

# G-Force<sup>®</sup> Oriented Perforating System

**ENABLES PERFORATING IN ANY DIRECTION  
REGARDLESS OF GUN/CASING POSITIONING**

## OVERVIEW

The Halliburton G-Force<sup>®</sup> system comprises an internal orienting charge tube assembly and gun carrier system that allows perforating in any direction irrespective of the gun's position relative to the casing.

With an orientation accuracy range of  $\pm 5^\circ$ , the G-Force system overcomes adverse factors that can significantly decrease the ability to orient the guns in a desired direction.

Unlike externally oriented systems, which use devices and weights external to the gun and exposed to the casing environment, the G-Force orienting mechanism is contained within the gun carrier. This eliminates added friction created by external guns moving axially down the casing wall and minimizes doglegs and other discontinuities during the deployment that can cause loss of orientation.

In addition, because the G-Force rotating orienting device is contained inside the protective environment of the carrier, the fundamental orienting design is unaffected by potential restrictions in the completion string.



## BENEFITS

- » Increased orientation accuracy range of  $\pm 5^\circ$  in wells of  $25^\circ$  deviation and greater
- » Can be loaded as a KleenZone<sup>®</sup> system for low-debris applications
- » Compatible with live well intervention systems such as the AutoLatch<sup>™</sup> connector, ratchet connector, and modular gun system
- » Can be deployed on coiled tubing, wireline, slickline, or jointed pipe

## FEATURES

- » Orienting mechanism is contained within the gun carrier, and is unaffected by potential restrictions in the completion string or well debris
- » Can be run through tubing to orient in casing
- » No need for fin tandems, eccentric tandems, or swivel subs
- » Gun assemblies can be centralized in the casing
- » No external weight bars required, eliminating gaps between loaded sections and lost shots
- » Gun orientation can be verified after gun retrieval

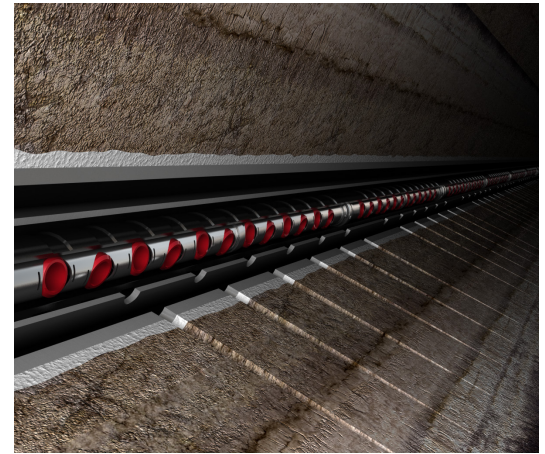
**CHALLENGE**

**North Sea**

This job required accurate orientation of the perforation planes in the direction of the maximum principal stress to ensure stable perforation tunnels, overcoming a sand production problem that previously limited production from the completion. The result was a safe and flawless onsite job execution that guaranteed flow assurance with an initial sand-free oil production rate of 6,000 standard cubic meters per day (37,600 BOPD) – a 20 percent increase in the overall Norne Field production potential.

**West Africa**

For this job, the customer’s objective was to manage sand flow into the wellbore. Challenges to overcome included loss of perforations in the productive zone due to the use of eccentric weighted hollow steel carriers, along with loss of orientation accuracy due to excessive torque and drag associated with conventional orienting techniques such as external fins and swivel. Halliburton recommended an oriented gun system with a 7-inch outside diameter (OD) to perforate a 95/8-inch casing in the direction of maximum principal stress. In addition to performance improvement, the new 7-inch-OD G-Force system reduced operating time during makeup, deployment, and positioning of the gun assemblies, thus saving the customer over 50 hours of rig time.



**G-Force® Gun System Specifications**

Gun OD	2 <sup>7</sup> / <sub>8</sub> -in. (73.025 mm)	3 <sup>1</sup> / <sub>8</sub> -in (79.375 mm)	3 <sup>3</sup> / <sub>8</sub> -in (85.725 mm)	4 <sup>5</sup> / <sub>8</sub> -in (117.475 mm)	7-in (177.80 mm)
Shot Density	4 spf (13 spm)	4 spf (13 spm)	4 spf (13 spm)	4 spf (13 spm)	6 spf (20 spm)
Phasing	0° or 180°, 0 – 180°, 10 – 350°, 90-270°	10 – 350°	0°, 0° or 180°, 0 – 180°, 10 – 350°, 180°	0°, 0 – 180°, 10 – 350°, 90-270°	0 – 180°
Charge Type	11.1-gm DP	17.5-gm MaxForce®	21-gm Millennium™, MaxForce-FRAC	39-gm Millennium™, Millennium-II, MaxForce, KleenZone®	39-gm Millennium-II, MaxForce
Tensile Rating	141,000 lb (63 957 kg)	148,000 lb (67 132 kg)	228,000 lb (103,419 kg) – 232,000 lb (105 233 kg)	323,700 lb (146 827 kg) – 399,000 lb (180 983 kg)	643,900 lb (292 068 kg)
Collapse Pressure	22,000 psi (1517 bar)	19,000 psi (1310 bar)	25,000 psi (1724 bar)	20,000 psi (1379 bar)	15,000 psi (1034 bar)

For more information, contact your local Halliburton representative or visit us on the web at [www.halliburton.com](http://www.halliburton.com)

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