.94]	3.0 %	5.0 [12.70]	
	FracIQ Connex 40	EC2-33A1971-FRX		19.0g, RDX	6 spf / 60°		0.41 [1.04]	6.5 %	5.0 [12.70]	
2 1 /0"	FracIQ 40	EC2-33A2371		23.0g, RDX		4 5"-5 5" OD P110	0.40 [1.02]	3.3 %		
3-1/0 19a-23a	FracIQ 40	EC2-33A2372	Fluid	23.0g, HMX		4.3 - 5.3 OD, P110	0.41 [1.04]	3.8 %		
175 255	Basix Frac 40	EC2-33A2371-BF		23.0g, RDX			0.40 [1.02]	6.6 %	40[1014]	
	Basix Frac 40	EC2-33A2371-BF		23.0g, RDX		6.0" OD, P110	0.40 [1.02]	7.5 %	4.0 [10.10]	
2 1 /0"	FracIQ 45	EC2-33A2071-45		20.0g, RDX			0.45 [1.14]	5.6 %	50[1270]	
20g-22g	FracIQ Connex 45	EC2-33A2371-FRX	Fluid	21.0g, RDX	6 spf / 60°	4.5"-5.5" OD, P110	0.45 [1.14]	3.2 %	5.0 [12.70]	
205 205	Basix Frac 45	EC2-33A2371-BF45		23.0g, RDX			0.45 [1.14]	5.9 %	4.0 [10.16]	
3-1/8" 23g Fraclu Basix F Fraclu Fraclu Fraclu Fraclu	FracIQ 50	EC2-33A2371-50 † EC2-33A2371-50G		23.0g, RDX		4.5"-5.5" OD, P110	0.50 [1.27]	1.5 %	5.0 [12.70]	
	FracIQ 50	EC2-33A2372-RX	Fluid	23.0g, HMX	6 spf / 60°	5.5" OD, P110	0.50 [1.27]	4.6 %		
	Basix Frac 50	EC2-33A2371-BF50	Fluid	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.

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DEEP PENETRATING/EXTREME DEEP PENETRATING

Carrier	Shanad Charge	Davt Number	Perforating		Shot Density /	^Casing O.D.	Performanc	e in Concrete	Performance in	Stressed Berea
O.D.	Snaped Charge	Part Number	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD [^] (in)[cm]	TTP (in)[cm]
	2210 Compay DV	EC2-33A1991-RX	+ Fluid an Dm/	19.0g, RDX					0.32 [0.81]	11.30 [28.70]
	3319 CONNEX RX	EC2-33A1992-RX	+ Fluid or Dry	19.0g, HMX					0.32 [0.81]	11.60 [29.46]
		EC2-33A1921	+ Fluid an Dm/	19.0g, RDX			0.51 [1.30]	42.07 [106.86]		
0.4.(0)	3319 Razor ADP	EC2-33A1922	+ Fluid or Dry	19.0g, HMX			0.49 [1.24]	41.10 [104.39]	0.43 [1.09]	14.60 [37.08]
3-1/8 10a		EC2-33A1921-E	+ Eluid or Dru	19.0g, RDX	$5 \text{ spt} / 60^{\circ} (\text{Dry})$	4-1/2" L-80	0.43 [1.09]	35.80 [90.93]		
17g	3314 BASIX ADP	EC2-33A1922-E	+ Fluid or Dry	19.0g, HMX						
	3319 Basix XDP	EC2-33A1921-EG	Fluid	d 19.0g, RDX			0.43 [1.09]	35.70 [90.68]		
	3319 Basix DP	EC2-33A1951	+ Fluid on Dm/	19.0g, RDX			0.54 [1.37]	29.20 [74.17]		
		EC2-33A1952	+ Fluid or Dry	19.0g, HMX						
		EC2-33A2321-RC		22.7g, RDX					0.40 [1.02]	15.60 [39.62]
	3323 Connex SDP	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]
3-1/8"	3323 Razor XDP	EC2-33A2322	Fluid	22.7g, HMX	$4 \operatorname{cnf} / 40^{\circ}$	4 1/2" 1 00	0.42 [1.07]	39.02 [99.11]	0.44 [1.12]	15.68 [39.83]
23g		EC2-33A2323	Fluiu	22.7g, HNS	0 spi / 00	4-1/2 L-00	0.35 [0.89]	26.05 [66.17]	0.37 [0.94]	12.12 [30.78]
205		EC2-33A2321-E		22.7g, RDX			0.42 [1.07]	46.01 [116.87]	0.39 [0.99]	12.30 [31.24]
	JUZU DASIX ADP	EC2-33A2322-E		22.7g, HMX			0.43 [1.09]	46.37 [117.78]		
	2222 Pacity CL	EC2-33A2321-EG		22.7g, RDX					0.41 [1.04]	11.90 [30.23]
	SSZS DASIX UT	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	Shanad Charge	Dart Number	Perforating	Evolocivo	Shot Density /	Inner Casing		Outer Casing	
O.D.	Shapeu Charge	Part Nulliper	Condition	Explosive	Phasing	O.D./Material	EHD (in)[cm]	O.D./Material	EHD (in)[cm]
	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]
3-1/8" 14g-23g	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	$4 \operatorname{cnf} / 40^{\circ}$	1 5" D110	0.30-0.32 [0.76-0.81]	7.0" 0110	0.39-0.41 [0.99-1.04]
	3323 Refrax	EC2-33A2371-D		23.0g, RDX	o spi / ou	4.5 P110	0.41-0.42 [1.04-1.07]	7.0 P110	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.

GOOD HOLE

Carrier	Shanod Chargo	Devt Number	Perforating	Evelocive	Shot Density /	^Casing O.D.	Performance in Concrete		Performance in Stressed Berea	
O.D.	Shapeu Charge	Part Nulliper	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD [^] (in)[cm]	TTP (in)[cm]
	3319 Connex XEH	EC2-33A1941-RC		19.0g, RDX		4-1/2" L-80			0.41 [1.04]	14.20 [36.07]
3-1/8" 19g		EC2-33A1942-RC		19.0g, HMX	5 spf / 60° (Dry)				0.42 [1.07]	14.37 [36.50]
	3319 Basix GH	EC2-33A1941		19.0g, RDX	6 spf / 60° (Fluid)		0.60 [1.52]	28.55 [72.52]		
		EC2-33A1942		19.0g, HMX						
	2222 Conney VELL	EC2-33A2341-RC		22.7g, RDX		4.4.(0)"			0.43 [1.09]	15.60 [39.62]
3-1/8"	3323 CONNEX AEH	EC2-33A2342-RC	Eluid	22.7g, HMX		4-1/2			0.43 [1.09]	15.89 [40.36]
23g	2222 Dealy CLI	EC2-33A2341-E	Fiuld	22.7g, RDX	o spi / ou	5-1/2" L-80	0.48 [1.22]	31.40 [79.76]		
	3323 Basix GH	EC2-33A2342-E		22.7g, HMX	1	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. 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.

COMPONENTS AND ACCESSORIES

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



GEUDynamics

Short Quick Change Assembly GN-QC31-0001



Top Sub, SQC Connection GN-R31-CQC20-A



Switch Sub Assembly GN-R31-T150-A



Plug/Shoot Adapter GN-R31-ST30 Aligning Switch Sub, LH Lock Ring GN-R31-T150L-A



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 Initiation Point Mode of Fire Detonating Cord Compatible Perforating Charges Maximum Gun Swell (in)[mm]

ENVIRONMENTAL

Maximum Pressure (psi)[MPa] Maximum Tensile* (lbf)[kN] Multiple Shot & Phasing Options, two (2) to 14 shots per carrier Bottom-fired, wireline, slickline, or tubing Mechanical or addressable, select fire 80-grain round FracIQ[®], Connex[®], Razor[®], Basix[™] 3.56 [90.42] @ 25.00g In Fluid; 3.63 [92.20] @ 22.7g Dry

22,700 [156.51] 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	
Part Number	# Shots	Phasing	(in)	(cm)	(in)	(mm)	(in)	(mm)	(lbs)	(kgs)
GLB33-J002	2	180°	15	38.10			20	74.20	21.0	9.5
GLB33-G003	3	120°	18	45.72			3.0	70.20	25.0	11.3
GLB33-B004	4	90°	18	45.72					25.0	11.3
GLB33-P005S	5	72°	20	50.80				50.00	28.0	12.6
GLB33-A006	6	60°	22	55.88					31.0	14.0
GLB33-A007T	7	60°	24	60.96	6.00	152.40	2.0		34.0	15.3
GLB33-P007S	/	51.4°	24	60.96	0.00	152.40			34.0	15.3
GLB33-R008	8	90° + 45°	26	66.04			2.0	50.60	36.0	16.2
GLB33-A010	10	60°	30	76.20					42.0	18.9
GLB33-R010	10	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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CONSTANT ENTRY HOLE AND PENETRATION

Carrior			Dorforating		Shot Donsity /		Performance in Stressed Berea (API RP19B Sec. 2)			
	D.D. Shaped Charge	Part Number	Condition	Explosive	Dhasing	AFI 17D Targeted Dine*		EHD Variation	TTD /in)[ana]	
0.D.			Condition		Flidsling	laigeteu ripe		Decentralized		
3-3/8"	FracIQ 20	EC2-33A1271	Eluid	12.0g, RDX	$6 \operatorname{enf} / (0)$	4.5"-5.5" OD P110	0.22 [0.56]	5.5%	E O [10 70]	
12g-13g	FracIQ 25	EC2-33A1371	Fiuld	13.0g, RDX	0 Shi / 00	6.0" OD P110	0.26 [0.66]	2.3 %	J.U [12.70]	

DEEP PENETRATING/EXTREME DEEP PENETRATING

Carrier	Shanad Charge	Deut Number	Perforating	Evaluative	Shot Density /	^Casing O.D.	Performance	e in Concrete	Performance in Stressed Berea	
O.D.	Shaped Charge	Part Number	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD^ (in)[cm]	TTP (in)[cm]
	2210 Connov DV	EC2-33A1991-RX		19.0g, RDX		5-1/2"			0.32 [0.81]	11.30 [28.70]
3-3/8"	3319 CONNEX KA	EC2-33A1992-RX	In Fluid or Dry	19.0g, HMX	$4 \operatorname{cnf} / 40^{\circ}$	5-1/2			0.32 [0.81]	11.60 [29.46]
19g	2210 Dazor VDD	EC2-33A1921	III Fluid of Dry	19.0g, RDX	0 shi / 00	4.1./0"	0.51 [1.30]	42.07 [106.86]		
	3317 Razor ADP	EC2-33A1922		19.0g, HMX		4-1/2			Performance EHD^ (in)[cm] 0.32 [0.81] 0.32 [0.81] 0.32 [0.81] 0.32 [0.81] 0 0.43 [1.09] 0.40 [1.02] 0.46 [1.17] 0.36 [0.91] 0.41 [1.04] 5] 0.44 [1.12] 0.37 [0.94] 5] 0.39 [0.99] 3] 0.41 [1.04] 0.40 [1.02] 0.40 [1.02] 0.40 [1.02] 0.48 [1.22] 0.35 [0.89] 3] 0.39 [0.99] 4] 0.50 [1.27] .] 0.36 [0.91] 0] 0.40 [1.02]	14.60 [37.08]
		EC2-33A2321-RC		22.7g, RDX					0.40 [1.02]	15.60 [39.62]
	3323 Connex SDP	EC2-33A2322-RC		22.7g, HMX					0.46 [1.17]	15.31 [38.89]
		EC2-33A2323-RC	In Fluid or Dry	22.7g, HNS					0.36 [0.91]	11.85 [30.10]
		EC2-33A2321	III Fluid of Dry	22.7g, RDX					0.41 [1.04]	16.40 [41.66]
3-3/8"	3323 Razor XDP	EC2-33A2322		22.7g, HMX	6 cnf / 60°		0.45 [1.14]	46.32 [117.65]	0.44 [1.12]	15.68 [39.83]
		EC2-33A2323		22.7g, HNS		1 1/2" 00			0.37 [0.94]	12.12 [30.78]
23g	3323 Basix XDP	EC2-33A2321-E	In Fluid or Dry	22.7g, RDX	o spi / ou	4-1/2 L-00	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]		
	2222 Desity CIL	EC2-33A2321-EG	Fluid	22.7g, RDX					0.41 [1.04]	11.90 [30.23]
O.D. 3-3/8" 19g 3-3/8" 23g 3-3/8" 25g	3323 DASIX GH	EC2-33A2322-EG		22.7g, HMX					0.40 [1.02]	11.90 [30.23]
	2222 Pacity DD	EC2-33A2351	In Fluid or Dry	22.7g, RDX			0.47 [1.19]	32.10 [81.53]		
	3323 DASIX DP	EC2-33A2352	III Fluid of Dry	22.7g, HMX						
		EC2-33B2521-RC		25.0g, RDX					0.40 [1.02]	15.10 [38.35]
	3325 Connex SDP	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]
3-3/8"		EC2-33B2521	Fluid	25.0g, RDX	$6 \operatorname{cm} f / (0)$	4 1 /0" 1 00	0.45 [1.14]	44.58 [113.23]	0.39 [0.99]	17.10 [43.43]
25g	3325 Razor XDP	EC2-33B2522	Fluid _	25.0g, HMX	0 shi / 00	4-1/2 L-00	0.53 [1.35]	47.30 [120.14]	0.50 [1.27]	16.27 [41.33]
3-3/8" 25g		EC2-33B2523		25.0g, HNS	-		0.37 [0.94]	30.20 [76.71]	0.36 [0.91]	13.20 [33.53]
		EC2-33B2521-E		25.0g, RDX			0.45 [1.14]	50.08 [127.20]	0.40 [1.02]	12.30 [31.24]
	3325 Basix XDP	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. 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.

BIG HOLE

Carrier O.D. Shaped C	Shanad Charge	Part Number	Perforating	Explosive	Shot Density /	^Casing O.D. Performance in Concrete		e in Concrete	Performance in Stressed Berea		
	Shaped Charge		Condition		Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD [^] (in)[cm]	TTP (in)[cm]	
3-3/8"	2222 Desity DU	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]	
23g	23g 3323 Basix BH	EC2-33A2332		22.7g, HMX							

GOOD HOLE

Carrier	Shapad Charge	Part Number	Perforating Condition	Evplosive	Shot Density /	^Casing O.D.	Performance	e in Concrete	Performance in Stressed Berea	
O.D.	Shaped Charge	Part Number		Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD^ (in)[cm]	TTP (in)[cm]
3-3/8"	/8" 3319 Connex XEH	EC2-33A1941-RC	In Fluid or Dry	19.0g, RDX					0.41 [1.04]	14.20 [36.07]
19g		EC2-33A1942-RC	In Fluid or Dry	19.0g, HMX		4-1/2" L-80			0.42 [1.07]	14.37 [36.50]
3-3/8"	3323 Connex XEH	EC2-33A2341-RC		22.7g, RDX					0.43 [1.09]	15.60 [39.62]
		EC2-33A2342-RC	In Fluid or Dry	22.7g, HMX	6 spf / 60°				0.43 [1.09]	15.89 [40.36]
23g	3323 Basix GH	EC2-33A2341		22.7g, RDX			0.52 [1.32]	33.58 [85.29]		
		EC2-33A2342		22.7g, HMX						
0.0/0"	2225 Conney VELL	EC2-33B2541-RC		25.0g, RDX						
3-3/8"	3323 COILIEX VEH	EC2-33B2542-RC	Fluid	25.0g, HMX		-			0.40 [1.02]	14.92 [37.90]
ZJg	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.

Conventional Short Guns 3-3/8 in (86 mm), GLB Spiral

COMPONENTS AND ACCESSORIES

Description	Part Nu	mber(s)		
Short Quick Change (SQC) Assembly (one per string, CCL to top sub)	GN-QC	31-0001		
Quick Rebuild Kit (contacts, teflon tubing, screw, spring, insulating retainer)	RKQ-GN-C	QC31-0001		
Complete Rebuild Kit with O-Rings (all required parts)	RKC-GN-C	QC31-0001		
TCP Transfer Kit (2-3/4" through 4")	GN-00	0-0025		
Top Sub, 3-3/8", Conventional and TCP	GN-R3	3-0020		
Wireline Insert & O-Ring	GN-E00-0011 (o-ri	ng: OR-N569-211)		
Spring Contact Assembly	GN-E0	0-0020		
Top Sub, Wireline	GN-R3	3-0035		
Top Sub, Ported, SQC Connection	GN-R33-	CQC20-A		
Top Sub Lift Sub Assembly, 3-3/8"	TC-LT3	33-000		
Tandem Sub, 3-3/8", Conventional and TCP	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			
O-Ring Materials and Size	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		
Port Plug and Port Plug O-Ring	GN-R00-T001 /	OR-N569-217		
3-3/8" Bull Plug, Standard	GN-R3	3-0022		
3-3/8" Bull Plug, with 2-3/8" EUE Pin	GN-R3	3-0023		
3-3/8" Bull Plug, with 2-7/8" EUE Pin	GN-R3	3-0024		
Plug/Shoot Adapter Assembly, 3-3/8"	GN-R3	3-ST30		
Thread Protectors, 3-3/8"				
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			



Bull Plug, Standard GN-R33-0022



Plug/Shoot Adapter GN-R33-ST30



Wireline Insert GN-E00-0011

Spring Contact Assembly GN-E00-0011 (4-1/2" OD top sub shown for reference only)



Тор Sub GN-R33-0020



Тандем Sub GN-R33-0021



Switch Tandem Sub Assy GN-R33-T100-A



Aligning Switch Sub, LH Lock Ring GN-R33-T150L-A

SWITCH TANDEM SUB

GN-R33-T150

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GEUDynamics

Short Quick Change Assembly GN-QC31-0001

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

> Top Sub, Wireline GN-R33-0035

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Patents: www.perf.com/patents

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 Initiation Point Mode of Fire Detonating Cord Compatible Perforating Charges Maximum Gun Swell (in)[mm]

ENVIRONMENTAL

Maximum Pressure (psi)[MPa] Maximum Tensile* (lbf)[kN] 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 40-grain ribbon Razor®and Circulating Charges 1.69" [43] @ 3.2g (In Fluid); 1.69" [43] @ 2.9g (Dry)

20,000 [138] 88,100 [392] *Hardware Calculated Breaking Point



CARRIER SPECIFICATIONS

Carrier Assembly	Shot Density & Phasing Options		Gun End to Center of First Scallop		Distance Shot to Shot		Approximate Weights	
T art Number	(spf) [spm]	Phasing	(in)	(mm)	(in)	(mm)	Fully Loaded	Blank Gun
GA1604-7915A-O***		0°		152.40		76.20		
GA1604-7915A-A***	4 spf [13 spm]	60°	6.00		3.00			
GA1604-7915A-B***		90°]					
GA1606-7915A-O***	6 cpf [20 cpm]	0°	5 50	139.70	2.00	50.00	4.25 lb/ft	3.62 lb/ft
GA1606-7915A-A***	6 spf [20 spm]	60°	5.50		2.00	50.60	(w/sub)	(w/sub)

*** 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.





DEEP PENETRATING/EXTREME DEEP PENETRATING

Carrier	Carrier O.D. Shaped Charge	Part Number	Perforating Condition	Explosive	Shot Density / Phasing	^Casing O.D.	Performance in Concrete		Performance in Stressed Berea	
O.D.						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	2.2~ UMV	4 spf / 0°		0.19 [0.48]	13.09 [33.25]		
			Fluid	J.∠g, ⊓M∧	6 spf / 60°		0.19 [0.48]	13.09 [33.25]	0.13 [0.33]	5.23 [13.28]
		EC1-15A0323		3.2g, HNS					0.11 [0.28]	5.00 [12.70]
1-9/16"		EC1-15A0321-L	Dmr	2.9g, RDX	$4 \operatorname{cnf} / 0^{\circ}$					
2.9g	EC1-15A0322-L	Dry	2.9g, HMX	o spi / 0*		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	Tubing/Drill Pipe	Entrance Hole	Penetration	
Carrier O.D.	Part Number	(g), load	Wall Thickness (in)[cm]	(in)[cm]	(in)[cm]	
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	
			0.580 [1.4732]	0.18 [0.4572]	[0.254]	
	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	
			0.885 [2.2479]	0.17 [0.4318]	[0.254]	

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. 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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Patents: www.perf.com/patents
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"	
Top Sub, TCP	GN-R16-0020
Top Sub, Wireline	GN-R16-0035
Tandem Sub, 1-9/16"	GN-R16-0021
O-Ring Materials and Size, Nitrile (standard option)	OR-N569-215
Viton (with back-up rings required for $> 325^{\circ}F$)	OR-V95G-215
Back-up rings for > 325°F	OR-B215-1308
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-156-000
Tandem Sub & Bull Plug Protector	GN-THD-156-020
Bull Plug, 1-9/16"	GN-R16-0022

GEODynamics®

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 Shot Density & Phasing options; Available Gun Lengths range from	ו 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	Ŋ
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	Shot Density & Phasing Options		Gun End to Center of First Scallop		Distance Shot to Shot		Approximate Weights	
Part Number	(spf) [spm]	Phasing	(in)	(mm)	(in)	(mm)	Fully Loaded	Blank Gun
GA17506-7517A-O***	(ant [20 anm]	0°	E E0	120 70	2.00	50.00	4.6 lb/ft	3.6 lb/ft
GA17506-7517A-A***	o spi [20 spin]	60°	5.50	139.70	2.00	50.80	(with sub)	(with sub)

*** 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.



DEEP PENETRATING/EXTREME DEEP PENETRATING

Carrier	Chanad Charge	Davt Number	Perforating		Shot Density /	^Casing O.D.	Performance	e in Concrete	Performance in	Stressed Berea	
O.D.	Shaped Charge	Part Number	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD [^] (in)[cm]	TTP (in)[cm]	
	1705 Common CDD	EC1-17A0521-RC		5.1g, RDX	(anf / (0)	4 4 4 4 9 9			0.21 [0.53]	7.40 [18.80]	
	1705 Connex SDP	EC1-17A0522-RC 5.1g, HM	5.1g, HMX	6 spr / 60°				0.21 [0.53]	8.70 [22.10]		
1.0(4)	1705 Razor XDP	EC1-17A0521	Fluid	5.1g, RDX	6 spf / 0°						
1-3/4 5.1g		EC1-17A0522		5.1g, HMX		6 spf / 0° 4-1/2" L-80 6 spf / 60°	0.26 [0.66]	21.63 [54.94]	0.20 [0.51]	7.70 [19.56]	
J.1g		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.

