

2 1/8-in PowerSpiral Nova

Extradeep spiral-phased capsule gun perforating system paired with PowerJet Nova extradeep penetrating shaped charges

APPLICATIONS

- Through-tubing perforating and re-perforating
- Underbalanced conditions
- Natural completions
- Extradeep penetration

The 2 1/8-in PowerSpiral Nova* extradeep spiral-phased capsule gun perforating system is a retrievable system designed for through-tubing operations. As a capsule gun, the 2 1/8-in PowerSpiral Nova system enables using the maximum charge size, which in combination with rock-optimized PowerJet Nova* extradeep penetrating shaped charges and strategically placed shock-absorbing material delivers perforations capable of the highest well productivity for the gun system size.

PowerJet Nova charges are so effective because they are the result of laboratory research involving hundreds of shaped charge test shots into a broad range of stressed rocks, including extreme values of rock strength. API RP 19B Section 1 performance data and additional stressed-rock testing document the improved efficiency of the charges' explosive energy transfer to the perforating jet. In addition to increasing penetration over previous-generation deep penetrating shaped charges, PowerJet Nova charges deliver up to 50% more formation contact for more effective stimulation treatments and increased drainage contact for greater productivity.

The proven design of the PowerSpiral* spiral-phased capsule gun perforating system used by the 2 1/8-in PowerSpiral Nova system employs shock-absorbing material between the charges. This attenuates shock waves during detonation to reduce charge-to-charge interference and also minimize shock waves in the wellbore. The effects are significant in increasing the performance of the shots across the wellbore.

The 2 1/8-in PowerSpiral Nova system is compatible with all wireline, LIVE* digital slickline services, and mechanical slickline conveyance.

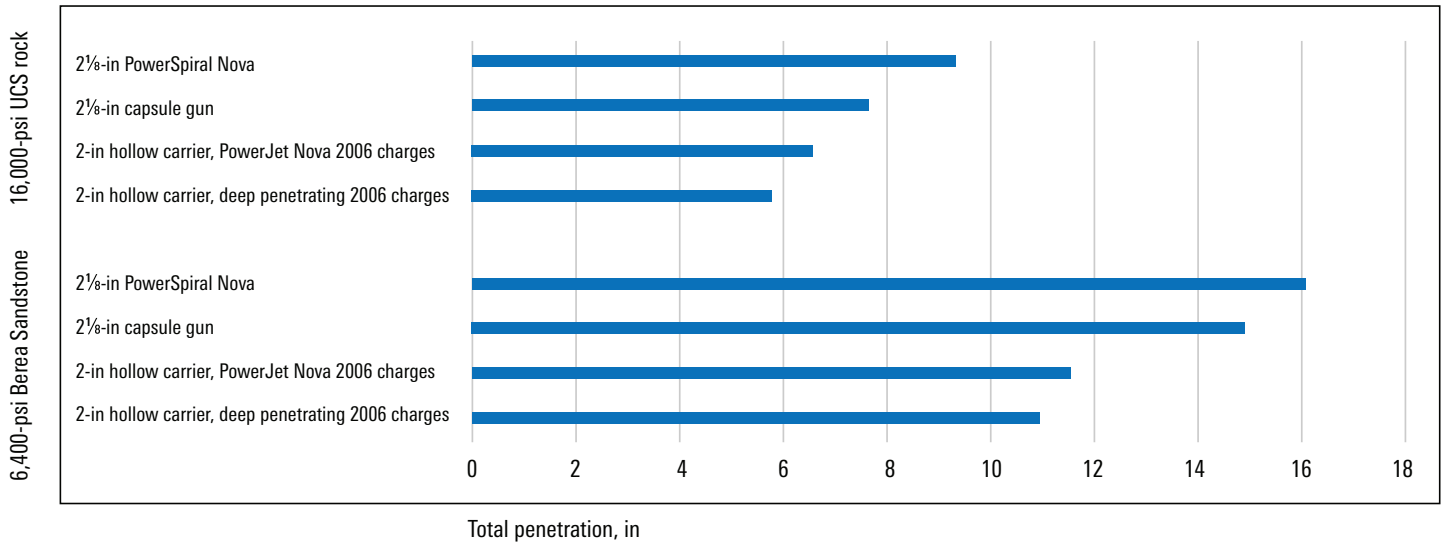


2 1/8-in PowerSpiral Nova spiral-phased capsule perforating system, 6 spf, 45° pendulum phasing.

