

A VAREL INNOVATION

High Energy

SERIES

BETTER FROM THE GROUND DOWN



A NEW LEVEL OF
DRILLING EXCELLENCE



VAREL
INTERNATIONAL

As a leading manufacturer and global supplier to the drilling industry, we are proud to introduce the next generation in drill bit performance – the Varel High Energy Series.

This innovative series ushers in a new line of roller cone bits capable of increasing drilling performance by effectively utilizing higher energy inputs in the form of increased rotary speed, increased weight on bit, or both.

To create the High Energy Series, our engineers used an integrated systems approach. At every point in the development process, each element was refined and enhanced to add to the durability and drilling rate of these new bits. As a result, our new High Energy Series bits are able to withstand applications where the combination of bit weight and rotary speed is at the high end of the spectrum, and by so doing, deliver better performance and outcomes in critical applications.

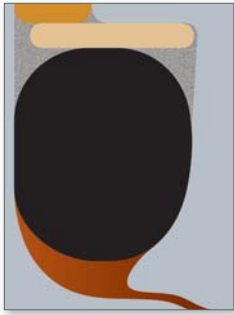
All of our HE Series bits are available with the added security of the industry’s most comprehensive program of enhanced diamond protection for roller cone bits.

D3DD = Diamond Features Code	
Diamond Feature	Enhanced Nomenclature
33% Back Row	D
50% Back Row	D1
66% Back Row	D2
100% Back Row	D3
33% Back Row + 100% Gage	DD
50% Back Row + 100% Gage	D1D
66% Back Row + 100% Gage	D2D
100% Back Row + 100% Gage	D3D
Full Diamond Structure	D3DD



Enhanced diamond protection results in:

- > Faster rate of penetration (ROP)
- > Fewer trips to replace worn or undergage bits
- > Improved durability and longer bit and seal life
- > Lower drilling costs
- > Reduced wear in abrasive formations
- > Improved gage holding

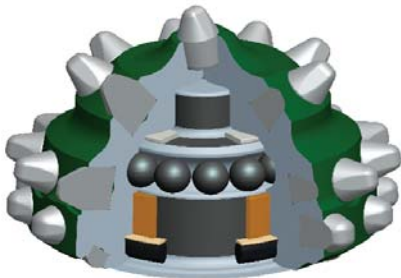


A heat shield, (above) pictured with the conical seal gland, helps prevent thermal degradation of the seal.

Proven technology meets enhanced features

The new High Energy product line consists of our 7½" to 13¾" sealed journal bearings with tungsten carbide cutting structures. The bits are built with time-proven O-ring seal technology, but with new features that greatly enhance the effective life of the seals. First, a new conical seal gland* design has been employed. This new geometry positions the seal in such a way that it can better handle pressure fluctuations and still maintain a preferred dynamic sealing location and interface. The new seal gland is further complemented by an industry exclusive* heat shield deployed between the seal and the inner bearing. This shield provides life extending thermal insulation to the seal from heat generated in the bearing. The result is a lower operating temperature for the seal that also extends seal life.

*Patent pending



Here, we see a cutaway of the new bearing system.

An improved seal and bearing system

The High Energy Series includes innovations that increase bearing life and seal protection. Engineers developed a bearing system designed to support higher loads on the bearing surface, which resulted in a more robust and more tightly toleranced journal bearing. In addition, a new anti-shale packing configuration is incorporated, improving cuttings diversion away from the mud side of the seal gland.

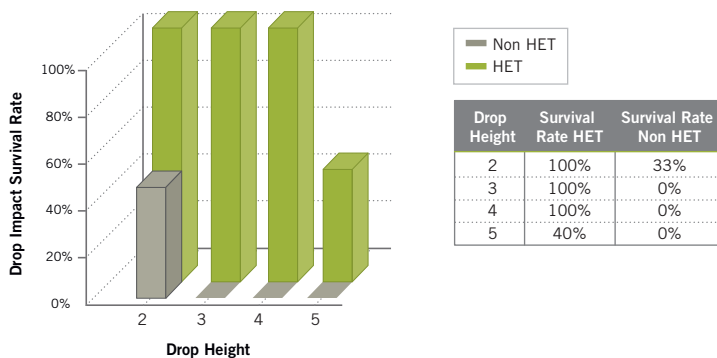


The power of V-Jet hydraulics

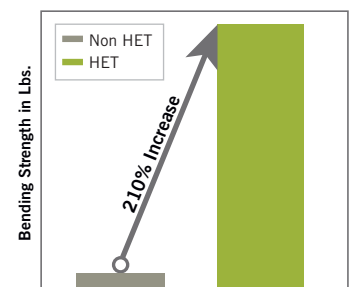
We have put the power of V-Jet hydraulics to work on the High Energy Series. Standard on all IADC 537 and softer High Energy Series bits, the V-Jet aimed flow stream produces better cone cleaning, which improves bit penetration rates. In addition to new head forgings, the new designs maximize leg strength while minimizing overall bit length, helping to deliver more hydraulic horsepower to the hole bottom. The shorter overall bit length improves steerability on directional BHAs.