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 Nu	ımber(s)			
Top Sub Lift Sub Assembly, 1-9/16" and 2"	TC-QC	TC-QC15-000			
Top Sub, TCP, 1-3/4" Top Sub, Wireline, 1-3/4" Tandem Sub, 1-3/4"	GN-R17 GN-R17 GN-R17	75-0020 75-0035 75-0021			
O-Ring Materials and Size Nitrile (standard option) Viton (with back-up rings required for > 325°F) Back-up rings for > 325°F	Top Connection OR-N569-215 OR-V95G-215 OR-B215-1308	Gun Connection OR-N569-218 OR-V95G-218 OR-B217-1468			
TCP Transfer Kit (1-9/16" through 2-1/2")	GN-02	0-0100			
Thread ProtectorsGN-THD-156-Carrier (Gun) ProtectorGN-THD-175-Tandem Sub & Bull Plug ProtectorGN-THD-175-					
Bull Plug, 1-3/4"	GN-R17	75-0022			

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 Initiation Point Mode of Fire Detonating Cord Compatible Perforating Charges Maximum Gun Swell (in)[mm]

ENVIRONMENTAL

Maximum Pressure (psi)[MPa] Maximum Tensile* (lbf)[kN] 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 40-grain ribbon Connex[®], Razor[®], Basix[™] 2.29" [58.16] @ 6.5g, (Connex XLS (extra low swell)) In Fluid or Dry

20,000 [138] 153,100 [681] *Hardware Calculated Breaking Point



CARRIER SPECIFICATIONS

Carrier Assembly	Shot Density & Phasing Options		Gun End to Center of First Scallop		Distance Shot to Shot		Approximate Weights		
Part Number	(spf) [spm]	Phasing	(in)	(mm)	(in)	(mm)	Fully Loaded	Blank Gun	
GA2004-7320A-O***		0°		152.40					
GA2004-7320A-A***	1 cnf [12 cnm]	60°	6.00		2.00	76.20			
GA2004-7320A-B***	4 shi [10 shili]	4 shi [10 shiii]	90°	0.00	152.40	5.00	70.20		
GA2004-7320A-J***		180°							
GA2005-7320A-A***	5 spf [16 spm]	60°	5.70	144.78	2.40	60.96			
GA2006-7320A-O***	6 cnf [20 cnm]	0°	5 50	120 70	2.00	50.90	6.1 lb/ft	4.9 lb/ft	
GA2006-7320A-A***	o spi [20 spin]	60°	5.50	137./0	2.00	50.80	(with sub)	(with sub)	

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

GOOD HOLE

Carrier	Chanad Charge	Dout Number	Perforating		Shot Density /	^Casing O.D.	Performance	e in Concrete	Performance in	Stressed Berea		
O.D.	Shaped Charge	Part Number	Condition	Explosive	Explosive	Explosive	Phasing	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	Chanad Charge	Dout Number	Perforating	Evalaciva	Perforating		^Casing O.D.	Performance	e in Concrete	Performance in	Stressed Berea
O.D.	Shaped Charge	Part Number	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD [^] (in)[cm]	TTP (in)[cm]	
		EC2-20A0721-RC		6.8g, RDX					0.22 [0.56]	8.94 [22.71]	
	2007 Connex SDP	EC2-20A0722-RC	Fluid	6.8g, HMX	6 spf / 60°	2-7/8"			0.22 [0.56]	9.37 [23.80]	
2" 6.8g		EC2-20A0723-RC		6.8g, HNS					0.20 [0.51]	7.30 [18.54]	
		EC1-20A0721		6.8g, RDX		3-1/2" L-80	0.25 [0.64]	21.83 [55.45]	0.22 [0.56]	9.55 [24.26]	
	2007 Razor XDP	EC1-20A0722	Fluid	6.8g, HMX	6 spf / 60°	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]			
		EC1-20A0721-E	FI 11	6.8g, RDX	$6 \operatorname{conf} / (0)$	2 1/2" 20	0.25 [0.64]	16.42 [41.71]			
	2007E Basix ADP	EC1-20A0722-E	Fiuld	6.8g, HMX	o spi / ou	3-1/2° L-80	0.25 [0.64]	20.70 [52.58]	0.24 [0.61]	8.40 [21.34]	
		EC2-20B0721-RC		6.5g, RDX					0.23 [0.58]	8.70 [22.10]	
2"	2007 Connex SDP ALS	EC2-20B0722-RC		6.5g, HMX	(((00	2.7/0"1.00			0.21 [0.53]	9.80 [24.89]	
6.5g		EC1-20B0721	In Fluid or Dry	6.5g, RDX	6 spt / 60°	2-7/8 L-80					
0	2007 Razor XLS XDP	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.

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-R2	0-0020	
Top Sub, Wireline	GN-R20	0-0035	
Tandem Subs, 2"			
Tandem Sub, TCP	GN-R20	0-0021	
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	0-0100	
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-100	00-004	
Low Profile Clip	MS-100	00-115	





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GN-R20-0035



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.

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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 Initiation Point Mode of Fire Detonating Cord Compatible Perforating Charges Maximum Gun Swell (in)[mm]

ENVIRONMENTAL

Maximum Pressure (psi)[MPa] Maximum Tensile* (lbf)[kN] 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 60-grain cord; DET-60H212 Connex[®], Razor[®], Basix[™], Refrax[™] 2.56" [6.50] @ 11.0g (In Fluid); 2.62" [66.55] @ 10.5g (Dry)

20,000 [138] 153,100 [681] *Hardware Calculated Breaking Point

CARRIER SPECIFICATIONS

Carrier Assembly	Shot Density & Phasir	ng Options	Gun End to First S	o Center of Scallop	Dist Shot t	ance to Shot	Approxima	te Weights
Part Number	(spf) [spm]	Phasing	(in)	(mm)	(in)	(mm)	Fully 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 (with sub)	7.5 lb/ft (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.



Revised: August 31, 2023 9:46 PN



DEEP PENETRATING/EXTREME DEEP PENETRATING

Carrier	Chanad Charge	Deut Number	Perforating		Shot Density /	^Casing O.D.	Performance	e in Concrete	Performance in	Stressed Berea		
O.D.	Shaped Charge	Part Number	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD [^] (in)[cm]	TTP (in)[cm]		
		EC2-23A1121-RC		11.0g, RDX					0.25 [0.64]	11.40 [28.96]		
	2311 Connex SDP	EC2-23A1122-RC		11.0g, HMX		IMX				0.31 [0.79]	11.35 [28.83]	
		EC2-23A1123-RC		11.0g, HNS					0.23 [0.58]	8.70 [22.10]		
2-3/8"		EC2-23A1121	Eluid	11.0g, RDX	$4 \operatorname{cpf} / 40^{\circ}$	2 1/2" 20			0.25 [0.64]	12.70 [32.26]		
11g	2311 Razor XDP	EC2-23A1122	Fluid	11.0g, HMX	o spi /ou	3-1/2 L-60	0.31 [0.79]	30.11 [76.48]	0.24 [0.61]	11.40 [28.96]		
	2211 Paris VDD	EC2-23A1123	11	11.0g, HNS			11.0g, HNS		0.25 [0.64]	22.70 [57.68]	0.23 [0.58]	9.20 [23.37]
		EC2-23A1121-E		11.0g, RDX						0.30 [0.76]	9.00 [22.86]	
		EC2-23A1122-E		11.0g, HMX								
		EC2-23A1121-LS	Dmr	11.0g, RDX	‡ 5 spf / 0°							
2-3/8"		EC2-23A1122-LS	Dry	11.0g, HMX		2 1/2" 20	0.31 [0.79]	30.11 [76.48]				
11g	2311 Razor ADP L3	EC2-23A1121-LS	Eluid	11.0g, RDX	$4 \operatorname{cnf} / 0^{\circ}$	3-1/2 L-00						
		EC2-23A1122-LS	Fiulu	11.0g, HMX	o spi / o		0.31 [0.79]	30.11 [76.48]				
		EC2-23A1121-RC-LS	Dmr	10.5g, RDX	$+ 5 \operatorname{cpf} / 40^{\circ}$				0.25 [0.64]	11.40 [28.96]		
2-3/8"	/8" 2211 Compary CDD VI C	EC2-23A1122-RC-LS	Dry	10.5g, HMX	∓ 5 spr / 60°	2 1 / 2"			0.31 [0.79]	11.35 [28.83]		
10.5g	2011 CONNEX SUP ALS	EC2-23A1121-RC-LS	Fluid	10.5g, RDX	6 cpf / 60°	3-1/2			0.25 [0.64]	11.40 [28.96]		
5		EC2-23A1122-RC-LS	Fiulu	10.5g, HMX	0 shi / 00				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.



DUAL CASING

Carrier	Chanad Charge	Dout Number	Perforating	Evalacivo	Shot Density / Inner Casing Outer Casing		Inner Casing		er Casing
O.D.	Shaped Charge	Part Number	Condition	Explosive	Phasing	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 Nu	ımber(s)	
Top Subs, 2-3/8"			
Top Sub, TCP	GN-R2	3-0020	
Top Sub, Wireline	GN-R2	3-0035	
Top Sub Lift Sub Assembly, 1-9/16" and 2"	TC-QC	15-000	
Tandem Subs, 2-3/8"			
Tandem Sub, TCP	GN-R2	3-0021	
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	
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 $> 325^{\circ}F$)	OR-V95G-215	OR-V95G-225	
Back-up rings for > 325°F	OR-B215-1308	OR-B225-2126	
Thread Protectors			
Top Sub (Top Pin)	GN-THD-	-156-020	
Carrier (Gun) Protector	GN-THD-	-239-030	
Tandem Sub & Bull Plug Protector	GN-THD-	-239-040	
Bull Plugs			
2-3/8" Standard GN-R23-0022			
2-3/8" with Sucker Rod Box Connection	GN-R23	3S-0022	
Setting Tool Adapter Sub	GN-R2	3-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 Initiation Point Mode of Fire Detonating Cord Compatible Perforating Charges Maximum Gun Swell (in)[mm]

ENVIRONMENTAL

Maximum Pressure (psi)[MPa] Maximum Tensile* (lbf)[kN] 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 40-grain ribbon Connex[®], Razor[®], Basix[™], Refrax[™] 2.66" [67.56] @ 11.5g (In Fluid)

20,000 [137.90] 137,500 [611.63] *Hardware Calculated Breaking Point

CARRIER SPECIFICATIONS

Carrier Assembly	Shot Density & Phasir	ng Options	Gun End to First S	o Center of Scallop	Dist Shot t	ance to Shot	Approxima	te Weights
Part Number	(spf) [spm]	Phasing	(in)	(mm)	(in)	(mm)	Fully 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 (with sub)	7.3 lb/ft (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.





DEEP PENETRATING/EXTREME DEEP PENETRATING

Carrier	Shaped Charge	Deut Number	Perforating	ating Explosive	Shot Density /	^Casing O.D.	Performance in Concrete		Performance in Stressed Berea	
O.D.	Shaped Charge	Part Number	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD [^] (in)[cm]	TTP (in)[cm]
	2511 Conney CDD	EC2-25A1121-RC		11.5g, RDX					0.28 [0.71]	11.50 [29.21]
2-1/2"	2511 Connex SDP	EC2-25A1122-RC		11.5g, HMX					0.29 [0.74]	12.00 [30.48]
	2511 Razor XDP	EC1-25A1121		11.5g, RDX	6 spf /60°	0.1/011.00			0.26 [0.66]	13.00 [33.02]
11.5g		EC1-25A1122	Fiuld	11.5g, HMX		3-1/2 L-60	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	Shanad Charge	Dort Number	Perforating	Evolocive	Shot Density /	Inne	er Casing	Outer Casing		
O.D.	Shapeu Charge	Part Nulliper	Condition	Explosive	Phasing	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.

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 Nu	Part Number(s)			
Top Sub Lift Sub Assembly, 1-9/16" and 2"	TC-QC	15-000			
Top Subs, 2-1/2"					
Top Sub, TCP	GN-R2	5-0020			
Top Sub, Wireline	GN-R2	5-0035			
Tandem Subs, 2-1/2" Tandem Sub, TCP Switch Tandem Sub, Wireline, 5.50" make-up length (MUL) Switch Tandem Sub, Wireline, 7.00" MUL	GN-R2 GN-R25 GN-R25	5-0021 -T100-A -T104-A			
TCP Transfer Kit (1-9/16" through 2-1/2")	GN-02	0-0100			
O-Ring Materials and Size Nitrile (standard option) Viton (with back-up rings required for > 325°F) Back-up rings for > 325°F	Top Connection OR-N569-215 OR-V95G-215 OR-B215-1308	Gun Connection OR-N569-225 OR-V95G-225 OR-B225-2160			
Thread Protectors Top Sub (Top Pin) Carrier (Gun) Protector Tandem Sub & Bull Plug Protector	GN-THD GN-THD GN-THD	-156-020 -250-030 -250-040			
Bull Plug, 2-1/2"	GN-R2	5-0022			

GEODynamics®

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 Initiation Point Mode of Fire Detonating Cord Compatible Perforating Charges Maximum Gun Swell (in)[mm]

ENVIRONMENTAL

Maximum Pressure (psi)[MPa] Maximum Tensile* (lbf)[kN] 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[™], Refrax[™], GEOPunch[™] 2.91 [73.91] @ 15.0g In Fluid; 3.02 [76.20] @ 15.0g Dry

25,000 [172.37] 176,600 [785.56] *Hardware Calculated Breaking Point



CARRIER SPECIFICATIONS

Carrier Assembly	Shot Density & Phasi	ing Options	Gun End t First S	o Center of Scallop	Dist Shot t	ance to Shot	Approxima	te Weights
Part Number	(spf) [spm]	Phasing	(in)	(mm)	(in)	(mm)	Fully Loaded	Blank Gun
GA2704-6827TI- A ***		60°	7.50	190.50	3.00	76.20		
GA2704-6827A- B ***		90°	7.50	190.50	3.00	76.20		
GA2704-6827TI- B ***	4 cof [12 com]	90°	7.50	190.50	3.00	76.20		
GA2704-6827A- B *** T	4 spi [15 spiii]	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 ***		0°	7.00	177.80	2.00	50.80		
GA2706-6827A- A ***		60°	7.00	177.80	2.00	50.80	44.00 11 /01	
GA2706-6827A- A *** T	6 spf [20 spm]	60°	6.00	152.40	2.00	50.80	(with sub)	9.82 lb/ft
GA2706-6827TI-A***		60°	7.00	177.80	2.00	50.80		(with Sub)
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.





CONSTANT ENTRY HOLE AND PENETRATION

Carrier		Shaped Charge Part Number Perforating Condition Explosive Shot Density / Phasing	Derforating		Shot Density /		Performance in Stressed Berea (API RP19B Sec. 2)			
O.D.	Shaped Charge		Phasing	Targeted Pipe*	EHD^ (in)[cm]	EHD Variation	TTP (in)[cm]			
					8	5 1	()[0]	Decentralized	(
0.0/4"	FracIQ 30	EC2-27A1171		11.0g, RDX			0.30 [0.76]	2.7 %		
2-3/4 11a-15a	FracIQ 35	EC2-27A1271 Fluid 12.0g, RDX 6 spf / 60	6 spf / 60°	4.5 UD	0.35 [0.89]	5.9 %	5.0 [12.70]			
118-128	FracIQ 40	EC2-27A1571		15.0g, RDX		FIIO	0.40 [1.02]	6.3 %		

DEEP PENETRATING/EXTREME DEEP PENETRATING

Carrier	Shaped Charge	Dout Number	Perforating	Evalesive	Shot Density /	^Casing O.D.	Performance in Concrete		Performance in Stressed Berea	
O.D.	Shapeu Charge	Part Nulliper	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD [^] (in)[cm]	TTP (in)[cm]
	2715 Connex SDP	EC2-27A1521-RC		15.0g, RDX					0.30 [0.76]	11.70 [29.72]
0.0 (4)		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]		
2-3/4 15a		EC2-27A1522	In Fluid or Dry	15.0g, HMX	6 spf /60°	4-1/2" L-80	0.39 [0.99]	37.45 [95.12]		
Tog		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	Shanad Charge	Dart Number	Perforating	Evalocivo	Shot Density /	Inne	er Casing	Oute	er Casing
O.D.	Shaped Charge	Part Number	Condition	Explosive	Phasing	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 amf / 609		0.29-0.30 [0.74-0.76]	5 5" D110	0.37-0.41 [0.94-1.04]
11g-15g	2715 Refrax	EC2-27A1571-R	Fiuld	15.0g, RDX	6 spt / 60°	4.0 PII0	0.34-0.36 [0.86-0.91]	5.5 PIIU	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	
	2708 GEOPunch HMX	EC2-27A0862	8.0g, HMX	1.05 [2.67]
	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.

^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.



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 Nu	ımber(s)	
Top Subs, 2-3/4"			
Top Sub, TCP	GN-R2	7-0020	
Top Sub, Wireline	GN-R2	7-0035	
Top Sub Lift Sub Assembly, 2-3/4" and 2-7/8"	TC-QC	27-000	
Tandem Subs, 2-3/4"			
Tandem Sub, TCP	GN-R2	7-0021	
Switch Tandem Sub, Wireline, Ported, 3" make-up length	GN-R27	-T100-A	
Aligning Switch Sub, LH Lock Ring	GN-R27	-T125-A	
TCP Transfer Kit (2-3/4" through 4")	GN-000-0025		
O-Ring Materials and Size	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	
Thread Protectors			
Top Sub (Top Pin)	GN-THD-	QC27-020	
Carrier (Gun) Protector	GN-THD	-275-030	
Tandem Sub & Bull Plug Protector	GN-THD	-275-040	
Bull Plugs			
2-3/4" Standard	GN-R2	7-0022	
2-3/4" with 2-3/8" EUE Pin	GN-R2	7-0023	
2-3/4" Shoot-Thru	GN-R27-ST27		
2-3/4" Shoot-Thru Assembly (GN-R27-T150-A and GN-R27-ST27)	GN-R2	7-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.

80-grain round

Standard

20.000 [138]

213,700 [950]

APPLICATION SPECIFICATIONS

Shot Density and Phasing Options **Initiation Point** Mode of Fire **Detonating Cord Compatible Perforating Charges** Maximum Gun Swell (in)[mm]

ENVIRONMENTAL

Maximum Pressure (psi)[MPa] Maximum Tensile* (lbf)[kN] *Hardware Calculated Breaking Point

CARRIER SPECIFICATIONS

	Carrier Assembly	Shot Density & Phasi	ing Options	Gun End t First S	o Center of Scallop	Dist Shot t	ance o Shot	Approximate Weights	
	Part Number	(spf) [spm]	Phasing	(in)	(mm)	(in)	(mm)	Fully Loaded	Blank Gun
	GA2804-6827A- A ***		60°						
074	GA2804-6827A- B ***	4 spf [13 spm]	90°	7.50	190.50	3.00	76.20		
27A	GA2804-6827A- O ***		0°						
Charge	GA2806-6827A- A ***		60°						
Case	GA2806-6827A-K***	6 spf [20 spm]	100°	7.00	177.80	2.00	50.80	12.04 ID/Tt	10.17 ID/TC
	† GA28H06-6827A-A***		60°					(with sub)	(with Sub)
	GA2804-6528A- A ***	4 spf [13 spm]	60°	7.50	190.50	3.00	76.20		
28A Charge Case	GA2806-6528A- A ***		60°	7.00	177.00	2.00	50.00		
	GA2806-6528A-K***	6 spf [20 spm]	100°	/.00	1//.80	2.00	50.80	12.04 ID/Tt	10.17 ID/TC
	GA2806-6528A- A *** T		60°	6.00	152.40	2.00	50.80	(with Sub)	(with Sub)

*** 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

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 FraclQ[®], Connex[®], Razor[®], Basix[™] 3.07 [77.98] @ 18.0g In Fluid; 3.13 [79.50] @ 15.0g Dry

High Pressure

25,000 [172]

213,700 [950]





Revised: August 31, 2023 9:46 PM





CONSTANT ENTRY HOLE AND PENETRATION

Corrior			Derforating		Shot Donsity /		Performance in	n Stressed Berea (AF	ea (API RP19B Sec. 2) on ed TTP (in)[cm] 5.0 [12.70]		
O.D.	Shaped Charge	Part Number	Condition	Explosive	Phasing	Targeted Pipe*	EHD [*] (in)[cm]	EHD Variation Decentralized	TTP (in)[cm]		
0.7/0"	FracIQ 30	EC2-27A1171		11.0g, RDX			0.30 [0.76]	2.7 %			
2-7/8 11g-15g	FracIQ 35	EC2-27A1271	Fluid	12.0g, RDX	6 spf / 60°	4.5 UD 0110	0.35 [0.89]	5.9 %	5.0 [12.70]		
	FracIQ 40	EC2-27A1571		15.0g, RDX		FIIO	0.40 [1.02]	6.3 %			
	Freed O 25	EC2-28A1171		11.0g, RDX			0.36 [0.91]	3.3 %			
2-7/8" 11g-16g	FraciQ 35	EC2-28A1172		11.0g, HMX	6 and 1 4 00	4.5" OD	0.36 [0.91]	2.1 %	E O [10 70]		
	FreedO 40	EC2-28A1671	Fiuld	16.0g, RDX	6 spf / 60°	P110	0.40 [1.02]	2.7 %	5.0 [12.70]		
	FIACIQ 40	EC2-28A1672		16.0g, HMX			0.40 [1.02]	2.7 %			

DEEP PENETRATING/EXTREME DEEP PENETRATING

Carrier	r Shaped Charge Part Number		Perforating	Evalorita	Shot Density /	^Casing O.D.	Performance in Concrete		Performance in Stressed Berea	
O.D.	Shaped Charge	Part Number	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD [^] (in)[cm]	TTP (in)[cm]
		EC2-27A1521-RC		15.0g, RDX					0.30 [0.76]	11.70 [29.72]
	2715 Connex SDP	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]
2-7/8"		EC2-27A1521	In Fluid or Dry	15.0g, RDX	$4 \operatorname{cnf} / 40^{\circ}$	4 1/2" 1 90			0.26 [0.66]	13.50 [34.29]
15g	2715 Razor XDP	EC2-27A1522	III Fluid of Dry	15.0g, HMX	o spi /ou	4-1/2 L-00	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						
		EC2-28A1821-RC		18.0g, RDX					0.42 [1.07]	13.00 [33.02]
	2818 Connex SDP	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]
2-7/8"		EC2-28A1821	Eluid	18.0g, RDX	$4 \operatorname{cnf} / 40^{\circ}$	4 1/2" 1 90	0.43 [1.09]	40.05 [101.73]	0.41 [1.04]	14.10 [35.81]
18g	2818 Razor XDP	EC2-28A1822	Fluid	18.0g, HMX	o shi 700	4-1/2 L-00	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]
		EC2-28A1821-E		18.0g, RDX					0.47 [1.19]	10.70 [27.18]
	ZOTO DUSIX VDP	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. FLUID: Qualified for shooting in FLUID only with perforating systems qualified by GEODynamics.