Ratings and Physical Data

| | PowerSpiral Nova Perforating System |
|--|---|
| Nominal gun size, in | 2.125 |
| Shot density, shots per foot (spf) | 6 |
| Phasing, ° | 45 pendulum |
| Max. gun length, ft | 30 |
| Min. restriction, in | 2.25 |
| Temperature rating, degF | HMX: 365 |
| Pressure rating, psi | 15,000 |
| Debris fill per charge, in | 4 1/2-in 11.6-lbm/ft casing: 0.18 5 1/2-in 17-lbm/ft casing: 0.12 7-in 32-lbm/ft casing: 0.07 |
| API Witnessed RP 19B Section 1 penetration, in | 27.5 |
| API Witnessed RP 19B Section 1 entrance hole, in | 0.30 |

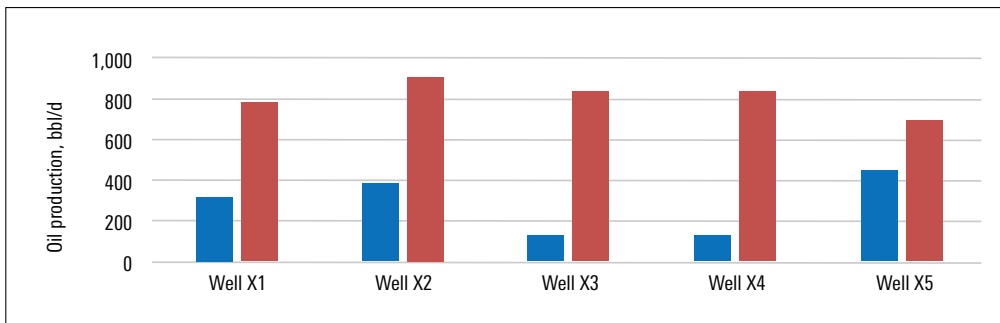
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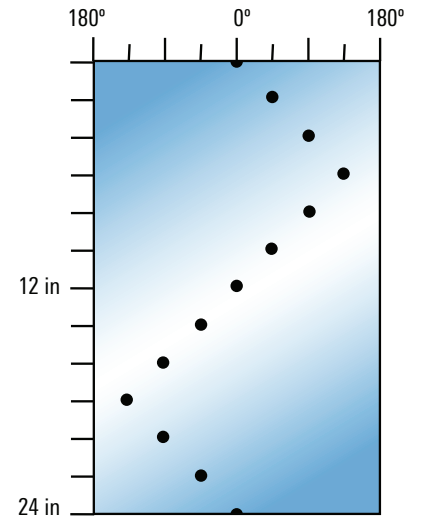
The 2 1/8-in PowerSpiral Nova system increases performance by up to 60% over that of hollow carrier gun systems and 22% over previous-generation capsule gun systems. UCS = unconfined strength.

Case study—Mexico

Wells perforated with 3 3/8-in tubing-conveyed perforating guns were not producing as expected. The suspected culprit was drilling-induced damage. The operator elected to re-perforate five wells using a rigless through-tubing deployment of the 2 1/8-in PowerSpiral Nova perforating system. The deep penetration bypassed the damage, resulting in increased oil production in each of the wells that totaled to a 184% increase for all five.



Oil production increased 184% for the five wells re-perforated with the 2 1/8-in PowerSpiral Nova system.



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