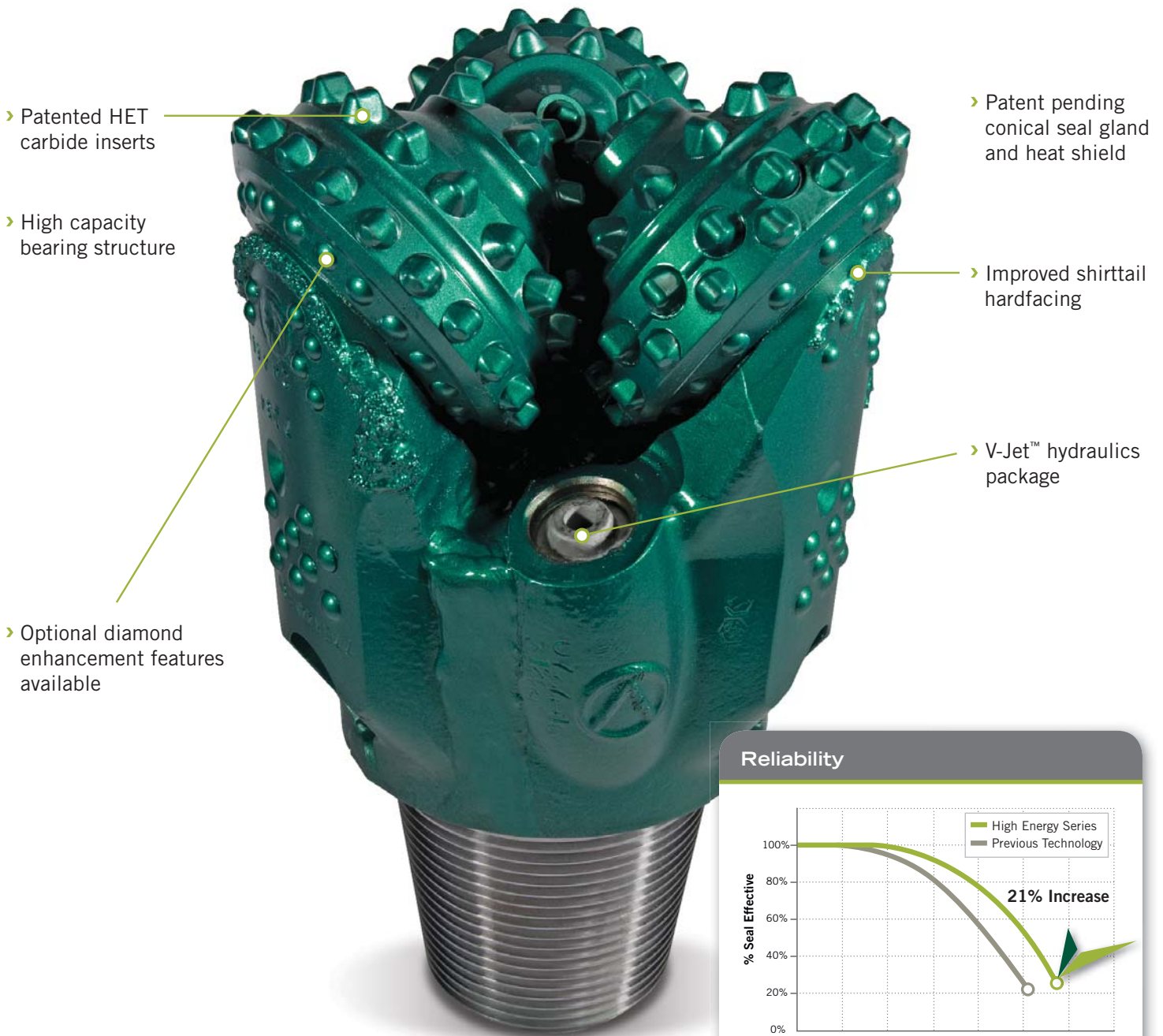


Impact Strength Testing



Static Bending Strength





> Our product development team started with a higher load capacity bearing geared toward higher weight and motor applications. Bearing reliability was also enhanced through closely controlled assembly tolerances.



Self draining reservoir

We have incorporated a larger dome-vented grease reservoir into the bearing system that is capable of delivering bearing lubrication over longer, higher load and higher RPM runs. This new reservoir provides a 13 percent increase in capacity over previous designs and is configured to be “self draining” to avoid cuttings buildup adjacent to the reservoir. This feature improves the reliability of reservoir performance when a High Energy Series bit is rerun.



Increased wear resistance

To ensure greater durability, we have incorporated a new shirttail hard metal formulation into our High Energy Series that significantly increases wear resistance in this critical area of the bit. Several upgraded shirttail enhancements, including leading edge shirttail inserts, stabilization inserts and diamond enhanced shirttail protection, also are available.

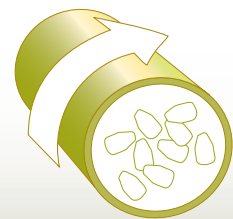
High Energy Tumbled (HET) cutting performance

The improvements in the High Energy Series bearing and seal system called for improvements in the cutting structures. To that point, we developed insert layout algorithms to fine-tune the overall cutting structure. This takes advantage of the higher energy inputs these new bits are capable of across the entire range of IADC codes, as well as the bit sizes incorporated in the High Energy Series.

What’s more, we have also designed the cutting structures to take advantage of the durability and toughness of our patented High Energy Tumbled (HET) processed inserts. HET technology has proven its value in field applications around the world. This proprietary process for improving the attributes of tungsten carbide inserts (TCI) overcomes the traditional trade-off between wear resistance and fracture toughness of tungsten carbide components and actually makes TCI components both harder and tougher. The HET process constitutes one more quality assurance step in the manufacturing of tungsten carbide inserts. We manufacture the inserts used in our products and control all of the HET processing and inspection of inserts.

High Energy Tumbled (HET) tungsten carbide

- › Patented process
- › Proven to increase insert toughness
- › Results in greater overall penetration rates
- › Reduced drilling costs



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