GOOD HOLE

Carrier	Chanad Charge	Deut Number	Perforating	Evaloriva	Shot Density /	hot Density / Casing O.D. Performance in Concrete Performance		Performance in	Stressed Berea	
O.D.	Shaped Charge	Part Number	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD [^] (in)[cm]	TTP (in)[cm]
2-7/8"	2715 Conney VELL	EC2-27A1541-RC	In Fluid on Day	15.0g, RDX	6 amf / 609	4 1 (0)			0.30 [0.76]	12.30 [31.24]
15g	2/15 Connex XEH	EC2-27A1542-RC	In Fluid or Dry	15.0g, HMX	6 spf / 60°	4-1/2"			0.35 [0.89]	11.60 [29.46]

DYNAMIC UNDERBALANCE PUNCHERS

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

HARDWARE

Gun Body Configuration/MaterialThreaded and scalloped, proprietary gun steel, similar to 41XX alloy steelCharge Tube Type & RetentionRound steel tube strip; bend tab retentionType of Tandem ConnectionBooster 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 Connections2.500" - 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. 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



COMPONENTS AND ACCESSORIES

Description	Part Nu	ımber(s)			
Top Subs, 2-7/8"					
Top Sub, TCP	GN-R28-0020				
Top Sub, 2-7/8" with 3-1/8" QC	GN-R28	-0020QC			
Top Sub, Wireline	GN-R2	8-0035			
Top Sub Lift Sub Assembly, 2-3/4" and 2-7/8"	TC-QC	27-000			
Tandem Subs, 2-7/8"					
Tandem Sub, TCP	GN-R2	8-0021			
Switch Tandem Sub, Wireline, Ported (6.25" make-up length)	GN-R28	-T150-A			
TCP Transfer Kit (2-3/4" through 4")	GN-000-0025				
O-Ring Materials and Size	Top Connection	Gun Connection			
Nitrile (standard option)	OR-N569-225	OR-N569-228			
Viton (with back-up rings required for > 325°F)	OR-V95G-225	OR-V95G-228			
Back-up rings for > 325°F	OR-B225-2160	OR-B228-2560			
Thread Protectors					
Top Sub (Top Pin)	GN-THD-	QC27-020			
Carrier (Gun) Protector	GN-THD	-288-030			
Tandem Sub & Bull Plug Protector	GN-THD	-288-040			
Bull Plugs					
2-7/8" Standard	GN-R2	8-0022			
2-7/8" with 2-3/8" EUE Pin	GN-R2	8-0023			
2-7/8 Shoot-Thru	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]

ENVIRONMENTAL

Maximum Pressure (psi)[MPa] Maximum Tensile* (lbf)[kN]

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 FraclQ[®], Connex[®], Razor[®], Basix[™], Basix[™] Frac, Refrax[™] 3.46 [87.88] @ 22.7g In Fluid; 3.60 [91.44] @ 19.0g Dry

22.500 [155.13] 202,300 [900] *Hardware Calculated Breaking Point



CARRIER SPECIFICATIONS

Carrier Assembly	Shot Density & Phasir	ng Options	Gun End to First Sca	o Center of allop @ 0	Dist Shot t	ance o Shot	Approxima	te Weights
Part Number	(spf) [spm]	Phasing	(in)	(mm)	(in)	(mm)	Fully Loaded	Blank Gun
GA3104-6033A- O ***		0°						
GA3104-6033A- A ***	4 spf [13 spm]	60°	7 50	100.50	3.00	76.20		
GA3104-6033A- B ***		90°	7.50	190.50				
GA3104-6033A- G ***		120°						
GA3105-6033A- A ***	E out [16 on m]	60°	7 20	100.00				
GA3105-6033A-J***	5 Spr [16 Spm]	180°	7.20	182.88	2.40	60.96		
GA3106-6033A- O ***		0°	7.00	177.00	2.00	50.00		1
GA3106-6033A- A ***	6 spf [20 spm]	60°	7.00	1/7.80	2.00	50.80	14.25 lb/ft	11.37 lb/ft
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.



BIG HOLE

Carrier	Shanad Charge	Dart Number	Perforating	Evolocivo	Shot Density /	Shot Density / ^Casing O.D. Pe		Performance in Concrete		Performance in Stressed Berea	
O.D.	Shapeu Charge	Part Nulliper	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD^ (in)[cm]	TTP (in)[cm]	
3-1/8"	2222 Desity DU	EC2-33A2331	Fluid	22.7g, RDX	$i = \frac{1}{2} \int dx dx dx$	4.1/0"1.00	0.78 [1.98]	7.60 [19.30]			
23g	3323 Basix BH	EC2-33A2332	Fiuld	22.7g, HMX	6 spt / 60°	4-1/2" L-80	0.79 [2.01]	7.80 [19.81]			

CONSTANT ENTRY HOLE AND PENETRATION

Corrier		Shaned Charge Dart Number Perforating Shot Density /		Performance in	n Stressed Berea (AP	RP19B Sec. 2)				
O.D.	Shaped Charge	Part Number	Condition	Explosive	Phasing	Targeted Pipe*	EHD^ (in)[cm]	EHD Variation Decentralized	TTP (in)[cm]	
2 1 /0"	FracIQ 20	EC2-33A1271		12.0g, RDX			0.22 [0.56]	5.5%	5.0 [12.70]	
3-1/0 12σ-13σ	Basix Frac 25	EC2-33A1271-BF	Fluid	12.0g, RDX	6 spf / 60°	4.5"-5.5" OD, P110	0.26 [0.66]	2.4 %	4.0 [10.16]	
12g-13g	FracIQ 25	EC2-33A1371		13.0g, RDX			0.26 [0.66]	4.1 %	5.0 [12.70]	
	FracIQ Connex 30	EC2-33A1471-FRX		14.0g, RDX			0.31 [0.79]	6.0 %	5.0 [12.70]	
3-1/8"	Basix Frac 30	EC2-33A1471-BF	Fluid	14.0g, RDX	$6 \operatorname{cnf} / 60^{\circ}$	4 5"-5 5" OD P110	0.31 [0.79]	4.0 %	4.0 [10.16]	
13g-16g	FracIQ 30	EC2-33A1671	Fluiu	16.0g, RDX	0 shi / 00	4.J -J.J OD, FII0	0.31 [0.79]	3.1 %	50[1270]	
	FracIQ 30	EC2-33A1672		16.0g, HMX			0.34 [0.86]	3.8 %	5.0 [12.70]	
	FracIQ Connex 35	EC2-33A1671-FRX		16.0g, RDX			0.36 [0.91]	5.0 %	5.0 [12.70]	
3-1/8"	Basix Frac 35	EC2-33A1871-BF	Fluid	18.0g, RDX	$4 \operatorname{cnf} / 40^{\circ}$	4.5"-5.5" OD, P110	0.36 [0.91]	3.4 %	4.0 [10.16]	
16g-20g	FracIQ 35	EC2-33A2071		20.0g, RDX	0 shi / 00		0.36 [0.91]	2.5 %	5 0 [12 70]	
	FracIQ 35	EC2-33A2072		20.0g, HMX			0.37 [0.94]	3.0 %	5.0 [12.70]	
	FracIQ Connex 40	EC2-33A1971-FRX		19.0g, RDX			0.41 [1.04]	6.5 %		
2 1 /0"	FracIQ 40	EC2-33A2371		23.0g, RDX	6 spf / 60°	4.5"-5.5" OD, P110	0.40 [1.02]	3.3 %	5.0 [12.70]	
3-1/0 19a-23a	FracIQ 40	EC2-33A2372	Fluid	23.0g, HMX			0.41 [1.04]	3.8 %		
175 255	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 %	4.0 [10.10]	
2 1 /0"	FracIQ 45	EC2-33A2071-45		20.0g, RDX			0.45 [1.14]	5.6 %	50[1270]	
20g-22g	FracIQ Connex 45	EC2-33A2371-FRX	Fluid	21.0g, RDX	6 spf / 60°	4.5"-5.5" OD, P110	0.45 [1.14]	3.2 %	5.0 [12.70]	
205 205	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 † EC2-33A2371-50G		23.0g, RDX		4.5"-5.5" OD, P110	0.50 [1.27]	1.5 %	5.0 [12.70]	
	FracIQ 50	EC2-33A2372-RX	Fluid	23.0g, HMX	(6 spf / 60°	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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^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



DEEP PENETRATING/EXTREME DEEP PENETRATING

Carrier	Chanad Charge	Davt Number	Perforating	Evalacivo	Shot Density /	^Casing O.D.	Performanc	erformance in Concrete Performance in S		Stressed Berea
O.D.	Snaped Charge	Part Number	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD^ (in)[cm]	TTP (in)[cm]
	2210 Conney DV	EC2-33A1991-RX	+ Fluid an Dm/	19.0g, RDX					0.32 [0.81]	11.30 [28.70]
	SS19 CONNEX RX	EC2-33A1992-RX	+ Fluid or Dry	19.0g, HMX					0.32 [0.81]	11.60 [29.46]
		EC2-33A1921	+ Fluid an Dm/	19.0g, RDX			0.51 [1.30]	42.07 [106.86]		
0.4.(0)	3319 Razor ADP	EC2-33A1922	+ Fluid or Dry	19.0g, HMX			0.49 [1.24]	41.10 [104.39]	0.43 [1.09]	14.60 [37.08]
3-1/8 10a		EC2-33A1921-E		19.0g, RDX	$5 \text{ spt} / 60^{\circ} (\text{Dry})$	4-1/2" L-80	0.43 [1.09]	35.80 [90.93]		
17g	3314 BASIX ADP	EC2-33A1922-E	+ Fluid or Dry	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		19.0g, RDX			0.54 [1.37]	29.20 [74.17]		
		EC2-33A1952	+ Fluid or Dry	19.0g, HMX						
		EC2-33A2321-RC		22.7g, RDX					0.40 [1.02]	15.60 [39.62]
	3323 Connex SDP	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]
3-1/8"	3323 Razor XDP	EC2-33A2322	Fluid	22.7g, HMX	$6 \operatorname{cnf} / 40^{\circ}$	4 1/2" 1 90	0.42 [1.07]	39.02 [99.11]	0.44 [1.12]	15.68 [39.83]
23g		EC2-33A2323	Fluiu	22.7g, HNS	0 spi / 00	4-1/2 L-00	0.35 [0.89]	26.05 [66.17]	0.37 [0.94]	12.12 [30.78]
		EC2-33A2321-E		22.7g, RDX			0.42 [1.07]	46.01 [116.87]	0.39 [0.99]	12.30 [31.24]
	JJZJ DASIX ADP	EC2-33A2322-E		22.7g, HMX			0.43 [1.09]	46.37 [117.78]		
	2222 Pacity CH	EC2-33A2321-EG		22.7g, RDX	$\overline{\langle}$				0.41 [1.04]	11.90 [30.23]
	SSZS DASIX 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	Shanad Charge	Dart Number	Perforating	Evolocivo	Shot Density /	Inner Casing		Outer Casing	
O.D.	Shapeu Charge	Part Nulliper	Condition	Explosive	Phasing	O.D./Material	EHD (in)[cm]	O.D./Material	EHD (in)[cm]
	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]
3-1/8" 14g-23g	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	$4 \operatorname{cnf} / 40^{\circ}$	4.5" P110	0.30-0.32 [0.76-0.81]	7.0" 0110	0.39-0.41 [0.99-1.04]
	3323 Refrax	EC2-33A2371-D		23.0g, RDX	0 spi / 00*		0.41-0.42 [1.04-1.07]	7.0 P110	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. FLUID: Qualified for shooting in FLUID only with perforating systems qualified by GEODynamics.

GOOD HOLE

Carrier	Shanad Charge	Deut Number	Perforating	Perforating Evplosive		^Casing O.D.	Performance	e in Concrete	Performance in	Stressed Berea	
O.D.	Shaped Charge	Part Number	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD^ (in)[cm]	TTP (in)[cm]	
	2210 Conney VELL	EC2-33A1941-RC		19.0g, RDX						0.41 [1.04]	14.20 [36.07]
3-1/8"	3319 Connex VEH	EC2-33A1942-RC		19.0g, HMX	5 spf / 60° (Dry)	4 1 /0" 1 00			0.42 [1.07]	14.37 [36.50]	
19g	2210 Dealty CLI	EC2-33A1941	+ Fluid or Dry	19.0g, RDX	6 spf / 60° (Fluid)	4-1/2 L-00	0.60 [1.52]	28.55 [72.52]			
	3319 Basix GH	EC2-33A1942		19.0g, HMX			Performance in Concrete Perform EHD (in)[cm] TTP (in)[cm] EHD^ (i) 0.41 [: 0.41 [: 0.60 [1.52] 28.55 [72.52] 0.60 [1.52] 28.55 [72.52] 0.43 [: 0.43 [: 0.48 [1.22] 31.40 [79.76]				
		EC2-33A2341-RC		22.7g, RDX		4 1 (0)			0.43 [1.09]	15.60 [39.62]	
3-1/8"	3323 Connex AEH	EC2-33A2342-RC	Eluid	22.7g, HMX	$6 \operatorname{enf} / (0)$	4-1/2			0.43 [1.09]	15.89 [40.36]	
23g	2222 Dealy CLI	EC2-33A2341-E	Fluid	22.7g, RDX	o spi / ou	5-1/2" L-80	0.48 [1.22]	31.40 [79.76]			
	3323 BASIX GH	EC2-33A2342-E		22.7g, HMX		4-1/2"			Performance in Str EHD^ (in)[cm] 0.41 [1.04] 0.42 [1.07] 0 0.43 [1.09] 0.43 [1.09]		

‡ 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.

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

Conventional Long Guns 3-1/8 in (79 mm), 4-6 SPF

COMPONENTS AND ACCESSORIES

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



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Short Quick Change Assembly GN-QC31-0001



Top Sub, SQC Connection GN-R31-CQC20-A



Switch Sub Assembly GN-R31-T150-A



Plug/Shoot Adapter GN-R31-ST30 Aligning Switch Sub, LH Lock Ring GN-R31-T150L-A



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
Initiation Point
Mode of Fire
Detonating Cord
Compatible Perforating Charges
Maximum Gun Swell (in)[mm]

12 SPF (150° - 30°); 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 Basix[™] 3.46 [87.88] @ 12.00g In Fluid

ENVIRONMENTAL

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

CARRIER SPECIFICATIONS

Carrier Assembly	Shot Density & Phasing		Gun End to Center of First Scallop		Distance Shot to Shot		Approximate Weights	
Part Number	(spf) [spm]	Phasing	(in)	(mm)	(in)	(mm)	Fully 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.





SUPER BIG HOLE

Carrier	Shawad Charge	Deut Number	Perforating	Evalaciva	Shot Density /	^Casing O.D.	Performance in Concrete		Performance in Stressed Berea	
O.D.	Shaped Charge	Part Number	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD [^] (in)[cm]	TTP (in)[cm]
3-1/8"	2112 Dealy CDU	EC2-31B1231	Eluid	12.0g, RDX	12 spf/150°	E 0" L 00	0.70 [1.78]	5.60 [14.22]	0.65 [1.65]	4.60 [11.68]
12g	STIZ BASIX SPH	EC2-31B1232	Fiuld	12.0g, HMX	12 spf/135°-45°	5.0 L-60				

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 stee
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. 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.

Conventional Long Guns 3-1/8 in (79 mm), 12 SPF, SBH

COMPONENTS AND ACCESSORIES

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



Wireline Insert GN-E00-0011

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



GEUL

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Short Quick Change Assembly GN-QC31-0001



Top Sub, SQC Connection GN-R31-CQC20-A



Switch Sub Assembly GN-R31-T150-A



Plug/Shoot Adapter GN-R31-ST30 Aligning Switch Sub, LH Lock Ring GN-R31-T150L-A



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 **Initiation Point** Mode of Fire **Detonating Cord Compatible Perforating Charges** Maximum Gun Swell (in)[mm]

ENVIRONMENTAL

Maximum Pressure (psi)[MPa] Maximum Tensile* (lbf)[kN]

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 FraclQ[®], Connex[®], Razor[®], Basix[™] 3.56 [90.42] @ 25.00g In Fluid; 3.63 [92.20] @ 22.7g Dry

22.700 [156.51] 331,900 [1476.36] *Hardware Calculated Breaking Point



CARRIER SPECIFICATIONS

Carrier Assembly	Shot Density & Phasing Options		Gun End to Center of First Scallop		Distance Shot to Shot		Approximate Weights	
Part Number	(spf) [spm]	Phasing	(in)	(mm)	(in)	(mm)	Fully Loaded	Blank Gun
GA3304-6033A- O ***		0°						
GA3304-6033A- A ***	4 spf [13 spm]	60°	7.50	100 50	2.00	76.20		
GA3304-6033A- B ***		90°		190.50	3.00			
GA3304-6033A- G ***		90° 120°						
GA3305-6033A-J***	5 spf [16 spm]	180°	7.20	182.88	2.40	60.96		
GA3306-6033A- O ***		0°						
GA3306-6033A- A ***	(ant [20 anna]	60°	7.00	177.80	2.00	50.80	15.25 lb/ft	13.50 lb/ft
GA3306-6033A-L***	o spi [20 spin]	+30°/-30°	1				(with sub)	(with sub)
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



CONSTANT ENTRY HOLE AND PENETRATION

Carrier			Dorforating		Shot Donsity /		Performance in Stressed Berea (API RP19B Sec. 2)			
	Shaped Charge	Part Number	Condition	Explosive Phasing		API 17D Targeted Dine*		EHD Variation	TTD (in)[cm]	
0.0.			Condition		Fliasing	laigeteu ripe		Decentralized		
3-3/8"	FracIQ 20	EC2-33A1271	Eluid.	12.0g, RDX	$f = \frac{1}{2} \int d\theta d\theta d\theta$	4.5"-5.5" OD P110	0.22 [0.56]	5.5%	E O [10 70]	
12g-13g	FracIQ 25	EC2-33A1371	Fiuld	13.0g, RDX	0 Spi / 00*	6.0" OD P110	0.26 [0.66]	2.3 %	J.U [12.70]	

DEEP PENETRATING/EXTREME DEEP PENETRATING

Carrier	Shanad Charge	Shaped Charge Dart Number		Perforating Explosive		Shot Density / ^Casing O.D.		e in Concrete	Performance in Stressed Berea	
O.D.	Shaped Charge	Part Number	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD^ (in)[cm]	TTP (in)[cm]
	2210 Connov DV	EC2-33A1991-RX		19.0g, RDX		5-1/2"			0.32 [0.81]	11.30 [28.70]
3-3/8"	3319 CONNEX KA	EC2-33A1992-RX	In Eluid or Dry	19.0g, HMX	$6 \operatorname{cnf} / 40^{\circ}$	5-1/2			0.32 [0.81]	11.60 [29.46]
19g	3319 Razor XDP	EC2-33A1921	III Fluid of Dry	19.0g, RDX	0 shi / 00	1-1/2"	0.51 [1.30]	42.07 [106.86]		
		EC2-33A1922		19.0g, HMX		4-1/2			0.43 [1.09]	14.60 [37.08]
		EC2-33A2321-RC		22.7g, RDX					0.40 [1.02]	15.60 [39.62]
	3323 Connex SDP	EC2-33A2322-RC		22.7g, HMX					0.46 [1.17]	15.31 [38.89]
		EC2-33A2323-RC	In Fluid or Dry	22.7g, HNS					0.36 [0.91]	11.85 [30.10]
	3323 Razor XDP	EC2-33A2321	III Fluid of Dry	22.7g, RDX					0.41 [1.04]	16.40 [41.66]
3-3/8" 23g		EC2-33A2322	-	22.7g, HMX	6 spf / 60°		0.45 [1.14]	46.32 [117.65]	0.44 [1.12]	15.68 [39.83]
		EC2-33A2323		22.7g, HNS		1 1/2" 00			0.37 [0.94]	12.12 [30.78]
	3323 Basix XDP	EC2-33A2321-E	In Fluid or Dry	22.7g, RDX		4-1/2 L-00	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]		
	2222 Desity CLL	EC2-33A2321-EG	Fluid	22.7g, RDX					0.41 [1.04]	11.90 [30.23]
	3323 DASIX GH	EC2-33A2322-EG		22.7g, HMX					0.40 [1.02]	11.90 [30.23]
	2222 Pacity DD	EC2-33A2351	In Fluid or Dry	22.7g, RDX			0.47 [1.19]	32.10 [81.53]		
	3323 DASIX DP	EC2-33A2352	III Fluid of Dry	22.7g, HMX						
		EC2-33B2521-RC		25.0g, RDX					0.40 [1.02]	15.10 [38.35]
	3325 Connex SDP	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]
3-3/8"		EC2-33B2521	Fluid -	25.0g, RDX	$6 \operatorname{cm} f / (0)$	4 1 /0" 1 00	0.45 [1.14]	44.58 [113.23]	0.39 [0.99]	17.10 [43.43]
25g	3325 Razor XDP	EC2-33B2522		25.0g, HMX	6 spf / 60°	4-1/2 L-00	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. FLUID: Qualified for shooting in FLUID only with perforating systems qualified by GEODynamics.

BIG HOLE

Carrier	Shanad Charge	Dart Number	Perforating	Explosive	Shot Density / Phasing	^Casing O.D.	Performance in Concrete		Performance in Stressed Berea	
O.D.	Shaped Charge	Part Nulliper	Condition			Application	EHD (in)[cm]	TTP (in)[cm]	EHD [^] (in)[cm]	TTP (in)[cm]
3-3/8"	2222 Desity DU	EC2-33A2331	Fluid	22.7g, RDX	((/ 00	F 4 (0 ²) L 00	0.70 [1.78]	5.79 [14.71]	0.69 [1.75]	4.05 [10.29]
23g	JJZJ BASIX BH	EC2-33A2332	Fluid	22.7g, HMX	o spi / ou	5-1/2 L-60				

GOOD HOLE

Carrier	Shawad Charge	Dent Number	Perforating	Evaluative	Shot Density /	^Casing O.D.	Performance	e in Concrete	Performance in	Stressed Berea
O.D.	Shaped Charge	Part Number	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD [^] (in)[cm]	TTP (in)[cm]
3-3/8"	2210 Conney VELL	EC2-33A1941-RC	In Fluid or Dr.	19.0g, RDX		4-1/2" L-80			0.41 [1.04]	14.20 [36.07]
19g	EC2-33A1942-RC	EC2-33A1942-RC	In Fluid or Dry	19.0g, HMX					0.42 [1.07]	14.37 [36.50]
	3323 Connex XEH	EC2-33A2341-RC	In Fluid or Dry	22.7g, RDX	6 spf / 60°				0.43 [1.09]	15.60 [39.62]
3-3/8"		EC2-33A2342-RC		22.7g, HMX					0.43 [1.09]	15.89 [40.36]
23g	2222 Desity CIL	EC2-33A2341		22.7g, RDX			0.52 [1.32]	33.58 [85.29]		
	3323 Basix GH	EC2-33A2342		22.7g, HMX						
0.0/0"	2225 Conney VELL	EC2-33B2541-RC		25.0g, RDX						
3-3/8″ 25g	3323 CONNEX XEH	EC2-33B2542-RC	Fluid	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. FLUID: Qualified for shooting in FLUID only with perforating systems qualified by GEODynamics.

