



MaxForce® Flow Ultra-Kleen™ System Delivers Maximum Flow Area with Low-Level Debris in the Gulf of Mexico

GUN SYSTEM ENABLES PRODUCE A MAXIMUM IN DEEPWATER, HIGH-PRESSURE WELL, ENABLING SUCCESSFUL FRAC-PACK OPERATION

GULF OF MEXICO

CHALLENGES

- » Provide a reliable gun system that would produce maximum flow area and, at the same time, be debris free to ensure that the frac-pack operation could be completed without any NPT
- » Avoid exceeding the pressure and dynamic loading limitations of other tools and equipment downhole during the perforating event

SOLUTION

Big-hole MaxForce® Flow Ultra-Kleen™ gun system, which was:

- » Developed for optimum performance in deepwater and high-pressure wells
- » Designed with dynamic transient control to address dynamic loading concerns
- » Selected for its delivery of the maximum flow area and lowest debris levels in the industry, ensuring the best environment for frac-pack completions

RESULTS

- » Gun system performed as intended to prevent shock loading from dynamic transient forces during the perforating event, thus safeguarding the completion and TCP string
- » System provided confirmation of the BHA upon retrieval from the wellbore, with no debris spotted on the shakers
- » Halliburton completed the job successfully without any operational incidents (such as sticking or bending), NPT, or safety issues

OVERVIEW

A Gulf of Mexico operator with a challenging deepwater, high-pressure well needed a perforating system that could perforate at bottomhole pressures greater than 21,000 psi (1448 bar) and at more than 30,000 feet (9144 meters) of true vertical depth (TVD). Because of the extreme well conditions, a standard gun system was not an option. Through close collaboration with Halliburton, the operator selected the innovative 6¾-inch, 18-SPF, big-hole MaxForce® Flow Ultra-Kleen™ gun system.

CHALLENGES

The operator was concerned about the dynamic transient load that a gun system might exert on its completion string during the perforating event – thus, the selected gun system could not exceed the pressure limitations of other downhole tools and equipment, and it could not compromise the operator's ability to perform a successful frac-pack operation. The operator required a gun system that would produce a maximum flow area and, at the same time, be debris free to ensure the frac-pack operation could be completed without any non-productive time (NPT).

SOLUTION

To meet these challenges, the Halliburton Global Engineering and Technology team designed and modeled the innovative Halliburton 6¾-inch, 18-SPF, big-hole MaxForce Flow Ultra-Kleen gun system with dynamic transient control. This system is rated to 25,000 psi (1724 bar) and 425°F (218°C). It was designed for optimum performance in deepwater and high-pressure wells, allowing Halliburton to perforate the wells within the limits of the operator's requirements. The MaxForce Flow Ultra-Kleen gun system leads the industry in both hole size and lowest amount of debris – thus minimizing NPT and safety issues, and enabling optimum frac-pack completions. Additionally, the system's design prevents shock loading from dynamic transient forces during the perforating event, which protects the completion and tubing-conveyed perforating (TCP) string.



The big-hole MaxForce® Flow Ultra-Kleen™ gun system is designed to perforate intervals in extreme conditions, making it ideal for deepwater Gulf of Mexico operations.

RESULTS

The perforated interval was from 30,710 feet (9360 meters) to 30,815 feet (9392 meters) measured depth (MD), and had a temperature of 245°F (118°C) and pressure of 21,174 psi (1460 bar). The MaxForce Flow Ultra-Kleen gun system fired and functioned successfully. After the guns fired, the well was monitored and reversed out. The system provided confirmation of the bottomhole assembly (BHA) upon retrieval from the wellbore, with no debris spotted on the shakers. The sump packer was retagged at the exact original tag mark on the pipe. With no indication of movement and fill, the gun was pulled out of the hole. The completion and TCP string were retrieved to surface with no incidents (such as sticking or bending), and with physical confirmation of all shots fired and minimum lost debris, as designed.

The entire job was completed with no NPT or safety issues. The MaxForce Flow Ultra-Kleen gun system successfully perforated the well under these extreme conditions, meeting all of the operator's requirements and expectations.

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