Conventional Long Guns 3-3/8 in (86 mm), 4-6 SPF

COMPONENTS AND ACCESSORIES

Description	Part Number(s)				
Short Quick Change (SQC) Assembly (one per string, CCL to top sub)	GN-QC	31-0001			
Quick Rebuild Kit (contacts, teflon tubing, screw, spring, insulating retainer)	RKQ-GN-C	QC31-0001			
Complete Rebuild Kit with O-Rings (all required parts)	RKC-GN-C	RKC-GN-QC31-0001			
TCP Transfer Kit (2-3/4" through 4")	GN-00	0-0025			
Top Sub, 3-3/8", Conventional and TCP	GN-R3	3-0020			
Wireline Insert & O-Ring	GN-E00-0011 (o-ri	ng: OR-N569-211)			
Spring Contact Assembly	GN-E0	0-0020			
Iop Sub, Wireline	GN-R3	3-0035			
lop Sub, Ported, SQC Connection	GIN-R33-	CQC20-A			
Top Sub Lift Sub Assembly, 3-3/8"	TC-LT3	33-000			
Tandem Sub, 3-3/8", Conventional and TCP	GN-R3	3-0021			
Ported Switch Tandem Sub Assembly, 12" long, 6.24" make-up length Ported Switch Tandem Sub Assembly, 3.25" make-up length	GN-R33-T150-A GN-R33-T100-A				
Aligning Switch Sub, LH Lock Ring, 6.24" make-up length (MUL) Aligning Switch Sub, RH Lock Ring, 6.24" MUL Aligning Short Switch Sub, RH*, *compatible with centralizer rings	GN-R33-T150L-A GN-R33-T150R-A GN-R33-T109R-A				
Locking Ring, Left-Hand Thread Locking Ring, Right-Hand Thread	GN-R3 GN-R3	3-L001 3-R001			
O-Ring Materials and Size Nitrile (standard option) Viton (with back-up rings required for > 325°F) Back-up rings for > 325°F	Top Connection OR-N569-230 OR-V95G-230 OR-B230-2813	Gun Connection OR-N569-231 OR-V95G-231 OR-B231-2870			
Port Plug and Port Plug O-Ring	GN-R00-T001 /	OR-N569-217			
3-3/8" Bull Plug, Standard 3-3/8" Bull Plug, with 2-3/8" EUE Pin 3-3/8" Bull Plug, with 2-7/8" EUE Pin	GN-R3 GN-R3 GN-R3	GN-R33-0022 GN-R33-0023 GN-R33-0024			
Plug/Shoot Adapter Assembly, 3-3/8"	GN-R3	3-ST30			
Thread Protectors, 3-3/8"					
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	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



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ynamics

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



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

BULL PLUG, STANDARD GN-R33-0022

GN-R33-ST30

Plug/Shoot Adapter



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Patents: www.perf.com/patents

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 Initiation Point Mode of Fire Detonating Cord Compatible Perforating Charges Maximum Gun Swell (in)[mm]

ENVIRONMENTAL

Maximum Pressure (psi)[MPa] Maximum Tensile* (lbf)[kN] 12 SPF (150° - 30°); 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 Basix[™] and IsoLoc[™] 3.46 [87.88] @ 12.00g In Fluid

20,000 [138] 331,900 [1476.36] *Hardware Calculated Breaking Point



CARRIER SPECIFICATIONS

Carrier Assembly	Shot Density & Phasing		Gun End to Center of First Scallop		Distance Shot to Shot		Approximate Weights	
Fait Number	(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-**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.

SUPER BIG HOLE

Carrier	Shanad Charge	Dart Number	Perforating	Evolocivo	Shot Density /	^Casing O.D.	Performance	e in Concrete	Performance in	Stressed Berea
O.D.	Shapeu Charge	Condition	Phasing	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD [^] (in)[cm]	TTP (in)[cm]	
3-3/8"	2112 Dealy CDU	EC2-31B1231	FI 1 I	12.0g, RDX	40 (450)	F 1/0"L 00	0.71 [1.80]	5.88 [14.94]	0.66 [1.68]	4.70 [11.94]
12g	STIZ BASIX SBH	EC2-31B1232	Fiuld	12.0g, HMX	12 spi/150	5-1/2 L-80				

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

Threaded and scalloped, proprietary gun steel, similar to 41XX alloy stee
Round steel tube strip; bend tab retention
Booster to booster (no splice)
3.375 [85.73] / 0.375 [9.53]
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.

Conventional Long Guns 3-3/8 in (86 mm), 12 SPF, SBH

COMPONENTS AND ACCESSORIES

Description	Part Nu	mber(s)		
Short Quick Change (SQC) Assembly (one per string, CCL to top sub)	GN-QC	31-0001		
Quick Rebuild Kit (contacts, teflon tubing, screw, spring, insulating retainer)	RKQ-GN-QC31-0001			
Complete Rebuild Kit with O-Rings (all required parts)	RKC-GN-QC31-0001			
TCP Transfer Kit (2-3/4" through 4")	GN-00	0-0025		
Top Sub, 3-3/8", Conventional and TCP	GN-R3	3-0020		
Wireline Insert & O-Ring	GN-E00-0011 (o-ri	ng: OR-N569-211)		
Spring Contact Assembly	GN-E0	0-0020		
Top Sub, Wireline	GN-R3	3-0035		
Top Sub, Ported, SQC Connection	GN-R33-	CQC20-A		
Top Sub Lift Sub Assembly, 3-3/8"	TC-LT3	33-000		
Tandem Sub, 3-3/8", Conventional and TCP	GN-R3	3-0021		
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-R3	3-L001		
Locking Ring, Right-Hand Thread	GN-R33-R001			
O-Ring Materials and Size	Top Connection	Gun Connection		
Nitrile (standard option)	OR-N569-230	OR-N569-231		
Viton (with back-up rings required for $> 325^{\circ}F$)	OR-V95G-230	OR-V95G-231		
Back-up rings for > 325°F	OR-B230-2813	OR-B231-2870		
Port Plug and Port Plug O-Ring	GN-R00-T001 /	OR-N569-217		
3-3/8" Bull Plug, Standard	GN-R3	3-0022		
3-3/8" Bull Plug, with 2-3/8" EUE Pin	GN-R3	3-0023		
3-3/8" Bull Plug, with 2-7/8" EUE Pin	GN-R3	3-0024		
Plug/Shoot Adapter Assembly, 3-3/8"	GN-R3	3-ST30		
Thread Protectors. 3-3/8"				
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



btul

namics

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



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

Revised: August 31, 2023 9:21 PM

Plug/Shoot Adapter GN-R33-ST30

BULL PLUG, STANDARD GN-R33-0022

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Patents: www.perf.com/patents

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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 Initiation Point Mode of Fire Detonating Cord Compatible Perforating Charges Maximum Gun Swell (in)[mm]

ENVIRONMENTAL

Maximum Pressure (psi)[MPa] Maximum Tensile* (lbf)[kN] 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 Connex®, Razor®, Basix™ 4.16 [105.66] @ 39.0g, In Fluid

19,700 [135] (4 SPF carrier) **434,400 [1932]** *Hardware Calculated Breaking Point





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
40A Charge Case	GA4004-4540A- A ***	4 spf [13 spm]	60°	- 7.50	100.50	3.00	76.20	22.05 lb/ft (with sub)	17.69 lb/ft (with sub)
	GA4004-4540A- B ***		90°						
	GA4004-4540A- G ***		120°		190.50				
	GA4004-4540A- OL ***		0°/+5/-5						
33A/ 33B Charge Cases	GA4005-6033A- A ***	5 f [1 (]	60°	7.20	182.88	2.40	60.96		
	GA4005-6033A- J ***	2 shi [10 shii]	180°						
	GA4006-6033A- A ***	6 spf [20 spm]	60°	7.00	177.80	2.00	50.80		







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

Carrier	rrier D.D. Shaped Charge	Part Number Perforat Condition	Perforating	Explosive	Shot Density / Phasing	^Casing O.D.	Performance in Concrete		Performance in Stressed Berea	
O.D.			Condition			Application	EHD (in)[cm]	TTP (in)[cm]	EHD^ (in)[cm]	TTP (in)[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]	
	4008 GEOPunch RDX	EC2-40A0861	8.0g, RDX		
4"	4008 GEOPunch HMX	EC2-40A0862	8.0g, HMX	1.05 [2.67]	
	4008 GEOPunch HNS	EC2-40A0863	8.0g, HNS		

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

Carrier	Shaped Charge	Part Number	Perforating Condition	Explosive	Shot Density /	^Casing O.D.	Performance in Concrete		Performance in Stressed Berea	
O.D.					Phasing	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					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	6 spf / 60°	5-1/2" L-80	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.
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 Nu	umber(s)	
Top Sub Lift Sub Assembly, 4"	TC-LT	40-000	
TCP Transfer Kit (2-3/4" through 4")	GN-00	0-0025	
Top Sub, 4" Top Sub Wireline Insert Spring Contact Assembly Tandem Sub, 4"	GN-R4 GN-E00-0011 (o-r GN-E0 GN-R4	0-0020 ing: OR-N569-211) 0-0020 0-0021	an an
O-Ring Materials and Size Nitrile (standard option) Viton (with back-up rings required for > 325°F) Back-up rings for > 325°F	Top Connection OR-N569-230 OR-V95G-230 OR-B230-2813	Gun Connection OR-N569-236 OR-V95G-236 OR-B236-3497	WireLine Insert
Bull Plug, 4" Standard Bull plug, 4" with 2-3/8" EUE Pin Bull plug, 4" with 2-7/8" EUE Pin	GN-R4 GN-R4 GN-R4	0-0022 0-0023 0-0024	SPRING CONTACT ASSEMBLY GN-E00-0011 (4-1/2" OD TOP SUB SHOWN FOR
Thread Protectors Top Sub (Top Pin) Carrier (Gun) Protector Tandem Sub & Bull Plug Protector	GN-THD GN-THD GN-THD	-312-020 -450-030 -450-040	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 Shot Density & Phasing options; Availab	le Gun Lengths range from 2' to 21'
Initiation Point	Top- or bottom-fired options available; convention	onal wireline and TCP
Mode of Fire	Simultaneous or selective fire	
Detonating Cord	80-grain round	60 ⁻
Compatible Perforating Charges	Basix™, Razor [®] , and Connex [®]	
Maximum Gun Swell (in)[mm]	4.67 [118.62] @ 39.0g, In Fluid	
		// \\

ENVIRONMENTAL

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



CARRIER SPECIFICATIONS

Carrier Assembly		Shot Density & Phasing Options		Gun End to Center of First Scallop		Distance Shot to Shot		Approximate Weights	
	Part Number	(spf) [spm]	Phasing	(in)	(mm)	(in)	(mm)	Fully Loaded	Blank Gun
	GA4504-4540A- A ***	1 ant [12 anm]	60°	7.50	100 50	2.00	74.00		
	GA4504-4540A- B ***	4 Spi [13 Spin]	4 spt [13 spm] 90°		190.50	3.00	/0.20		
40A	GA4505-4540A- A ***		60°	7.20	182.88	2.40	60.96		
Charge	GA4505-4540A- O ***		0°					28.7 lb/ft (w/sub)	21.2 lb/ft (w/sub)
	GA4505-4540A- LB ***	5 spi [16 spin]	0°/+10°						
	GA4505-4540A- OL ***		0°/+5/-5						
33A/	GA4504-6033A- B ***	4 spf [13 spm]	90°	7.50	190.50	3.00	76.20		
33B Charge	GA4505-6033A- A ***	5 spf [16 spm]	60°	7.20	182.88	2.40	60.96	23.4 lb/ft (w/sub)	20.9 lb/ft (w/sub)
Cases	GA4506-6033A- A ***	6 spf [20 spm]	60°	7.00	177.80	2.00	50.80		





BIG HOLE (40A CHARGE CASE)

Carrier	Chanad Charge	Dout Number	Perforating	Evalaciva	Shot Density /	^Casing O.D.	Performance	e in Concrete	Performance in	Stressed Berea
O.D.	Shaped Charge	Part Number	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD [^] (in)[cm]	TTP (in)[cm]
4-1/2"		EC2-40A3931	El.: J	39.0g, RDX	E	7.0" 00	0.86 [2.18]	6.13 [15.57]		
39g	4039 Basix BH	EC2-40A3932	Fluid	39.0g, HMX	5 spr / 60°	7.0 L-80				

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

Carrier	Chanad Charge	Dout Number	Perforating	Evalaciva	Shot Density /	^Casing O.D.	Performance	e in Concrete	Performance in	Stressed Berea
O.D.	Shaped Charge	Part Number	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD [^] (in)[cm]	TTP (in)[cm]
	EC2-40A3921-RC	39.0g, RDX					0.41 [1.04]	17.15 [43.56]		
	4039 Connex SDP	EC2-40A3922-RC		39.0g, HMX					0.43 [1.09]	17.80 [45.21]
4.4.(0))		EC2-40A3923-RC		39.0g, HNS					0.36 [0.91]	15.20 [38.61]
4-1/2 20a		EC2-40A3921	Fluid	39.0g, RDX	5 spf / 60°	7.0" L-80	0.44 [1.12]	58.59 [148.82]	0.38 [0.97]	18.60 [47.24]
57g	4039 Razor ADP	EC2-40A3922		39.0g, HMX			0.45 [1.14]	72.93 [185.24]	0.37 [0.94]	19.10 [48.51]
		EC2-40A3921-E		39.0g, RDX					0.56 [1.42]	16.10 [40.89]
	4037 BASIX XDP	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	4008 GEOPunch RDX	EC2-40A0861	8.0g, RDX	
4-1/2"	4008 GEOPunch HMX	EC2-40A0862	8.0g, HMX	1.05 [2.67]
	4008 GEOPunch HNS	EC2-40A0863	8.0g, HNS	

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

Carrier Shaped Charge		Dort Number	Perforating	Evalorivo	Shot Density /	^Casing O.D.	Performance	e in Concrete	in Concrete Performance in Stressed Berea	
O.D.	Shapeu Charge	Part Nulliper	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD [^] (in)[cm]	TTP (in)[cm]
4.4.(0)		EC2-33A2321-RC		22.7g, RDX					0.34 [0.86]	14.75 [37.47]
4-1/2 22a	3323 Connex SDP	EC2-33A2322-RC	Fluid	22.7g, HMX	6 spf / 60°	5-1/2"			0.46 [1.17]	15.31 [38.89]
ZJg		EC2-33A2323-RC		22.7g, HNS					0.36 [0.91]	10.50 [26.67]
4-1/2"		EC2-33B2521	In Fluid on Dm.	25.0g, RDX	(anf / (09	7.0"			0.44 [1.12]	16.30 [41.40]
25g	3325 Razor ADP	EC2-33B2522	In Fluid or Dry	25.0g, HMX	o spi / ou	7.0			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.



GOOD HOLE (33A CHARGE CASES)

Carrier	Chanad Charge	Dout Number	Perforating	Evalesive	Shot Density /	^Casing O.D.	Performance	e in Concrete	Performance in	Stressed Berea
O.D.	Shaped Charge	Part Number	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD [^] (in)[cm]	TTP (in)[cm]
4-1/2"	2222 Conney VELL	EC2-33A2341-RC	FI 11	22.7g, RDX	(and / (0)	7.0"			0.34 [0.86]	14.72 [37.39]
23g	3323 Connex AEH	EC2-33A2342-RC	Fiuld	22.7g, HMX	o spi / ou	7.0			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-00	0-0030		
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-R4	5-0022		
4-1/2" with 2-7/8" EUE Pin	GN-R4	5-0023		
Thread Protectors, Top Sub (Top Pin)	GN-THD	GN-THD-312-020		
Carrier (Gun) Protector	GN-THD	GN-THD-450-030		
Tandem Sub & Bull Plug Protector	GN-THD	GN-THD-450-040		



NE INSERT 0-0011

ACT ASSEMBLY 0-0011 SUB SHOWN FOR ICE 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
Initiation Point	Top- or bottom-fired opt
Mode of Fire	Simultaneous or selectiv
Detonating Cord	80-grain round
Compatible Perforating Charges	Connex [®] , Razor [®] , Basix™
Maximum Gun Swell (in)[mm]	4.67 [118.62] @ 39.0g, I

ENVIRONMENTAL

Maximum Pressure (psi)[MPa] Maximum Tensile* (lbf)[kN] SPM (60°); Available Gun Lengths range from 1 to 7 meters p- or bottom-fired options available; conventional wireline and TCP nultaneous or selective fire -grain round onnex®, Razor®, Basix™ 57 [118.62] @ 39.0g, In Fluid

17,700 [122] 517,800 [2303] *Hardware Calculated Breaking Point

CARRIER SPECIFICATIONS

Carrier Assembly Part Number	Shot De # Shots Phas		t Density & Gun End to Center of Phasing First Scallop		Distance Shot to Shot		Gun Lengths	Approximate Weights		
		spm	Phasing	(mm)	(in)	(mm)	(in)	(m)	(kg)	(lbs)
GM4517-4540A-A017	17		60°	190	7.48			1.35	39.6	87
GM4517-4540A-A034	34			175	6.89		2.38606	2.35	67.1	148
GM4517-4540A-A050	50			190	7.48			3.35	94.8	209
GM4517-4540A-A067	67	17 spm		175	6.89	60.6061		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







BIG HOLE

Carrier	Shanad Charge	Dout Number	Perforating	g Explosive	Shot Density /	^Casing O.D.	Performance in Concrete		Performance in Stressed Berea		
O.D.	Shaped Charge	Part Nulliper	Condition		Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD [^] (in)[cm]	TTP (in)[cm]	
4-1/2"	4020 Desity DU	EC2-40A3931	Fluid	39.0g, RDX	E_{out} ((0)	70"1 00	0.86 [2.18]	6.13 [15.57]			
39g	4039 Basix BH	EC2-40A3932	Fiuld	39.0g, HMX	5 spi / 60°	7.0 L-00					

DEEP PENETRATING/EXTREME DEEP PENETRATING

Carrier	Shanad Charge	Dout Number	Perforating Explosive	Shot Density /	^Casing O.D.	Performanc	e in Concrete	Performance in	Stressed Berea	
O.D.	Shaped Charge	Part Number	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD [^] (in)[cm]	TTP (in)[cm]
	4039 Connex SDP	EC2-40A3921-RC		39.0g, RDX	5 spf / 60°				0.41 [1.04]	17.15 [43.56]
4-1/2"		EC2-40A3922-RC	Fluid	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]
		EC2-40A3921		39.0g, RDX			0.44 [1.12]	58.59 [148.82]	0.38 [0.97]	18.60 [47.24]
57g	4039 Razor ADP	EC2-40A3922		39.0g, HMX			0.45 [1.14]	72.93 [185.24]	0.37 [0.94]	19.10 [48.51]
		EC2-40A3921-E		39.0g, RDX					0.56 [1.42]	16.10 [40.89]
	4039 Basix XDP	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		
	4008 GEOPunch HMX	EC2-40A0862	8.0g, HMX	1.05 [2.67]	
	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.

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 Nu	Part Number(s)				
Top Sub Lift Sub Assembly, 4-5/8"	TC-LT4	5-000H				
TCP Transfer Kit (4-1/2" through 7")	GN-00	0-0030				
Top Sub, 4-1/2"	GN-R4	5-0020				
Top Sub Wireline Insert	GN-E00-0011 (o-r	ing: OR-N569-211)				
Spring Contact Assembly	GN-E0					
Tandem Sub, 4-1/2"	GN-R4	~//				
O-Ring Materials and Size	Top Connection	Gun Connection				
Nitrile (standard option)	OR-N569-230	OR-N569-342	1 · · ·			
Viton (with back-up rings required for > 325°F)	OR-V95G-230	OR-V95G-342	Wideling bi			
Back-up rings for > 325°F	OR-B230-2813	OR-B342-3997	GNI-E00-00			
Bull Plug, 4-1/2" Standard	GN-R4	5-0022				
4-1/2" with 2-7/8" EUE Pin	GN-R4	5-0023	GN-F00-00			
Thread Protectors, Top Sub (Top Pin)	GN-THD	(4-1/2" OD TOP SUE				
Carrier (Gun) Protector	GN-THD	REFERENCE O				
Tandem Sub & Bull Plug Protector	GN-THD	GN-THD-450-040				



SERT 011

ASSEMBLY 011 SHOWN FOR VLY)

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
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] Maximum Tensile* (lbf)[kN]

ireline and TCP

17,200 [118] 517,800 [2303] *Hardware Calculated Breaking Point

CARRIER SPECIFICATIONS

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







BIG HOLE

Carrier	Chanad Charge	Dout Number	Perforating	Explosive	Shot Density /	^Casing O.D.	Performance	e in Concrete	Performance in	Stressed Berea
O.D.	Shaped Charge	Part Number	Condition		Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD^ (in)[cm]	TTP (in)[cm]
4-1/2"	2222 Desity DU	EC2-33A2331	El.: d	22.7g, RDX	12 spf/135°-45°	7 0" 1 90	0.81 [2.06]	5.28 [13.41]	0.78 [1.98]	5.00 [12.70]
23g	3323 Basix BH	EC2-33A2332	Fiuld	22.7g, HMX		7.0 L-80			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	Chanad Charge	Deut Number	Perforating Condition	Explosive	Shot Density /	^Casing O.D. Performance in Concrete			Performance in Stressed Berea	
O.D.	Shaped Charge	Part Number			Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD [^] (in)[cm]	TTP (in)[cm]
4-1/2" 23g	3323 Connex SDP	EC2-33A2321-RC		22.7g, RDX						
		EC2-33A2322-RC	Fluid	22.7g, HMX	12 spf / 135°-45°	7.0" 90			0.46 [1.17]	15.31 [38.89]
	3323 Razor XDP	EC2-33A2321		22.7g, RDX		7.0 L-80			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/MaterialThreaded and scalloped, proprietary gun steel, similar to 41XX alloy steelCharge Tube Type & RetentionRound steel tube strip; bend tab retentionType of Tandem ConnectionBooster to booster (no splice)Nominal OD / Wall Thickness (in)[mm]4.50 [114.30] / 0.375 [9.53]Upper/Lower Thread Connections3-15/16" - 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.

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

GEODynamics®

COMPONENTS AND ACCESSORIES

Description	Part Nu	ımber(s)			
Top Sub Lift Sub Assembly, 4-5/8"	TC-LT4	5-000H			
TCP Transfer Kit (4-1/2" through 7")	GN-00	GN-000-0030			
Top Sub, 4-1/2"	GN-R4	5-0020			
Top Sub Wireline Insert	GN-E00-0011 (o-r	ing: OR-N569-211)			
Spring Contact Assembly	GN-E0	0-0020			
Tandem Sub, 4-1/2"	GN-R4	5-0021			
O-Ring Materials and Size Nitrile (standard option) Viton (with back-up rings required for > 325°F) Back-up rings for > 325°F	Top Connection OR-N569-230 OR-V95G-230 OR-B230-2813	Gun Connection OR-N569-342 OR-V95G-342 OR-B342-3997			
Bull Plug, 4-1/2" Standard 4-1/2" with 2-7/8" EUE Pin	GN-R45-0022 GN-R45-0023				
Thread Protectors, Top Sub (Top Pin) Carrier (Gun) Protector Tandem Sub & Bull Plug Protector	GN-THD GN-THD GN-THD	-312-020 -450-030 -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
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] Maximum Tensile* (lbf)[kN]

nal wireline and TCP

17,200 [118] 517,800 [2303] *Hardware Calculated Breaking Point

CARRIER SPECIFICATIONS

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





SUPER BIG HOLE

Carrier	Carrier O.D. Shaped Charge	Part Number	Perforating Condition	Explosive F	Shot Density /	^Casing O.D.	O.D. Performance in Concrete		Performance in Stressed Berea	
O.D.					Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD^ (in)[cm]	TTP (in)[cm]
4-1/2"	4526 Dealy CDUITI	EC2-45B2631	Fluid	26.0g, RDX	12 spf/135°-45°	7.0" L-80	0.87 [2.21]	5.67 [14.40]		
26g	4526 Basix SBH TL	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 Nu	Part Number(s)				
Top Sub Lift Sub Assembly, 4-5/8"	TC-LT4	TC-LT45-000H				
TCP Transfer Kit (4-1/2" through 7")	GN-00	0-0030				
Top Sub, 4-1/2" Top Sub Wireline Insert Spring Contact Assembly	GN-R4 GN-E00-0011 (o-r GN-E0	N				
Tandem Sub, 4-1/2"	GN-R4	5-0021				
O-Ring Materials and Size Nitrile (standard option) Viton (with back-up rings required for > 325°F) Back-up rings for > 325°F	Top Connection OR-N569-230 OR-V95G-230 OR-B230-2813	Gun Connection OR-N569-342 OR-V95G-342 OR-B342-3997				
Bull Plug, 4-1/2" Standard 4-1/2" with 2-7/8" EUE Pin	GN-R4 GN-R4	GN-R45-0022 GN-R45-0023				
Thread Protectors, Top Sub (Top Pin) Carrier (Gun) Protector Tandem Sub & Bull Plug Protector	GN-THD GN-THD GN-THD	GN-E00-0011 (4-1/2" OD top sub shown f 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.

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

Simultaneous or selective fire

4.816 [122.33] @ 39.0g, In Fluid

Standard

18,900 [130]

*454,600 [2022]

Connex[®], Razor[®], Basix[™]

80-grain round

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.

5 SPF (60°); Available Gun Lengths range from 2' to 21'

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

High Pressure

APPLICATION SPECIFICATIONS

Shot Density and Phasing Initiation Point Mode of Fire Detonating Cord Compatible Perforating Charges Maximum Gun Swell (in)[mm]

ENVIRONMENTAL

Maximum Pressure (psi)[MPa] Maximum Tensile* (lbf)[kN] *Hardware Calculated Breaking Point

CARRIER SPECIFICATIONS

Carrier Assembly	Shot Density & Phasing		Gun End to Center of First Scallop		Distance Shot to Shot		Approximate Weights	
i alt Nullber	(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.









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"		EC2-40A3931	Fluid	39.0g, RDX	E f / / 00	7.0" 00	0.86 [2.18]	6.13 [15.57]		
39g	4034 DASIX BH	EC2-40A3932	Fiuld	39.0g, HMX	5 spi / 60*	7.0 L-80				

DEEP PENETRATING/EXTREME DEEP PENETRATING

Carrier	r Shaped Charge Part Nu	Deut Number	Perforating	Shot Density /	^Casing O.D.	Performance in Concrete		Performance in Stressed Berea		
O.D.	Shaped Charge	Part Number	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD [^] (in)[cm]	TTP (in)[cm]
	4039 Connex SDP	EC2-40A3921-RC	Fluid	39.0g, RDX					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	5 spf / 60°				0.36 [0.91]	15.20 [38.61]
4-5/8"		EC2-40A3921		39.0g, RDX		7.0"			0.38 [0.97]	18.60 [47.24]
39g	4039 Razor XDP	EC2-40A3922		39.0g, HMX		7.0			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]
	4008 GEOPunch RDX	EC2-40A0861	8.0g, RDX	
4-5/8"	4008 GEOPunch HMX	EC2-40A0862	8.0g, HMX	1.05 [2.67]
	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.

HARDWARE

Gun Body Configuration/MaterialThreaded and scalloped, proprietary gun steel, similar to 41XX alloy steelCharge Tube Type & RetentionRound steel tube strip; bend tab retentionType of Tandem ConnectionBooster to booster (no splice)Nominal OD / Wall Thickness (in)[mm]4.625 [117.48] / 0.4375 [11.11]Upper/Lower Thread Connections3-15/16" - 6P ACME-2G

COMPONENTS AND ACCESSORIES

Description	Part Nu	ımber(s)	
Top Sub Lift Sub Assembly, 4-5/8"	TC-LT4	1	
TCP Transfer Kit (4-1/2" through 7")	GN-00	0-0030	
Top Sub, 4-1/2"	GN-R4	5-0020	
Top Sub Wireline Insert	GN-E00-0011 (o-r	ing: OR-N569-211)	
Spring Contact Assembly	GN-E0	0-0020	
Tandem Sub, 4-1/2"	GN-R4	5-0021	
O-Ring Materials and Size Nitrile (standard option) Viton (with back-up rings required for > 325°F) Back-up rings for > 325°F	Top Connection OR-N569-230 OR-V95G-230 OR-B230-2813	Gun Connection OR-N569-342 OR-V95G-342 OR-B342-3997	W
Bull Plug, 4-1/2" Standard 4-1/2" with 2-7/8" EUE Pin	GN-R4 GN-R4	5-0022 5-0023	- Spring
Thread Protectors, Top Sub (Top Pin) Carrier (Gun) Protector Tandem Sub & Bull Plug Protector	GN-THD GN-THD GN-THD	-312-020 -450-030 -450-040	(4-1/2" C



Wireline Insert GN-E00-0011

SPRING CONTACT ASSEMBLY GN-E00-0011 (4-1/2" OD top sub shown for reference only) Iamics

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 Initiation Point Mode of Fire Detonating Cord Compatible Perforating Charges Maximum Gun Swell (in)[mm]

ENVIRONMENTAL

Maximum Pressure (psi)[MPa] Maximum Tensile* (lbf)[kN] 12 SPF (135°-45°); 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 Connex[®], Razor[®] 4.69 [119.13] @ 22.7g, In Fluid

18,900 [130] 454,600 [2022] *Hardware Calculated Breaking Point



CARRIER SPECIFICATIONS

Carrier Assembly	Shot Density & Phasing		Gun End to Center of First Scallop		Distance Shot to Shot		Approximate Weights	
Fait Number	(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/ sub)	23.4 lb/ft (w/ 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.





DEEP PENETRATING/EXTREME DEEP PENETRATING

Carrier	Shawad Charge	Dent Number	Perforating		Shot Density /	^Casing O.D.	Performance	e in Concrete	Performance in	Stressed Berea
O.D.	Shapeu Charge	Part Nulliper	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD [^] (in)[cm]	TTP (in)[cm]
4-5/8" 3323 Connex SDP	EC2-33A2321-RC		22.7g, RDX							
	3323 Connex SDP	EC2-33A2322-RC	Elui d	22.7g, HMX	10 (1050 450	7.0" L-80			0.46 [1.17]	15.31 [38.89]
23g	23g 3323 Razor XDP	EC2-33A2321	Fluid	22.7g, RDX	12 spi / 135 -45					
		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 Nu		
Top Sub Lift Sub Assembly, 4-5/8"	TC-LT4		
TCP Transfer Kit (4-1/2" through 7")	GN-00	0-0030	
Top Sub, 4-1/2" Top Sub Wireline Insert Spring Contact Assembly	GN-R45-0020 GN-E00-0011 (o-ring: OR-N569-211) GN-E00-0020		and the second s
Tandem Sub, 4-1/2"	GN-R4	5-0021	7
O-Ring Materials and Size Nitrile (standard option) Viton (with back-up rings required for > 325°F) Back-up rings for > 325°F	Top Connection OR-N569-230 OR-V95G-230 OR-B230-2813	Gun Connection OR-N569-342 OR-V95G-342 OR-B342-3997	WireLine Insert GN-E00-0011
Bull Plug, 4-1/2" Standard 4-1/2" with 2-7/8" EUE Pin	GN-R45-0022 GN-R45-0023		SPRING CONTACT ASSEMBLY GN-E00-0011
Thread Protectors , Top Sub (Top Pin) Carrier (Gun) Protector Tandem Sub & Bull Plug Protector	GN-THD-312-020 GN-THD-450-030 GN-THD-450-040		(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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Patents: www.perf.com/patents

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	
Initiation Point	
Mode of Fire	
Detonating Cord	
Compatible Perforating Charges	
Maximum Gun Swell (in)[mm]	

ENVIRONMENTAL

Maximum Pressure (psi)[MPa] Maximum Tensile* (lbf)[kN] 12 SPF (135°-45°); 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 Razor® 4.81 [122.17] @ 26.0g, In Fluid

18,900 [130] 454,600 [2022] *Hardware Calculated Breaking Point



CARRIER SPECIFICATIONS

Carrier Assembly	Shot Density & Phasing		Gun End to Center of First Scallop		Distance Shot to Shot		Approximate Weights	
Part Number	(spf) [spm]	Phasing	(in)	(mm)	(in)	(mm)	Fully 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/ sub)	23.5 lb/ft (w/ 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.



SUPER BIG HOLE

Carrier	Chanad Charge	d Charge Dert Number Perforating Shot D		Shot Density /	^Casing O.D.	Performance in Concrete Performa			Stressed Berea		
O.D.	Snaped Charge	Part Number	Condition	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD [^] (in)[cm]	TTP (in)[cm]
		¹ EC2-46A2631		26.0g, RDX		7.0" L-80	0.90 [2.29]	5.50 [13.97]			
4626 Razor S 4-5/8" 26g 4526 Basix 4626 Basix	4626 Razor SBH TL LD	¹ EC2-46A2632		26.0g, HMX							
		¹ EC2-46A2631	Fluid	26.0g, RDX	16 spf/ 140°-20°	7-3/4" C-110	0.96 [2.44]	5.40 [13.72]			
	4526 Basix SBH TL	EC2-45B2631		26.0g, RDX			0.94 [2.39]	6.27 [15.93]			
		EC2-45B2632		26.0g, HMX 26.0g, RDX		7.0" 90					
	4404 Dealy CDLLTL	¹ EC2-46B2631				7.0 L-60	0.94 [2.39]	6.27 [15.93]			
	4020 DASIX SBH TL	¹ EC2-46B2632		26.0g, HMX							

Charge cases 45A & 46A are zinc; charge cases 45B & 46B are steel. ¹Blank 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.

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	on Part Number(s)		
Top Sub Lift Sub Assembly, 4-5/8"	TC-LT4		
TCP Transfer Kit (4-1/2" through 7")	GN-00	0-0030	
Top Sub, 4-1/2" Top Sub Wireline Insert Spring Contact Assembly	GN-R4 GN-E00-0011 (o-r GN-E0		
Tandem Sub, 4-1/2"	GN-R4	1	
O-Ring Materials and Size Nitrile (standard option) Viton (with back-up rings required for > 325°F) Back-up rings for > 325°F	Top Connection Gun Connectior OR-N569-230 OR-N569-342 OR-V95G-230 OR-V95G-342 OR-B230-2813 OR-B342-3997		Sprii
Bull Plug, 4-1/2" Standard 4-1/2" with 2-7/8" EUE Pin	GN-R45-0022 GN-R45-0023		(4-1/2
Thread Protectors, Top Sub (Top Pin) Carrier (Gun) Protector Tandem Sub & Bull Plug Protector	GN-THD GN-THD GN-THD		



NE INSERT 0-0011

ACT ASSEMBLY 0-0011 P SUB SHOWN FOR ICE ONLY)

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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.

16 SPF (140°-20°); Available Gun Lengths range from 4' to 21'

High Pressure

20,000 [138] @ 235°F

465,300 [2069]

APPLICATION SPECIFICATIONS

Shot Density and Phasing Initiation Point Mode of Fire **Detonating Cord Compatible Perforating Charges** Maximum Gun Swell (in)[mm]

ENVIRONMENTAL

Maximum Pressure (psi)[MPa] Maximum Tensile* (lbf)[kN] *Hardware Calculated Breaking Point

CARRIER SPECIFICATIONS

Carrier Assembly Part Number	Shot Density & I	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
Standard: GA4616-4045A- D ***	16 spf [52 spm]	140°-20°	6.00	152.40	0.75	19.05	27.4 lb/ft (w/ sub)	22.9 lb/ft (w/ 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/ sub)	22.9 lb/ft (w/ 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.

Simultaneous or selective fire

4.81 [122.17] @ 26.0g, In Fluid

Standard

18,900 [130]

454,600 [2022]

80-grain round

Razor®

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.





Patents: www.perf.com/patents



SUPER BIG HOLE

Carrier	Chanad Charge	Dout Number	Perforating	Perforating Condition Explosive	Shot Density /	^Casing O.D.	Performance	e in Concrete	Performance in	Stressed Berea
O.D.	Shapeu Charge	Part Nulliper	Condition		Condition	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD^ (in)[cm]
		¹ EC2-46A2631		26.0g, RDX		7 0" 1-90	0.90 [2.29]	5.50 [13.97]		
4626 Razor SBH TL LD	¹ EC2-46A2632		26.0g, HMX		7.0 L-00					
		¹ EC2-46A2631		26.0g, RDX		7-3/4" C-110	0.96 [2.44]	5.40 [13.72]		
4-5/8 26a	4504 Desity CDULTI	EC2-45B2631	Fluid	26.0g, RDX	16 spf/ 140°-20°		0.94 [2.39]	6.27 [15.93]		
20g	4JZ0 DASIX JDH TL	EC2-45B2632		26.0g, HMX		7.0" L-80				
40	4404 Desity CDULTI	¹ EC2-46B2631		26.0g, RDX			0.94 [2.39]	6.27 [15.93]		
	4020 DASIX SBH TL	¹ EC2-46B2632		26.0g, HMX						

Charge cases 45A & 46A are zinc; charge cases 45B & 46B are steel. ¹Blank 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.

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 Nu	ımber(s)	
Top Sub Lift Sub Assembly, 4-5/8"	TC-LT4	5-000H	
TCP Transfer Kit (4-1/2" through 7")	GN-00	0-0030	
Top Sub, 4-1/2"	GN-R4	5-0020	
Top Sub Wireline Insert	GN-E00-0011 (o-ri	ing: OR-N569-211)	
Spring Contact Assembly	GN-E0	0-0020	
Tandem Sub, 4-1/2"	GN-R45-0021		
O-Ring Materials and Size Nitrile (standard option) Viton (with back-up rings required for > 325°F) Back-up rings for > 325°F	Top Connection Gun Connection OR-N569-230 OR-N569-342 OR-V95G-230 OR-V95G-342 OR-B230-2813 OR-B342-399		
Bull Plug, 4-1/2" Standard 4-1/2" with 2-7/8" EUE Pin	GN-R45-0022 GN-R45-0023		
Thread Protectors, Top Sub (Top Pin) Carrier (Gun) Protector Tandem Sub & Bull Plug Protector	GN-THD-312-020 GN-THD-450-030 GN-THD-450-040		



Casing Shot Pattern and Phasing at 16 SPF 140° $\,$

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 Initiation Point Mode of Fire Detonating Cord Compatible Perforating Charges Maximum Gun Swell (in)[mm]

ENVIRONMENTAL

Maximum Pressure (psi)[MPa] Maximum Tensile* (lbf)[kN] 12 SPF (135°-45°); 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 Connex[®], Razor[®] 4.867 [123.62] @ 22.7g, In Fluid

25,000 [172] @ 260°F 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
GA4712-5033A-C***-HP	12 spf [39 spm]	135°-45°	6.00	152.40	1.00	25.40	37.0 lb/ft (w/ sub)	31.0 lb/ft (w/ 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.





DEEP PENETRATING/EXTREME DEEP PENETRATING

Carrier O.D. Shaped Charge	Dout Number	Perforating	Evelaciva	Shot Density /		^Casing O.D. Performance in Concrete			Performance in Stressed Berea		
	Shaped Charge	Part Number	Condition		Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD [^] (in)[cm]	TTP (in)[cm]	
	EC2-33A2321-RC		22.7g, RDX								
4-5/8"	4-5/8" 3323 Connex SDP	EC2-33A2322-RC	Eluia	22.7g, HMX	10 (1050 450	7.0" 00			0.46 [1.17]	15.31 [38.89]	
23g 3323 Razor XDP	EC2-33A2321	Fiuld	22.7g, RDX	12 spt / 135°-45°	7.0 L-60						
	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 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 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 Nu		
Top Sub Lift Sub Assembly, 4-5/8"	TC-LT4		
TCP Transfer Kit (4-1/2" through 7")	GN-00	0-0030	
Top Sub, 4-1/2"	GN-R4	5-0020]
Top Sub Wireline Insert	GN-E00-0011 (o-r	ing: OR-N569-211)	
Spring Contact Assembly	GN-E0	0-0020	
Tandem Sub, 4-1/2"	GN-R4	5	
O-Ring Materials and Size Nitrile (standard option) Viton (with back-up rings required for > 325°F) Back-up rings for > 325°F	Top Connection OR-N569-230 OR-V95G-230 OR-B230-2813	Gun Connection OR-N569-342 OR-V95G-342 OR-B342-3997	Wireline I GN-F00-0
Bull Plug, 4-1/2" Standard 4-1/2" with 2-7/8" EUE Pin	GN-R4 GN-R4	5-0022 5-0023	SPRING CONTACT GN-E00-0
Thread Protectors, Top Sub (Top Pin) Carrier (Gun) Protector Tandem Sub & Bull Plug Protector	GN-THD-312-020 GN-THD-450-030 GN-THD-450-040		(4-1/2" OD TOP SU REFERENCE (



NSERT 0011

ASSEMBLY 0011 UB SHOWN FOR 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 Initiation Point Mode of Fire Detonating Cord Compatible Perforating Charges Maximum Gun Swell (in)[mm]

ENVIRONMENTAL

Maximum Pressure (psi)[MPa] Maximum Tensile* (lbf)[kN] 16 SPF (140°-20°); Available Gun Lengths range from 3' to 21' Top- or bottom-fired options available; conventional wireline and TCP Simultaneous or selective fire 80-grain round Razor[®], Basix[™] 4.828 [122.63] @ 26.0g, In Fluid

23,000 [158.6] @ 260°F 454,600 [2022] *Hardware Calculated Break Point



CARRIER SPECIFICATIONS

Carrier Assembly Part Number	Shot Density & Phasing		Gun End to First S	un End to Center of First Scallop		Distance Shot to Shot		te Weights
	(spf) [spm]	Phasing	(in)	(mm)	(in)	(mm)	Fully Loaded	Blank Gun
GA4716-4045A- D ***	16 spf [52 spm]	140°-20°	6.00	152.40	0.75	19.05	35.60 lb/ft (w/sub)	31.0 lb/ft (w/ 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 [2.67]	6.75 [2.06]	3.75 [1.14]	2.75 [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.



SUPER BIG HOLE

Carrier	Shawad Charge	Shanad Charge Dart Number Per		Perforating Explosive		^Casing O.D.	Performance in Concrete		Performance in Stressed Berea	
O.D.	Shaped Charge	Part Number	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD [^] (in)[cm]	TTP (in)[cm]
		¹ EC2-46A2631		26.0g, RDX 26.0g, HMX	7.0" 0.0	0.90 [2.29]	5.50 [13.97]			
	4626 Razor SBH TL LD 1 4526 Basix SBH TL E 4626 Basix SBH TL 1 1 1 1 1 1 1 1 1 1 1 1 1 1	¹ EC2-46A2632				7.0 L-60				
4.0 (4)		¹ EC2-46A2631	Fluid	26.0g, RDX	16 spf/ 140°-20°	7-3/4" C-110	0.96 [2.44]	5.40 [13.72]		
4-3/4 26a		EC2-45B2631		26.0g, RDX			0.94 [2.39]	6.27 [15.93]		
20g		EC2-45B2632		26.0g, HMX		7.0" L-80				
		¹ EC2-46B2631		26.0g, RDX			0.94 [2.39]	6.27 [15.93]		
		¹ EC2-46B2632		26.0g, HMX						

Charge cases 45A & 46A are zinc; charge cases 45B & 46B are steel. ¹Blank 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.

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-LT4	5-000H		
TCP Transfer Kit (4-1/2" through 7")	GN-00	0-0030		
Top Sub, 4-1/2"	GN-R4	5-0020		
Top Sub Wireline Insert	GN-E00-0011 (o-r	ing: OR-N569-211)		
Spring Contact Assembly	GN-E0	0-0020		
Tandem Sub, 4-1/2"	GN-R4	5-0021		
O-Ring Materials and Size Nitrile (standard option) Viton (with back-up rings required for > 325°F) Back-up rings for > 325°F	Top Connection OR-N569-230 OR-V95G-230 OR-B230-2813	Gun Connection OR-N569-342 OR-V95G-342 OR-B342-3997		
Bull Plug, 4-1/2" Standard 4-1/2" with 2-7/8" EUE Pin	GN-R45-0022 GN-R45-0023			
Thread Protectors , Top Sub (Top Pin) Carrier (Gun) Protector Tandem Sub & Bull Plug Protector	GN-THD-312-020 GN-THD-450-030 GN-THD-450-040			



Casing Shot Pattern and Phasing at 16 SPF 140° $\,$

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; Available Gun Le	engths from 2' to 21'
Initiation Point	Top- or bottom-fired options available; conventional wireline and T	CP
Mode of Fire	Simultaneous or selective fire	<
Detonating Cord	80-grain round	2
Compatible Perforating Charges	Razor®	
Maximum Gun Swell (in)[mm]	4.81 [122.17] In Fluid	

ENVIRONMENTAL

Maximum Pressure (psi)[MPa] Maximum Tensile* (lbf)[kN] 30,000 [207] 688,000 [3060] *Hardware Calculated Break Point

CARRIER SPECIFICATIONS

Carrier Assembly	Shot Density &	Phasing	Gun End of First	to Center Scallop	Shot to Sho Across	ot Distance Tandem	Distance Pla	Between nes	Approxima	te Weights
Part Number	(spf) [spm]	Phasing	(in)	(mm)	(in)	(mm)	(in)	(mm)	Fully Loaded	Blank Gun
GA4724-3548K- N ***	24 spf [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 [6.32]	14.75 [4.50]	10.75 [3.28]	6.75 [2.06]	4.75 [1.45]	3.75 [1.14]	2.75 [0.84]	1.75 [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 for more information about this system

SUPER BIG HOLE

Carrier	Shanad Charge Dart Number Perforating Ev		Explosive Shot Density /		^Casing O.D.	^Casing O.D. Performance in Concrete		Performance in Stressed Berea			
O.D.	Shaped Charge	Part Number	Condition	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD [^] (in)[cm]	TTP (in)[cm]		
4.0 (4)	4818 Razor SBH EC2	EC2-48K1831		18.0g, RDX		7.0"1.90					
4-3/4 19a		FC2 401/1022	Fluid	10.0- LINAV	10.0~ LIMV	24 spf/ 90°-45°	7.0 L-00	0.73 [1.85]	4.81 [12.22]		
Tog		ECZ-40K103Z		10.0g, HIMA		† 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)				
O-Ring Materials and Size	Top Connection	Gun Connection			
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			
TCP Transfer Kit (4-1/2" through 7")	GN-00	0-0030			
Lift Sub Assembly, Tandem, 4-1/2"	TC-LT4	5-000H			
Lifting Clamp Assembly, 4.75"	TC-LC-04	750-0000			
Top Sub, 4-3/4"	GN-R47	5-0020			
Top Sub Wireline Insert; Spring Contact Assembly	GN-E00-0011 (o-ring: OR-	N569-211); GN-E00-0020			
Tandem Sub, 4-3/4"	GN-R47	75-0021			
Bull Plugs, 4-3/4" Standard	GN-R47	5-0022			
4-3/4" with 2-7/8" EUE Pin	GN-R47	5-0023			
Finned Centralizing Bull Plug, 4.75" OD x 6.25"	GN-R475	23-C625			
Thread Protector, Top Sub (Top Pin)	GN-THD-	-312-020			
Carrier (Gun) Protector	GN-THD-	450-030			
Tandem Sub & Bull Plug Protector	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
Initiation Point
Mode of Fire
Detonating Cord
Compatible Perforating Charges
Maximum Gun Swell (in)[mm]

ENVIRONMENTAL

Maximum Pressure (psi)[MPa] Maximum Tensile* (lbf)[kN] 12 SPF (135°-45°); Available Gun Lengths range from 4' to 22' Top- or bottom-fired options available; conventional wireline and TCP Simultaneous or selective fire 80-grain round Razor®, Basix™, (23g max.; grooved charge case required) 5.34 [135.64] @ 19.0g in Fluid

17,200 [118.59] 461,800 [2054] *Hardware Calculated Breaking Point



CARRIER SPECIFICATIONS

Carrier Assembly	Shot Density & Phasing		Gun End to Center of First Scallop		Distance Shot to Shot		Approximate Weights	
Part Nulliber	(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.



DEEP PENETRATING/EXTREME DEEP PENETRATING

Carrier	Shawad Charge	Deut Number	Perforating		Shot Density /	^Casing O.D.	Performance	e in Concrete	Performance in	Stressed Berea	
O.D.	Shaped Charge	Part Number	Condition	Phasin	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD [^] (in)[cm]	TTP (in)[cm]	
5-1/8"		EC2-33A2321	Eluid	† 22.7g, RDX	10 and 1000 AE	7 5 /0"					
23g	3323 Razor ADP	EC2-33A2322	Fiuld	† 22.7g, HMX	12 spt / 135°-45°	12 spt / 135°-45°	/-5/6			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 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 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)				
O-Ring Materials and Size Nitrile (standard option) Viton (with back-up rings required for > 325°F) Back-up rings for > 325°F	Top Connection Gun Connect OR-N569-230 OR-N569-3 OR-V95G-230 OR-V95G-3 OR-B230-2813 OR-B346-45				
TCP Transfer Kit (4-1/2" through 7")	GN-000	0-0030			
Top Sub Lift Sub Assembly, 5-1/8"	TC-LT51-000H				
Top Sub, 5-1/8" Top Sub Wireline Insert; Spring Contact Assembly	GN-R51-0020 GN-E00-0011 (o-ring: OR-N569-211); GN-E00-0020				
Tandem Sub, 5-1/8"	GN-R5	1-0021			
Bull Plugs, 5-1/8" Standard 5-1/8" with 2-7/8" EUE Pin Centralized Bull Plug, 5-1/8" with 6-1/4" O.D	GN-R51-0022 GN-R51-0023 GN-R5122-C625				
Thread Protector, Top Sub (Top Pin) Carrier (Gun) Protector 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 Initiation Point Mode of Fire Detonating Cord Compatible Perforating Charges Maximum Gun Swell (in)[mm]

12 SPF (135°-45°); Available Gun Lengths range from 4' to 22' Top- or bottom-fired options available; conventional wireline and TCP Simultaneous or selective fire 80-grain round Razor® 5.33 [135.38] @ 32.0g In Fluid

ENVIRONMENTAL

Maximum Pressure (psi)[MPa] Maximum Tensile* (lbf)[kN] 17,200 [118.59] 461,800 [2054] *Hardware Calculated Breaking Point



CARRIER SPECIFICATIONS

Carrier Assembly	Shot Density &	Shot Density & Phasing		Gun End to Center of First Scallop		Distance Shot to Shot		te Weights
Part Number	(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-**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.



SUPER BIG HOLE

Carrier	Shaped Charge	Davt Number	Perforating	Explosive	Shot Density /	^Casing O.D.	Performance	e in Concrete	Performance in	Stressed Berea	
O.D.	Snaped Charge	Part Number	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD [^] (in)[cm]	TTP (in)[cm]	
		EC2-51A3231		32.0g, RDX	(16 spf / 140°-20°	4 (((4 4 0 0 0 0 0		1.07 [2.72]	6.60 [16.76]		
5-1/8"	5132 Razor SBH TE ED	EC2-51A3232	Elui d	32.0g, HMX		7 5 /0" 1 00					
32g		FC0 51D0001	Fiuld	32.0g, RDX	12 spf/135°-45°	7-5/8 L-60	1.05 [2.67]	7.08 [17.98]			
	5152 Kazor SBH LD	OF SBH LD EC2-51B3231		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)				
O-Ring Materials and Size Nitrile (standard option)	Top Connection OR-N569-230	Gun Connection OR-N569-346			
Viton (with back-up rings required for > 325°F)	OR-V95G-230	OR-V95G-346			
Back-up rings for > 325°F	OR-B230-2813	OR-B346-4559			
TCP Transfer Kit (4-1/2" through 7")	GN-00	0-0030			
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-R5	1-0021			
Bull Plugs, 5-1/8" Standard	GN-R5	1-0022			
5-1/8" with 2-7/8" EUE Pin	GN-R5	1-0023			
Centralized Bull Plug, 5-1/8" with 6-1/4" O.D	GN-R51	22-C625			
Thread Protector, Top Sub (Top Pin)	GN-THD-312-020				
Carrier (Gun) Protector	GN-THD-512-030				
Tandem Sub & Bull Plug Protector	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
Initiation Point
Mode of Fire
Detonating Cord
Compatible Perforating Charges
Maximum Gun Swell (in)[mm]

16 SPF (140°-20°); Available Gun Lengths range from 3' to 22' Top- or bottom-fired options available; conventional wireline and TCP Simultaneous or selective fire 80-grain round Razor® 5.33 [135.38] @ 32.0g In Fluid

ENVIRONMENTAL

Maximum Pressure (psi)[MPa] Maximum Tensile* (lbf)[kN] 17,200 [118.59] 461,800 [2054] *Hardware Calculated Breaking Point



CARRIER SPECIFICATIONS

Carrier Assembly	Shot Density & Phasing		Gun End to Center of First Scallop		Distance Shot to Shot		Approximate Weights	
Part Number	(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.





SUPER BIG HOLE

Carrier	Chanad Charge	Davt Number	Perforating	Evalaciva	Shot Density /	^Casing O.D.	Performance	e in Concrete	Performance in	Stressed Berea
O.D.	Snaped Charge	Part Number	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD^ (in)[cm]	TTP (in)[cm]
		EC2-51A3231		32.0g, RDX	$16 \operatorname{enf} / 1409 209$		1.07 [2.72]	6.60 [16.76]		
5-1/8"	5132 Razor SBH TE ED	EC2-51A3232 32.0g, HMX 16 spt / 140°-2	10 spi / 140°-20°	7 5 /0" 00						
32g		FC0 51D0001	Fluid	32.0g, RDX	12 spf/135°-45°	7-5/8 L-80	1.05 [2.67]	7.08 [17.98]		
	DIDZ KAZOL ZRH LD	ECZ-21B3231		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 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)			
O-Ring Materials and Size Nitrile (standard option) Viton (with back-up rings required for > 325°F)	Top Connection OR-N569-230 OR-V95G-230	Gun Connection OR-N569-346 OR-V95G-346		
Back-up rings for > 325°F	OR-B230-2813	OR-B346-4559		
TCP Transfer Kit (4-1/2" through 7")	GN-00	0-0030		
Top Sub Lift Sub Assembly, 5-1/8"	TC-LT5	1-000H		
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			
Bull Plugs, 5-1/8" Standard 5-1/8" with 2-7/8" EUE Pin Centralized Bull Plug, 5-1/8" with 6-1/4" O.D	GN-R51-0022 GN-R51-0023 GN-R5122-C625			
Thread Protector, Top Sub (Top Pin) Carrier (Gun) Protector 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°

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
Initiation Point
Mode of Fire
Detonating Cord
Compatible Perforating Charges
Maximum Gun Swell (in)[mm]

ENVIRONMENTAL

Maximum Pressure (psi)[MPa] Maximum Tensile* (lbf)[kN] 22 SPF (140°-20°); Available Gun Lengths range from 3' to 21' Top- or bottom-fired options available; conventional wireline and TCP Simultaneous or selective fire 80-grain round Basix[™] and Razor[®] (19g max.; grooved charge case required) 5.34 [135.64] @ 19.0g, In Fluid

15,400 [106.18] 461,800 [2054] *Hardware Calculated Breaking Point



CARRIER SPECIFICATIONS

Carrier Assembly	Shot Density &	Phasing	Gun End to First S	o Center of icallop	Dist Shot t	ance o Shot	Approxima	te Weights
Fait Nulliber	(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.



GOOD HOLE

Carrier	Chanad Charge	Deut Number	Perforating		Shot Density /	^Casing O.D.	Performance	e in Concrete	Performance in	Stressed Berea
O.D.	Shapeu Charge	Part Nulliper	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD^ (in)[cm]	TTP (in)[cm]
	2210 Depar CLI	EC2-33A1941-G		† 19.0g, RDX					0.37 [0.94]	12.10 [30.73]
5-1/8"	3319 Razor GH	EC2-33A1942-G	FI . I	† 19.0g, HMX	00 (/4400.000	7.5.(0)				
19g		EC2-33A1941-EG	Fluid	† 19.0g, RDX	22 spt / 140°-20°	/-5/8	0.37 [0.94]	25.20 [64.01]		
	3319 Basix GH	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	Shanad Charge	Dart Number	Perforating	Evolocivo	Shot Density /	^Casing O.D.	Performance	e in Concrete	Performance in	Stressed Berea
O.D.	Shapeu Charge	Part Nulliper	Condition	Explosive	Phasing	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.

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)			
O-Ring Materials and Size	Top Connection	Gun Connection		
Nitrile (standard option)	OR-N569-230	OR-N569-346		
Viton (with back-up rings required for > 325°F)	OR-V95G-230	OR-V95G-346		
Back-up rings for > 325°F	OR-B230-2813	OR-B346-4559		
TCP Transfer Kit (4-1/2" through 7")	GN-00	0-0030		
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			
Bull Plugs, 5-1/8" Standard	GN-R51-0022			
5-1/8" with 2-7/8" EUE Pin	GN-R51-0023			
Centralized Bull Plug, 5-1/8" with 6-1/4" O.D	GN-R51	GN-R5122-C625		
Thread Protector, Top Sub (Top Pin)	GN-THD-312-020			
Carrier (Gun) Protector	GN-THD-512-030			
Tandem Sub & Bull Plug Protector	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) GEODynamics®
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; Av	ailable Gun Lengths 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	45°
Compatible Perforating Charges	Super Big Hole	
Maximum Gun Swell (in)[mm]	6.83 [173.48] @ 52.0g, In Fluid	

ENVIRONMENTAL

Maximum Pressure (psi)[MPa] Maximum Tensile* (lbf)[kN] 30,000 [207] 1,229,000 [5466] *Hardware Calculated Break Point

CARRIER SPECIFICATIONS

Carrier Assembly	Shot Density & Phasing		Gun End to Center of First Scallop		Shot to Shot Distance Across Tandem		Distance Between Planes		Approximate Weights	
i art Number	(spf) [spm]	Phasing	(in)	(mm)	(in)	(mm)	(in)	(mm)	Fully Loaded	Blank Gun
GA6722-2068K-N***	22 spf 90°-4	90°-45°	8.18	207.77	19.26	489 20	2.19	55.63	76.70 lb/ft	60.20 lb/ft
	[72 spm]		5ft and longer guns				,			00.20 10/10

*** 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 [6.32]	14.75 [4.50]	10.75 [3.28]	6.75 [2.06]	4.75 [1.45]	3.75 [1.14]	2.75 [0.84]	1.75 [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.







SUPER BIG HOLE

Carrier	Chanad Charge	Deut Number	Perforating		Shot Density /	^Casing O.D.	^Casing O.D. Performance in Concrete		Performance in Stressed Berea		
O.D.	Shaped Charge	Part Number	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD [^] (in)[cm]	TTP (in)[cm]	
(0 / 4)	EC2-68K5231		52.0g, RDX		0.5/011.00						
6-3/4 52a	6852 Razor SBH		Fluid		22 spf/ 90°-45°	22 spf/ 90°-45°	9-5/6 L-60	1.08 [2.74]	5.62 [14.27]		
52g 500		ECZ-00K3232		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/MaterialThreaded and scalloped, proprietary gun steel, similar to 41XX alloy steelCharge Tube Type & RetentionRound steel tube strip, bend tab charge retentionType of Tandem ConnectionBooster to booster (no splice)Nominal OD / Wall Thickness (in)[mm]6.75 [171] / 0.875 [22.23]Upper/Lower Thread Connections5.75 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.

COMPONENTS AND ACCESSORIES

Description	Part Nu	mber(s)			
O-Ring Materials and Size Viton (with back-up rings required for > 325°F)	Top Connection OR-V95G-230	Gun Connection OR-V95G-357			
Back-up rings for > 325°F	OR-B230-2813	OR-B357-5873			
TCP Transfer Kit, Long Transfer	GN-000	0-0035			
Lift Sub Assembly, Tandem, 4-1/2"	TC-LT45-000H (threads into b	pottom part of 2-piece tandem)			
Top Sub, 6-3/4"	GN-R6	75D20			
Top Sub Wireline Insert; Spring Contact Assembly	GN-E00-0011 (o-ring: OR-	N569-211); GN-E00-0020			
Two Piece Tandem 6-3/4" w/8-1/4" Centralizing Ring	GN-R675D2	21-Z827-CT			
Two Piece Tandem 6-3/4" (Top) GN-R675D21-Z1 (o-rings: OR-	V95G-237, OR-V95G-357; ba	ick-up rings: OR-B357-5873)			
Two Piece Tandem 6-3/4" (Bottom) GN-R675D21-Z2 (o-rings: OR-V95G-342, OR-V	/95G-357; back-up rings: OR-I	B342-3997, OR-B357-5873)			
Centralizing Ring 6-3/4" (8.270" OD) Sub Wrench	GN-RH6 GN-R675	75-R827 D21-ZTL			
Bull Plugs, 6-3/4" Standard	GN-R6	75D22			
6-3/4" with 2-7/8" EUE Pin	GN-R675D23				
6-3/4" with 3-1/2" EUE Pin	GN-R6	75D24			
Centralized with 2-7/8" EUE Pin	GN-R675[D23-C825			
Centralized with 3-1/2" EUE Pin	GN-R675[D24-C825			
Thread Protector, Top Sub (Top Pin)	GN-THD-	-312-020			
Carrier (Gun) Protector	GN-THD-	-675-030			
Tandem Sub & Bull Plug Protector	GN-THD-	-675-040			

GN-R675D21-Z827-CT 2-pc. Tandem with 8-1/4" OD Ring Centralizer



O-Rings: OR-V95G-342, OR-V95G-357 Back-Ups: OR-B342-3997,OR-B357-5873

GN-R675D21-Z2, 2-pc. Tandem Bottom

bt

ynamics

GN-R675D21-Z1, 2-pc. Tandem Top O-Rings: OR-V95G-237, OR-V95G-357 Back-Ups: OR-B357-5873

GN-RH675-R827

8-1/4" Ring Centralizer

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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
Initiation Point
Mode of Fire
Detonating Cord
Compatible Perforating Charges
Maximum Gun Swell (in)[mm]

ENVIRONMENTAL

Maximum Pressure (psi)[MPa] Maximum Tensile* (lbf)[kN] 12 SPF (135°-45°); Available Gun Lengths range from 2' to 22' Top- or bottom-fired options available; conventional wireline and TCP Simultaneous or selective fire 80-grain round Connex®, Razor®, Basix™ 7.28 [184.91] @ 39.0g

13,500 [93] 770,700 [3,428] *Hardware Calculated Breaking Point

CARRIER SPECIFICATIONS

Carrier Assembly	Shot Density &	Gun End to Center of First Scallop		Distance Shot to Shot		Approximate Weights		
Fait Nullibers	(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 [6.63]	20.75 [6.32]	14.75 [4.50]	10.75 [3.28]	6.75 [2.06]	5.75 [1.75]	3.75 [1.14]	2.75 [0.84]	1.75 [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.









DEEP PENETRATING/EXTREME DEEP PENETRATING

Carrier	Chanad Charge	Dout Number	Perforating		Shot Density /	^Casing O.D.	Performance in Concrete		Performance in Stressed Berea	
O.D.	Snaped Charge	Part Number	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD [^] (in)[cm]	TTP (in)[cm]
	1020 Connov SDD	EC2-40A3921-RC		39.0g, RDX					0.46 [1.17]	16.50 [41.91]
403	4039 Connex SDP	EC2-40A3922-RC	Fluid	39.0g, HMX					0.42 [1.07]	17.50 [44.45]
7"		EC2-40A3921		39.0g, RDX	12 spf / 135°-45°	0 5/0" 00			0.38 [0.97]	16.90 [42.93]
39g	4039 Razor ADP	EC2-40A3922		39.0g, HMX		9-5/6 L-60	0.41 [1.04]	53.59 [136.12]	0.44 [1.12]	17.65 [44.83]
		EC2-40A3921-E		39.0g, RDX					0.50 [1.27]	15.70 [39.88]
	4039 Basix XDP	EC2-40A3922-E		39.0g, HMX						

GOOD HOLE

Carrier	Shanad Charge	Dart Number	Perforating	Evalocivo	Shot Density /	^Casing O.D.	Performance	e in Concrete	Performance in	Stressed Berea
O.D.	Shaped Charge	Part Nulliper	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD [^] (in)[cm]	TTP (in)[cm]
7"	4020 Desity CIL	EC2-40A3941	39.0g, RDX	10 out / 1050 / 50	0 5 /0"	0.80 [2.03]	15.42 [39.17]			
39g	4039 Basix GH	EC2-40A3942	Fiuld	39.0g, HMX	12 spi / 135*-45*	9-5/8				

SUPER GOOD HOLE

Carrier	Shanad Charge	Dart Number	Perforating	Evolocivo	Shot Density /	Casing O.D.	Performance	e in Concrete	Performance in	Stressed Berea
O.D.	Shapeu Charge	Part Nulliper	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD^ (in)[cm]	TTP (in)[cm]
7"	4045 Razor SGH, RDX	EC2-40S4551	El.: J	45.0g, RDX	45.0g, RDX 45.0g, HMX 12 spf / 135° - 45°	0 5 /0" 1 00	0.90 [2.29]	22.01 [55.91]		
45g	4045 Razor SGH, HMX	EC2-40S4552	Fiuld	45.0g, HMX		9-5/8° L-80				

HARDWARE

Gun Body Configuration/Material **Charge Tube Type & Retention Type of Tandem Connection** Nominal OD / Wall Thickness (in)[mm] **Upper/Lower Thread Connections**

Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel Round steel tube strip; bend tab retention Booster to booster (no splice) 7.00 [178] / 0.50 [12.7] *Contact your sales representative for special material requirements. 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. ^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.



COMPONENTS AND ACCESSORIES

Description	Part Number(s)					
O-Ring Materials and Size Nitrile (standard option)	Top Connection OR-N569-230	Gun Connection OR-N569-360				
Viton (with back-up rings required for > 325°F) Back-up rings for > 325°F	OR-V95G-230 OR-B230-2813	OR-V95G-360 OR-B360-6309				
TCP Transfer Kit (4-1/2" through 7")	GN-00	0-0030				
Lift Sub Assembly, Tandem, 5-1/8"	TC-LT5	1-000H				
Top Sub, 7"	GN-R7	0-0020				
Top Sub Wireline Insert Spring Contact Assembly	GN-E00-0011 (o-r GN-E0	ing: OR-N569-211) 0-0020				
Tandem Sub, 7"	GN-R70-0021 (o-rings: OR-N569-360)					
Two Piece Tandem 7" with 8-1/4" Centralizing Ring	GN-R70-0	GN-R70-0021-Z825				
Two Piece Tandem 7" (Top) GN-R70-0021-Z1 (o-rings: OR-V95G-241, OR-	V95G-360; back-up ri	ngs: OR-B360-6309)				
Two Piece Tandem 7" (Bottom) GN-R70-0021-Z2 (o-rings: OR-V95G-346, OR-V95G-360; back-	up rings: OR-B346-4	559, OR-B360-6309)				
Centralizing Ring 7" (8-1/4" OD) Sub Wrench	GN-RH GN-R70-	70-R825 0021-ZTL				
Bull Plugs, 7" Standard 7" with 2-7/8" EUE Pin 7" with 3-1/2" EUE Pin	GN-R7 GN-R7 GN-R7	0-0022 0-0023 0-0024				
Thread Protector, Top Sub (Top Pin) Carrier (Gun) Protector Tandem Sub & Bull Plug Protector	GN-THD GN-THD GN-THD	-312-020 -700-030 -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

GN-R/0-0021-2825 2-pc. Tandem with 8-1/4" OD Ring Centralizer **GN-RH70-R825** 8-1/4" OD Ring Centralizer

GN-R70-0021-ZTL

GN-R/0-0021-ZTL Sub Wrench

Conventional Long Guns 7 in (178 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
Initiation Point
Mode of Fire
Detonating Cord
Compatible Perforating Charges
Maximum Gun Swell (in)[mm]

ENVIRONMENTAL

Maximum Pressure (psi)[MPa] Maximum Tensile* (lbf)[kN] 12 SPF (135°-45°); Available Gun Lengths range from 2' to 22' Top- or bottom-fired options available; conventional wireline and TCP Simultaneous or selective fire 80-grain round Razor® 7.15 [181.61] @ 52.0g, In Fluid

13,500 [93] 770,700 [3,428] *Hardware Calculated Breaking Point

CARRIER SPECIFICATIONS

Carrier Assembly Part Numbers	Shot Density & Phasing		Gun End to Center of First Scallop		Distance Shot to Shot		Approximate Weights	
Fait Nullibers	(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 [6.63]	20.75 [6.32]	14.75 [4.50]	10.75 [3.28]	6.75 [2.06]	5.75 [1.75]	3.75 [1.14]	2.75 [0.84]	1.75 [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.





SUPER BIG HOLE

Carrier	Shanad Charge	Davt Number	Perforating	Evalasiva	Shot Density /	^Casing O.D. Performance in Concret		e in Concrete	Performance in Stressed Berea		
O.D.	Shaped Charge	Part Number	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD [^] (in)[cm]	TTP (in)[cm]	
7"		EC2-70C3931		39.0g, RDX 39.0g, HMX		9-5/8" L-80	1.24 [3.15]	7.08 [17.98]			
39g	39g 7039 Razor SBH TL LD	EC2-70C3932									
			Fluid		15 spf / 140°-20°	9-5/8" L-80	1.39 [3.53]	6.50 [16.51]			
7" 7052 Razor SBH TL LD	EC2-70C5231		52.0g, RDX	JX	^^10-1/8" SM-125S	1.12 [2.84]	6.60 [16.76]				
		EC2-70C5232		52.0g, HMX		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/MaterialThreaded and scalloped, proprietary gun steel, similar to 41XX alloy steelCharge Tube Type & RetentionRound steel tube strip; twist-lock retentionType of Tandem ConnectionBooster 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 Connections6.25 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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Patents: www.perf.com/patents



COMPONENTS AND ACCESSORIES

Description	Part Number(s)			
O-Ring Materials and Size Nitrile (standard option)	Top Connection OR-N569-230	Gun Connection OR-N569-360		
Viton (with back-up rings required for > 325°F) Back-up rings for > 325°F	OR-V95G-230 OR-B230-2813	OR-V95G-360 OR-B360-6309		
TCP Transfer Kit (4-1/2" through 7")	GN-00	0-0030		
Lift Sub Assembly, Tandem, 5-1/8"	TC-LT5	1-000H		
Top Sub, 7"	GN-R7	0-0020		
Top Sub Wireline Insert Spring Contact Assembly	GN-E00-0011 (o-ri GN-E0	ng: OR-N569-211) 0-0020		
Tandem Sub, 7"	GN-R70-0021 (o-rings: OR-N569-360)			
Two Piece Tandem 7" with 8-1/4" Centralizing Ring	GN-R70-0	021-Z825		
Two Piece Tandem 7" (Top) GN-R70-0021-Z1 (o-rings: OR-V95G-241, OR-	V95G-360; back-up ri	ngs: OR-B360-6309)		
Two Piece Tandem 7" (Bottom) GN-R70-0021-Z2 (o-rings: OR-V95G-346, OR-V95G-360; back-	up rings: OR-B346-45	559, OR-B360-6309)		
Centralizing Ring 7" (8-1/4" OD) Sub Wrench	GN-RHZ GN-R70-	70-R825 0021-ZTL		
Bull Plugs, 7" Standard 7" with 2-7/8" EUE Pin 7" with 3-1/2" EUE Pin	GN-R7 GN-R7 GN-R7	0-0022 0-0023 0-0024		
Thread Protector, Top Sub (Top Pin) Carrier (Gun) Protector Tandem Sub & Bull Plug Protector	GN-THD GN-THD GN-THD	-312-020 -700-030 -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

GN-R/0-0021-ZTL Sub Wrench

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.

15 SPF (140°-20°); Available Gun Lengths from 2' to 21'

Simultaneous or selective fire

7.23 [183.64] @ 52.0g, In Fluid

Standard

13,500 [93]

770,700 [3,428]

80-grain round

Razor®

APPLICATION SPECIFICATIONS

Shot Density and Phasing Options Initiation Point Mode of Fire **Detonating Cord Compatible Perforating Charges** Maximum Gun Swell (in)[mm]

ENVIRONMENTAL

Maximum Pressure (psi)[MPa] Maximum Tensile* (lbf)[kN] *Hardware Calculated Breaking Point

CARRIER SPECIFICATIONS

Carrier Assembly Part Numbers	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
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-**D147**. 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.





Revised: August 31, 2023 9:46 PM

High Pressure

14,600 [100]

770,700 [3,428]



SUPER BIG HOLE

Carrier	Shanad Charge	Davt Number	Perforating	Evalasiva	Shot Density /	^Casing O.D. Performance in Concret		e in Concrete	Performance in Stressed Berea		
O.D.	Shaped Charge	Part Number	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD [^] (in)[cm]	TTP (in)[cm]	
7"		EC2-70C3931		39.0g, RDX 39.0g, HMX		9-5/8" L-80	1.24 [3.15]	7.08 [17.98]			
39g	39g 7039 Razor SBH TL LD	EC2-70C3932									
			Fluid		15 spf / 140°-20°	9-5/8" L-80	1.39 [3.53]	6.50 [16.51]			
7" 7052 Razor SBH TL LD	EC2-70C5231		52.0g, RDX	JX	^^10-1/8" SM-125S	1.12 [2.84]	6.60 [16.76]				
		EC2-70C5232		52.0g, HMX		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/MaterialThreaded and scalloped, proprietary gun steel, similar to 41XX alloy steelCharge Tube Type & RetentionRound steel tube strip; twist-lock retentionType of Tandem ConnectionBooster 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 Connections6.25 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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Patents: www.perf.com/patents

COMPONENTS AND ACCESSORIES

Description	Part Number(s)				
O-Ring Materials and Size	Top Connection	Gun Connection			
Nitrile (standard option)	OR-N569-230 OR-N569-360				
Viton (with back-up rings required for > 325°F)	OR-V95G-230	OR-V95G-360			
Back-up rings for > 325°F	OR-B230-2813	OR-B360-6309			
TCP Transfer Kit (4-1/2" through 7")	GN-00	0-0030			
Lift Sub Assembly, Tandem, 5-1/8"	TC-LT5	1-000H			
Top Sub, 7"	GN-R7	0-0020			
Top Sub Wireline Insert	GN-E00-0011 (o-ri	ng: OR-N569-211)			
Spring Contact Assembly	GN-E0	0-0020			
Tandem Sub, 7"	GN-R70-0021 (o-rings: OR-N569-360)				
Two Piece Tandem 7" with 8-1/4" Centralizing Ring	GN-R70-0	021-Z825			
Two Piece Tandem 7" (Top) GN-R70-0021-Z1 (o-rings: OR-V95G-241, OR-	V95G-360; back-up ri	ngs: OR-B360-6309)			
Two Piece Tandem 7" (Bottom) GN-R70-0021-Z2 (o-rings: OR-V95G-346, OR-V95G-360; back-	up rings: OR-B346-45	559, OR-B360-6309)			
Centralizing Ring 7" (8-1/4" OD)	GN-RH7	70-R825			
Sub Wrench	GN-R70-	0021-ZTL			
Bull Plugs, 7" Standard	GN-R7	0-0022			
7" with 2-7/8" EUE Pin	GN-R7	0-0023			
7" with 3-1/2" EUE Pin	GN-R7	0-0024			
Thread Protector, Top Sub (Top Pin)	GN-THD	-312-020			
Carrier (Gun) Protector	GN-THD-700-030				
Tandem Sub & Bull Plug Protector	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

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GN-R70-0021-Z1, 2-pc. Tandem Top O-Rings: OR-V95G-241, OR-V95G-360 Back-Ups: OR-B360-6309

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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

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 Initiation Point Mode of Fire **Detonating Cord Compatible Perforating Charges** Maximum Gun Swell (in)[mm] Perforation Area Open to Flow

ENVIRONMENTAL

Maximum Pressure (psi)[MPa] Maximum Tensile* (lbf)[kN]

18 SPF (90°) rotated cluster 11.25° spiral; Available Gun Lengths from 4' to 21' Top- or bottom-fired options available; conventional wireline and TCP Simultaneous or selective fire 80-grain round Razor® 7.22 [183.39] In Fluid @ 52.0g 360° coverage in 9-5/8" casing

11,500 [79] 770,700 [3,428] *Hardware Calculated Break Point

CARRIER SPECIFICATIONS

Carrier Assembly Part Number	Shot Densit	y & Phasing	Gun End to Center Scallop	Distance Between Planes		Approximate Weights		
	(spf) [spm]	Phasing	(in)	(mm)	(in)	(mm)	Fully Loaded	Blank Gun
GA7018-1870K- Q ***	18 spf 90° Planar		4' guns = 8.00	203.20	2 (7	47.00	55 04 lb/ft	24.27 lb/ft
	[59 spm]	11.25° Spiral	7'-21' guns = 7.333	186.18	2.07	07.82	55.74 ID/TT	34.27 ID/IL

*** 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.









SUPER BIG HOLE

Carrier Shaped Charge	Davt Number	Perforating	E-mlash-s	Shot Density /	^Casing O.D.	Performance	e in Concrete	Performance in Stressed Berea		
O.D.	Shaped Charge	Part Nulliper	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD [^] (in)[cm]	TTP (in)[cm]
7"		EC2-70K3931		39.0g, RDX		9-5/8" L-80	1.04 [2.64]	6.31 [16.03]	1.10 [2.79]	4.40 [11.18]
39g	7039K Razor SBH	EC2-70K3932		39.0g, HMX	20 spf / 90°-45°				1.18 [3.00]	4.60 [11.68]
7"	7" 52g 7052K Razor SBH**	EC2-70K5231	Fluid	52.0g, RDX			1.41 [3.58]	5.67 [14.40]		
52g		EC2-70K5232		52.0g, HMX			1.42 [3.61]	7.06 [17.93]		

HARDWARE

Gun Body Configuration/Material Charge Tube Type & Retention Type of Tandem Connection Nominal OD / Wall Thickness (in)[mm] Upper/Lower Thread Connections Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel Round steel tube strip, bend tab charge retention Booster to booster (no splice) 7.00 [178] / 0.50 [12.7] *Contact your sales representative for special material requirements. 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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COMPONENTS AND ACCESSORIES

Description	Part Number(s)			
O-Ring Materials and Size Nitrile (standard option)	Top Connection OR-N569-230	Gun Connection OR-N569-360		
Viton (with back-up rings required for > 325°F) Back-up rings for > 325°F	OR-V95G-230 OR-B230-2813	OR-V95G-360 OR-B360-6309		
TCP Transfer Kit (4-1/2" through 7")	GN-00	0-0030		
Lift Sub Assembly, Tandem, 5-1/8"	TC-LT5	1-000H		
Top Sub, 7"	GN-R7	0-0020		
Top Sub Wireline InsertGN-E00-0011 (o-ring: OR-N560Spring Contact AssemblyGN-E00-0020				
Tandem Sub, 7"	GN-R70-0021 (o-rings: OR-N569-360)			
Two Piece Tandem 7" with 8-1/4" Centralizing Ring	GN-R70-0	021-Z825		
Two Piece Tandem 7" (Top) GN-R70-0021-Z1 (o-rings: OR-V95G-241, OR-	V95G-360; back-up ri	ngs: OR-B360-6309)		
Two Piece Tandem 7" (Bottom) GN-R70-0021-Z2 (o-rings: OR-V95G-346, OR-V95G-360; back-	up rings: OR-B346-45	559, OR-B360-6309)		
Centralizing Ring 7" (8-1/4" OD) Sub Wrench	GN-RHZ GN-R70-	70-R825 0021-ZTL		
Bull Plugs, 7" Standard 7" with 2-7/8" EUE Pin 7" with 3-1/2" EUE Pin	GN-R7 GN-R7 GN-R7	0-0022 0-0023 0-0024		
Thread Protector, Top Sub (Top Pin) Carrier (Gun) Protector Tandem Sub & Bull Plug Protector	GN-THD GN-THD GN-THD	-312-020 -700-030 -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

GN-R/0-0021-ZTL Sub Wrench

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; Availal	ble Gun Lengths from 2' to 21'
Initiation Point	Top- or bottom-fired options available; conventional wire	eline and TCP
Mode of Fire	Simultaneous or selective fire	t t
Detonating Cord	80-grain round	4
Compatible Perforating Charges	Razor®	
Maximum Gun Swell (in)[mm]	7.22 [183.39] In Fluid	

ENVIRONMENTAL

Maximum Pressure (psi)[MPa] Maximum Tensile* (lbf)[kN] 11,500 [79] 770,700 [3,428] *Hardware Calculated Break Point

CARRIER SPECIFICATIONS

Carrier Assembly	Shot Density & I	Gun End to First S	o Center of icallop	Distance Pla	Between nes	Approximate Weights		
Fait Number	(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 [6.32]	14.75 [4.50]	10.75 [3.28]	6.75 [2.06]	4.75 [1.45]	3.75 [1.14]	2.75 [0.84]	1.75 [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.





SUPER BIG HOLE

Carrier	Carrier Shaped Charge Dart Nu		Perforating	Evelocivo	Shot Density /	^Casing O.D.	Performance in Concrete		Performance in Stressed Berea		
O.D.	Shaped Charge	Part Number	Condition	Explosive	Phasing	Application	EHD (in)[cm]	TTP (in)[cm]	EHD [^] (in)[cm]	TTP (in)[cm]	
7"		EC2-70K3931		39.0g, RDX	20 spf / 90°-45°		1.04 [2.64]	6.31 [16.03]	1.10 [2.79]	4.40 [11.18]	
39g	39g /039K Razor SBH	EC2-70K3932		39.0g, HMX					1.18 [3.00]	4.60 [11.68]	
7"		EC2-70K5231	Fiuld	52.0g, RDX		9-5/6 L-60	1.41 [3.58]	5.67 [14.40]			
52g	52g 7052K Razor SBH	EC2-70K5232		52.0g, HMX			1.42 [3.61]	7.06 [17.93]			

HARDWARE

Gun Body Configuration/Material Charge Tube Type & Retention Type of Tandem Connection Nominal OD / Wall Thickness (in)[mm] Upper/Lower Thread Connections Threaded and scalloped, proprietary gun steel, similar to 41XX alloy steel Round steel tube strip, bend tab charge retention Booster to booster (no splice) 7.00 [178] / 0.50 [12.7] *Contact your sales representative for special material requirements. 6.25 in. - 5P ACME-2G



UNROLLED CASING (DEG) 20 SPF, 4 SHOTS PER PLANE, (90/45)

Casing Shot Pattern and Phasing at 20 SPF 90°

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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COMPONENTS AND ACCESSORIES

Description	Part Number(s)				
O-Ring Materials and Size Nitrile (standard option)	Top Connection OR-N569-230	Gun Connection OR-N569-360			
Viton (with back-up rings required for > 325°F) Back-up rings for > 325°F	OR-V95G-230 OR-B230-2813	OR-V95G-360 OR-B360-6309			
TCP Transfer Kit (4-1/2" through 7") GN-000-0030					
Lift Sub Assembly, Tandem, 5-1/8"	TC-LT5	1-000H			
Top Sub, 7" Top Sub Wireline Insert Spring Contact Assembly	GN-R70-0020 GN-E00-0011 (o-ring: OR-N569-2 GN-E00-0020				
Tandem Sub, 7"	GN-R70-0021 (o-rings: OR-N569-360)				
Two Piece Tandem 7" with 8-1/4" Centralizing Ring	GN-R70-0	021-Z825			
Two Piece Tandem 7" (Top) GN-R70-0021-Z1 (o-rings: OR-V95G-241, OR-	V95G-360; back-up ri	ngs: OR-B360-6309)			
Two Piece Tandem 7" (Bottom) GN-R70-0021-Z2 (o-rings: OR-V95G-346, OR-V95G-360; back-	up rings: OR-B346-45	59, OR-B360-6309)			
Centralizing Ring 7" (8-1/4" OD) Sub Wrench	GN-RHZ GN-R70-0	70-R825 D021-ZTL			
Bull Plugs, 7" Standard 7" with 2-7/8" EUE Pin 7" with 3-1/2" EUE Pin	GN-R7 GN-R7 GN-R7	0-0022 0-0023 0-0024			
Thread Protector, Top Sub (Top Pin) Carrier (Gun) Protector Tandem Sub & Bull Plug Protector	GN-THD GN-THD GN-THD	-312-020 -700-030 -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

GN-R/0-0021-ZTL Sub Wrench

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	

	Mechanical Specifications													
Gun Size	Deut Number	Len	gth	We	ight	Top Connection (UH)			Gun Connection (DH)					
(OD)	Part Number	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 ACME-2G	-215	OR-B215-1308			
1-3/4"	GN-R175-0020	2.06 / 5.23	5.31 / 13.49	2.05	0.93	1-9/32" 12P STUB ACME-2G			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		-215	OR-B215-1308	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- ME-2G	225	OD 0225 2140	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		-225	OR-0223-2100	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 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" & 4-5/8"	GN-R45-0020	3.47 / 8.81	9.00 / 22.86	27.69	12.56	2-3/4" 6P AC-	220	OD 220 2812	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	ME-2G	-230	OR-D230-2013	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[®]

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.





	Mechanical Specifications													
Gun Size	Davit Niumah au	Len	igth	Weight	Gun Co	onnections								
(OD)	Part Number	Makeup (in/cm)	Overall (in/cm)	(lbs/kg)	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.



SPECIFICATIONS

Deut Number	Description	Makeup	Length	Overall	Length	Weight	
Part Number	Description	(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.





Mechanical Specifications												
Cup Sizo		Part Nu	Imbers		Make-U	Make-Up Length		ight	Gun Connections			
(OD)	Standard	2-3/8" EU Pin	2-7/8" EU Pin	3-1/2" EU Pin	Standard (in/cm)	EU Pin (in/cm)	Standard (lbs/kg)	EU Pin (lbs/kg)	Thread	O-Rings (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	
2-1/0"	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	
3-1/0	- GN-R31-002		GN-R31-0024	-	-	2.25 / 5.72	-	12.74 / 5.78	2-3/4" 6P ACME-2G	-230	OR-B230-2813	
2_2/0"	GN-R33-0022	2 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	
5-5/0	-		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 minim izes 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.

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

SPECIFICATIONS

Deut Number	Description	Makeu	b Length	Overal	l Length	Weight	
Part Number	Description	(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



6-3/8" OD Centralizing Tandem GN-R3321-C638

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 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

Dant Nume have	Part Number Description		Length	Overall Length		Weight	
Part Number	Description	(in)	(cm)	(in)	(cm)	(Ibs)	(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	Specification	s (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	Plug, 6-1/4" OD, 1/2" Drift 3.56 9.0		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.





RING CENTRALIZER SPECIFICATIONS

Part Number	OD		We	ight
4140 Material	(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.



6-1/4 OD Extended Ring Centralizer GN-RH475-R625-EXT

SPECIFICATIONS

Deut Number	Description		Makeup Length		Overall Length		Weight	
Part Number	Description	(in)	(cm)	(in)	(cm)	(Ibs)	(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		/A	4.50	11.43	6.72	3.05	





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.

SPECIFICATIONS

- 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.



6-3/8 OD Extended Ring Centralizer GN-RH51-R638-EXT

Davit Nivershaw	Description		Length	Overall Length		Weight	
Part Number	Description	(in)	(cm)	(in)	(cm)	(Ibs)	(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.

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RING CENTRALIZER SPECIFICATIONS

Dart Number	0	D	Weight		
Part Number	(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 EXTENDED RING CENTRALIZER GN-RH51-R638-EXT

6-3/8" OD RING CENTRALIZER GN-RH51-R638



EXTENDED RING CENTRALIZER SPECIFICATIONS

Part Number	OD		Wi	dth	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).

8.129" OD EXTENDED RING CENTRALIZER GN-RH51-R813-EXT



Centralizing Gun Connectors (Booster to Booster) 6.750" Conventional Gun Systems



2-рс. Тандем Воттом GN-R675D21-72

O-Rings: OR-V95G-342, OR-V95G-357

BACK-UPS:

OR-B342-3997, OR-B357-5873

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.



SPECIFICATIONS

Dout Number	Description	Makeup Length		Overall Length		Weight	
Part Number	Description	(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	ling 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



2-рс. Тандем Тор GN-R675D21-Z1

О-**Rings:** OR-V95G-237, OR-V95G-357 **Васк-Ups:** OR-B357-5873

> 2-pc. Tandem with 8-1/4" OD Ring Centralizer GN-R675D21-Z827-CT

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.

8-1/4" Ring Centralizer GN-RH675-R827

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.



8-1/4" OD RING CENTRALIZER GN-RH70-R825 **2-рс. Тандем Воттом** GN-R70-0021-Z2

O-Rings: OR-V95G-346, OR-V95G-360

Васк-Ups: OR-B346-4559, OR-B360-6309

> **2-рс. Тандем Тор** GN-R70-0021-Z1

O-Rings: OR-V95G-241, OR-V95G-360

> **Васк-Ups:** OR-B360-6309

SPECIFICATIONS

Deut Number	Description	Makeup Length		Overall Length		Weight	
Part Number	Description	(in)	(cm)	(in)	(cm)	(Ibs)	(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	F	efer to Exter	nded Ring Ce	ntralizer Spe	cs (next page	e)
GN-R70-0021-ZTL	7" 2 pc. Tandem Sub Wrench	N	/A	24.00	60.96	6.00	2.72



2-pc. Tandem with 8-1/4" OD Ring Centralizer GN-R70-0021-Z825

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.



RING CENTRALIZER SPECIFICATIONS

Part Number	0	D	Weight		
Part Number	(in)	(cm)	(Ibs)	(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		Wi	dth	Weight		
Part Number	(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 (higher than the carrier)				
Torque Required to Shear (8 Screws)	4,000 - 4,500 ft/lbs				
Rotations Required to Shear	11 Rotations (to the right)				
Upper/Lower Thread Connections	3-15/16" 6P ACME-2G				
Salect a ring material based on fluid compatibility and wellbore temperature					

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-RH45CR1-RXXX 4.5"/4.63"/4.75" Centralizing Ring, 6.12" OD (shown)

> *Centralizer Rings Ordered Separately See options listed on Next Page.

LEFT HAND THREAD

GN-R450-BA21-Z2 BREAK-APART TANDEM (BOTTOM) O-RINGS: OR-V95G-231 (2), OR-V95G-342 (2) BACK-UPS: OR-B231-2870 (2), OR-B342-3997 (2)

O-RING: OR-N569-229 (1) (FITS INSIDE TOP BETWEEN TOP AND BOTTOM)

SHEAR SCREWS: TC-SP2520-375 (8) 1/4-20 x 3/8", MATCH DRILLED TO SUBS (REPLACEMENT SCREWS ORDERED SEPARATELY)

GN-R450-BA21-Z1, 4.50" Break-Apart Tandem (Top) O-Rings: OR-V95G-342 (2) Back-Ups: OR-B342-3997 (2)

*GN-R45-R001-450, THREAD PROTECTOR RING (NOT SHOWN) ALSO AVAILABLE WHEN A CENTRALIZER RING IS NOT REQUIRED.



TC-TL45-BPS00 Sub Wrench (1/2" Drive)

RING CENTRALIZER SPECIFICATIONS

Part Number	Part Number	C	OD		ight
4140 Material	1018 Material	(in)	(cm)	(Ibs)	(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



GN-RH45CR1-R625 Centralizing Ring, 6.25" OD (SHOWN)

Centralizer rings are 1.60 in. wide with 4.30 in. -6P Stub ACME 2G internal threads.

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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



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



CARRIER (GUN) PROTECTOR EQUIPPED WITH MELT PLUG AND O-RINGS

HANDLING PROTECTORS ONLY NOT FOR LIFTING



Equipped with Melt Plug



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-PUP23-002N 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-LT00-238		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-PUP23-602P 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-LT40-003
TC-LT45-000	Lift Sub Assembly, 4-1/2" & 4-5/8" Tandem	TC 1700 000	TC-PUP28-902P 2-7/8," 8.7#/ft, P-110	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	IC-LI00-288		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"		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 EU (8 Rhd)	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"		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"	2-778 EU (8 Rhd)	5-3/4"-6P ACME-2G
TC-LT70-003	Coupling, Tandem Lift Sub, 7"		6-1/4" - 5P ACME 2G



COUPLING (TANDEM SUB OR TOP SUB)

LIFT SUB Assembly, 4-1/2 & 4-5/8" Tandem TC-LT45-000 (shown)



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 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

Cup O D Dest Number Description		Yield	Rating	We	ight	
Gun O.D.	Part Number	Description	(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



EPIC[™] Systems EPIC[™] Command

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, multiwell, 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.





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

Used with the FIRE button to enable shooting power supply.	
Adjust CCL gain and signal volume when key is in CCL mode.	
AUX	Signal feedthrough via the AUX jack on back. Typical connection to another wireline panel.
LOG	Signal feedthrough via the LOG connection on back.
SAFE	No power on the line; line is terminated per RP-67. Safe key is removable.
CCL	Displays the virtual CCL meter. Signal is routed through the rear CCL port to CCL logging system.
ARM	Enables inventory, arming, and shooting functions.
Input commands and view system/function responses.	
Download job-specific data files or perform panel software update.	
Controls both AC and DC power.	
Used along with the ARM button to enable shooting power supply.	
	Used wit Adjust CC AUX LOG SAFE CCL ARM Input cor Downloa Controls Used alou



REAR INPUTS and OUTPUTS

AC INPUTS	120VAC input (5A, 3AG fused)
DC INPUTS	12V truck battery input (2A, 3AG fused)
LIGHTS	2A, 3AG fuse for safe light circuit
CCL	CCL output to logging system
LIGHTS	Standard output to truck safe lights
AUX	$\frac{1}{4}$ " phone connection; LINE is routed here when key is in AUX position
LOG	PL-259 connection; LINE is routed here when key is in LOG position
LINE	Wireline connection

EPIC[™] Systems EPIC[™] Test

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

EPIC[™] Systems EPIC[™] Switches



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.

Ca	pab	ili	ti	es

- Intrinsically safe Shoot on the fly
- Dual fire (switch types: normal or Set/Fire)

ADDRESSABLE FIRING MODE

- to detonator, feed-through, and ground
- Reassign address on surface without disassembly
- Skip gun capability (skip a problematic gun and prevent non-productive time (NPT))

Inventory Rates

One (1) switch per second

RAPID FIRING MODE (Field Configurable)

- Intrinsically safe
- Shoot on the fly
- Dual fire (switch types: normal or Set/Fire)
- Viable switch count before each shot-checks connections
 Viable switch count before each shot-checks connections to detonator, feed-through, and ground
 - No software requirement

Five (5) switches per second

• Inventory and arm bottom-most circuit with one touch



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	 Independent Third Party Organization (ITPO) certified RF Safe, ESD Safe, and API RP-67 compliant All wired connections, including detonator, safely tested with the EPIC[™] Test box 		
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 registerred trademark of Canatex Completions Solutions, Inc. ICSI[®] is a registered trademark of Innovative Completion Systems, Inc. Hunting[®] is a registered trademark of Hunting PLC



EPIC[™] FLYING LEADS

Mechanical Specifications	
5-Wire Switch Dimensions	2-1/4" x 5/8" x 1/4"
Accessories	Part Number
UY2 Scotchlok Connector (recommended)	AP-M-26224
UY Scotchlok Connector (may be substituted for the above U' use on switch wires only)	Y2, but AP-M-26214
UR2 Scotchlok Connector (three-gang for ground wires)	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



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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
Туре	"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)
2//"	AEL-CHD2001-7/32"	Cablehead, 3/4, (7/32 Line)
3/4	AEL-CHD2001-9/32"	Cablehead, 3/4, (9/32 Line)
	AEL-CHD3001-5/16"	Cablehead 1in X 5/16in
1"	AEL-CHD3001-7/32"	Cablehead, 1in (7/32in Line)
	AEL-CHD3001-9/32	Cablehead, 1in (9/32in Line)
4.0.(0)	AEL-CHD4001-3/8"	Cablehead, 1-3/8in
1-3/0	AEL-CHD4001-9/32"	Cablehead, 1-3/8in, GO (9/32in Line)
	AEL-CHD5001-1/4"	Cablehead 1-7/16in, GO (1/4in Line)
1-7/16"	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.



GEUDynamics



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
Туре	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	
4 "	AEL-CCL3001	CCL, 1in, GO Style	
L	AEL-CCL3002	CCL, 1in, Non-Grounded	
1.2/0"	AEL-CCL4001	CCL, 1-3/8in, Grounded	
1-3/0	AEL-CCL4002	CCL, 1-3/8in, Non-Grounded	
1-7/16"	AEL-CCL5001	AEL-CCL5001 CCL, 1-7/16in, GO Style	
1_11/16"	AEL-CCL6002	CCL, 1-11/16in, GO Style	
1-11/10	AEL-CCL6003	CCL, 1-11/16in, Grounded	
1-5/8" AEL-CCL6006 CCL, 1-5/8in, (Non-Grounded)		CCL, 1-5/8in, (Non-Grounded)	
2-1/8"	-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)		CCL, 2-3/4" (Grounded)	
		CCL, 3-1/4in, GO Style (GO Box Top-QC Box Btm)	
	AEL-CCL9002	CCL, 3-1/8in, GO Style (GO Box Top-QC Box Btm)	
3-1/8"	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.

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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'
Туре	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'	
	AEL-SBS3001	Sinker Bar, Steel 1in x 5'	
1 "	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'	
	AEL-SBL5001	Sinker Bar, Lead 1-7/16in x 5'	
	AEL-SBL5002	Sinker Bar, Lead 1-7/16in x 7'	
1-7/16"	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	
	AEL-SBL6001	Sinker Bar, Lead 1-11/16in x 5'	
	AEL-SBL6002	Sinker Bar, Lead 1-11/16in x 7'	
1-11/16"	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'	
0"	AEL-SBL9001	Sinker Bar, Lead 2in x 5'	
Ζ	AEL-SBL9002	Sinker Bar, Lead 2in x 7'	
2.2/4"	AEL-SBS9003	Sinker Bar, Steel, 2-3/4in x 7', OTL	
2-3/4	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

GEODynamics[®]

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
Туре	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.

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Advanced E-Line Solutions Adaptors



ADAPTORS, cont.

Part Number	Description	Part Number	Description
AEL-ADA3002	Shot Rod Hanger, 1in	AEL-ADA5007	Sealed Tear Drop / GO Pin 1-7/16in
AEL-ADA3003	1in Double GO Pin	AEL-ADA5007S	Double Sealed Tear Drop / GO Pin 1-7/16in (short)
AEL-ADA3004	FPT Bull Plug, 1in	AEL-ADA5008	GO Box / Tear Drop Pin 1-7/16in
AEL-ADA3005	Button Sub,1in	AEL-ADA5009	GO Pin / Sealed Tear Drop 1-7/16in
AEL-ADA3006	1in Double GO Box	AEL-ADA5010	Double GO Pin 1-7/16in (with phasing ring)
AEL-ADA3011	Shot Rod Bull Plug, 1in	AEL-ADA5011	GO Tear Drop Sub 1-7/16in (with phasing ring)
AEL-ADA3016	Box, 1in / Pin, 3/4in	AEL-ADA5012	GO Sealed Tear Drop / GO Box 1-7/16in
AEL-ADA3017	Pin, 1in / Pin, 3/4in	AEL-ADA6001	Schlumberger Box 1-11/16in / GO Pin
AEL-ADA3021	Shot Rod Assembly, 1in x 5'	AEL-ADA6002	1-11/16" Double Sealed Tear Drop, Go Pin
AEL-ADA3024	Double Sealed Tear Drop, 1in	AEL-ADA6003	Schlumberger Pin 1-11/16in / GO Pin
AEL-ADA4001	Tear Drop x GO Pin, 1-3/8in	AEL-ADA6006S	Teardrop Pin / GO Pin, 1-11/16in
AEL-ADA4002	Shot Rod Hanger 1-3/8in	AEL-ADA6007	RTG Tandem 1-9/16in
AEL-ADA4003S	Double Pin, 1-3/8in	AEL-ADA6008	RTG Top Sub 1-9/16in
AEL-ADA4005	Bull Plug Box, 1-3/8in	AEL-ADA6009	RTG Blast Sub 1-9/16in
AEL-ADA4006	Bull Plug Pin, 1-3/8in	AEL-ADA6010	RTG Bull Plug 1-9/16in
AEL-ADA4007	1-3/8in Schlumberger Box GO Pin	AEL-ADA6011	RTG Lower Decentralizer Adapter 1-9/16in
AEL-ADA4011	Freepoint Bull Plug, 1-3/8in	AEL-ADA6013	GO Box Double, 1-11/16in
AEL-ADA4015	SR Pin, 5/8in X GO Box, 1-3/8in	AEL-ADA6015	GO Pin Double, 1-11/16in
AEL-ADA4016	SR Box 5/8in X GO Pin, 1-3/8in	AEL-ADA6024	Shot Rod Assembly, 1-5/8in x 5'
AEL-ADA4037	Shot Rod Assembly Complete	AEL-ADA6030	Shot Rod Hanger, 1-5/8in
AEL-ADA4038	Sucker Rod Box 3/4in - GO Pin, 1-3/8in	AEL-ADA6100	Tag Shooting Sub, 1-11/16in
AEL-ADA4039	SR Pin, 3/4in / GO Box, 1-3/8in	AEL-ADA7004	QC Pin GO 3-1/4in, GO Pin 1-7/16in
AEL-ADA4041	Shot Rod Bull Plug, 1-3/8in	AEL-ADA7010	QC Box / GO Box, 2-1/2in
AEL-ADA4042	GO Box, 1-3/8in x GO Pin, 1in	AEL-ADA8001	Button Firing Sub 1-1/2in
AEL-ADA4043	GO Box, 1in x GO Pin, 1-3/8in	AEL-ADA8004	Button Firing Sub 1-1/2in (high pressure)
AEL-ADA5001	GO Box 1in / 1-7/16in GO Pin	AEL-ADA9001	Quick Change GO Style 3-1/4in OD Less Det Blk
AEL-ADA5002	GO Pin 1in / 1-7/16in GO Box	AEL-ADA9001-DB	Quick Change GO Style 3-1/4in or 3-1/8in OD With Det Blk
AEL-ADA5003	Tear Drop / GO Pin 1-7/16in, Long	AEL-ADA9004	Quick Change GO Style 3-1/8in OD Less Det Blk
AEL-ADA5003S	Tear Drop / GO Pin 1-7/16in, Short	AEL-ADA9004-DB	Quick Change GO, 3-1/8in (with detonator block)
AEL-ADA5004-HV	Tear Drop / GO Pin 1-7/16in High Voltage Contact	AEL-ADA9007	Top Sub, 2-3/4in (Over the line, 2/3/8in FN)
AEL-ADA5005	Double GO Pin 1-7/16in	AEL-ADA9007-2	Top Sub, 2-3/4in (Over the line, 2in FN)
AEL-ADA5005S	Double GO Pin 1-7/16in Short	AEL-ADA9008	2in Fishing Neck for 3-1/8in or 3-1/4in CCL
AEL-ADA5006	Double GO Box 1-7/16in	AEL-ADA9009	Fish Neck Pin/Box, 2-3/4in

Advanced E-Line Solutions Centralizers and De-Centralizers

500°F

Varies

20,000 psi

1-5/8" to 22"

1-7/16" to 2-3/4"

Bowspring and Roller Arm

Gearhart "GO" and Quick Change "GO"

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).

CENTRALIZERS

SPECIFICATIONS

Temperature Rating
Pressure Rating
Diameter Range
I.D. Range
Tool Length
Туре
Connections

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.

500°F

N/A

Varies

20,000 psi

1-3/8" to 2"

Channel or Button Magnets

Gearhart "GO" and RTG (bolt-together type)

DE-CENTRALIZERS



Advanced F-Line Solutions



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-F	MG6003	FPT Lower Magnet, 1-5/8in
AEL-FBS1002	FPT Lower Bowspring, 11/16in	AEL-F	PT1000	11/16in Freepoint Tool Complete
AEL-FBS3001	FPT Bowspring, 1in	AEL-F	PT3000	1in Freepoint Tool Complete
AEL-FMG1001	Magnet, Upper Section 11/16in	AEL-F	PT3001	Freepoint Tool, 1in W/Magnets
AEL-FMG1002	Magnet, Spacer Section, 11/16in	AEL-F	PT4000	1-3/8in Freepoint Tool Complete
AEL-FMG1003	Magnet, Lower Section, 11/16in	AEL-F	PT6000	1-5/8in Freepoint Tool Complete
AEL-FMG3001	Magnet, Upper Section, 1in	AEL-I	FSJ1001	FPT Slack Joint, 11/16in
AEL-FMG3002	Magnet, Spacer Section1in	AEL-I	FSJ3001	Slack Joint, 1in
AEL-FMG3003	Magnet, Lower Section 1in	AEL-I	FSJ4001	Slackjoint, 1-3/8in x 16in
AEL-FMG4001	Magnet FPT Upper 1-3/8in	AEL-I	FSJ6001	Slack Joint, 1-5/8in x 16in
AEL-FMG4002	Magnet, FPT Spacer, 1-3/8in	AEL-F	SN1001	FPT Sensor, 11/16in
AEL-FMG4003	Magnet FPT Lower 1-3/8in	AEL-F	SN3001	FPT Sensor, 1in
AEL-FMG6001	FPT Upper Magnet, 1-5/8in	AEL-F	SN6001	FPT Sensor, 1-5/8in
AEL-FMG6002	FPT Magnet Spacer, 1-5/8in			

Please contact your sales representative for redress kits and pricing.



GEUDynamics





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 (w/out EC2-33X prefix)	_	Charge P/N (suffix)	_	Sub	Switch	O-Ring Material
L	G Loade Gun	xx	NN	ХХ	NN	-	NN	х	NNNN	-	XX thru XXXXX	-	х	х	х

Gun Series			Phasing	# Shots	De	etonating Cord		Charge P/N			Sub
IC GIC STRATX®		Α	60°	Total shots available in the	E	DET-80H212		The 4-digit charge part number followed		Х	No Sub
		В	90°	carrier (e.g., 06, 12)	Г	(HMX)		by -XX or a 2- to 5-character suffix;		•	ςτρλτγ® τοτε_λ
Carrier OD		С	135°-45°			DET-80R111		e.g., EC2-33A1371 = 1371-XX		A	51RAIX- 1070-A
Two-Digit OD (e.g., 31)	vo-Digit OD (e.g., 31) D 140°-20°		140°-20°	#Loaded Shots		(RDX)		EC2-33A2371-BF45 = 2371-BF45		С	Disposable XVR T172A
<u> </u>	-	G	120°	Actual number of loaded shots					_	Ε	STRATX [®] T279-A (Orienting)
	-	J	180°	(e.g., carrier holds 06, but 05							
	-	0	0°	loaded per order)							Curitah
	-	P	72°								Switch
	-	V	51.4°							X	No Switch (EPIC Module
	-	R	Rotated							\vdash	Shipped Separately)
	-	HF	120°/60°							D	STRATX [®] PIC Module
	-	SA	45° I, 60°								(A140 Detonator)
	-	SB	45° 1, 90°								
	-	SC	45° I, 135°								O-Ring Material
	-	SD	45° T, 140°							Х	No O-Rings (No Sub)
	-	56	45° T, 120°							NI	N!!+.:! -
	-	2)	45° T, 160°							N	INITIIE
	-	50 SD	45 T, U							V	Viton
	-	<u>۲</u>	43 1,72								
	-	00	00								
	-	10	180°								
		G0	120°								
	-	BO	90°								
	F	RO	Rotated								
		P0	51.4°								

Part Number Descriptions Loaded Gun Systems, HELLFire[®], GLB Short Guns



	Examples: Loaded Gun Part Numbers and Descriptions
LGHF33HF06-03I0771-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

A	Gun ssembly	Gun Series	Carrier OD	Phasing	# Shots	-	# Loaded Shots	Detonating Cord	Charge P/N (w/out EC2-33X prefix)	-	Charge P/N (suffix)	-	Sub	Switch	O-Ring Material
LG	Loaded Gun	ХХ	NN	ХХ	NN	-	NN	х	NNNN	-	XX thru XXXXX	-	х	х	Х

	Gun	Series			Phasing	# Shots		Detonating Cord	Charge P/N			Sub
LB	GLB	Short Guns		Α	60°	Total shots available in the	Х	No Detcord	The 4-digit charge part number followed		Х	No Sub
HF	HF	HELLFire®		В	90°	carrier (e.g., 06, 12)	F	DET-80H212 (HMX)	by -XX or a 2- to 5-character suffix;		~	
]	С	135°-45°			DET-80R111 (RDX)	e.g., EC2-33A1371 = 1371-XX		C	Disposable XVR 1172A
	Carr			D	140°-20°	#Loaded Shots			EC2-33A2371-BF45 = 2371-BF45	Г		
				G	120°	Actual number of loaded shots						Switch
IWC	o-Digit	OD (e.g., 31)		J	180°	(e.g., carrier holds 06, but 05					х	No Switch
				0	0°	loaded per order)						
				Р	72°						A	EPIC ^{IIII} Flying Leads
				V	51.4°						В	EPIC [™] Switch in a Can
				R	Rotated					L		
				HF	120°/60°					[O-Ring Material
				SA	45° T, 60°						V	
				SB	45° T, 90°						X	No O-Rings (No Sub)
				SC	45° T, 135°						N	Nitrile
				SD	45° T, 140°						v	Viton
				SG	45° T, 120°						v	VICOII
				SJ	45° T, 180°							
				SO	45° T, 0°							
				SP	45° T, 72°							
				A0	60°							
				00	0°							
				JO	180°							
				G0	120°							
				B0	90°							
				RO	Rotated							
				P0	51.4°							



	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	NINI	NINI		NINI	NINIV		v	NININI	
GM	Gun Assembly - Metric	ININ	ININ	-	ININ	ININA	-	^	INININ	

Carrie	er 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

Charg	e 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
	Α	60°
	В	90°
	С	135° - 45°
	D	140° - 20°
	G	120°
	J	180°
	0	0°
	Р	72°
		90° + 45°
1	R	60° + 30°
1		51.4° + 25./°

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	Gun Type			Corrier OD	Coco Turo	Explosive	Charge Tupe			Cuffix	
Charge	Code	Description		Carrier OD	Case Type	Weight	Charge Type	Explosive Type	-	SUITIX	
ГС	1	Retrievable Tubing Gun		NINI	v		N	N		VV than VVVVV	
EC	2	Retrievable Casing Gun		NN	X	NN (g)	IN	IN	-		

Carrier OD		Case Type		Charge Type	Exp	losive Type		Charge P/N Suf	fix
Size	Code	Represents charge case properties, such as material, case size, case shape, or shot arrange- ment (in the gun carrier).		Represents the type of charge. Some examples are: DP XDP BH SBH	1	RDX		Extra characters	s,
1-9/16"	15				2	HMX	_	e.g., EC2-33A2371-BF	BF45
1-3/4"	17		GH, and Equal Hole size charges.	3	HNS		hole). See list belo	ow.	
2"	20						L		
2-3/8"	23	Used internally.					Charge P/N Suffixes		
2-1/2"	25					-BF		Basix™ Frac	
2-3/4"	27					-C		lsoLoc™ Charges	
2-7/8"	28					-D		Refrax™ Dual Casing	
2 1 /0"	20					-Е		Economy	
3-1/0	31, 33					-EG		Economy Grooved	
3-3/8"	33					-FRX		FracIQ® Connex®	
4"	40					-G		Grooved Case	
4-1/2"	45					-LD		Low Debris	
4-5/8"	46					-L, -LS		Low Swell	
4.0/4"	40					-R		Refrax™ Dual Casing	
4-3/4	48					-RC	Co	nnex® Reactive Charg	ge
5"	51					-RX		Reactive Charge	
5-1/8"	51					-SB		SandIQ®	
6-3/4"	68					-SC		SandIQ®	
7"	70					-SD		SandIQ®	
	1					-SE		SandIQ®	
						-SF		SandIQ®	

See Nomenclature for more details

-SG

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SandIQ®

Nomenclature Abbreviations, Acronyms, and Terms

GEODynamics®

A - B - C

	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								
-Т	IsoLoc™ Charge								
TL	Twistlock								
XDP	Extra Deep Penetrating								
-XEH	Extra Entry Hole								



NOTES



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