normet

NORMET.COM

ROCK REINFORCEMENT

D-Bolt®

Dynamic Bolts

Normet D-Bolt® represents a new generation of energy-absorbing rock bolting systems designed for efficient and reliable rock strata reinforcement. It is used as permanent rock reinforcement in underground excavations and is suited to applications where rock mass deformation or seismicity is expected during the life of the mine.

D-Bolt® is comprised of a proprietary smooth steel bar with deformed sections (paddle-sets) along its length. The smooth sections (stems) allow dynamic elongation and the paddle-sets act as anchor points. The position and quantity of paddles can be configured to suit specific geotechnical requirements.

WORKING PRINCIPLE

D-Bolt® reinforces the rock mass by confining dilation between the paddle-sets.

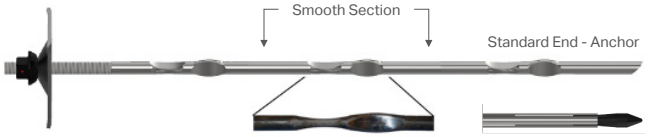
For confinement forces less than the yield limit of the steel, the bolt offers elastic, stiff support properties.

However, as confinement forces exceed the yield limit, the smooth stem sections de-bond from the resin or grout and undergo permanent plastic elongation, allowing the bolt to deform with the rock mass and absorb dynamic energy, while still maintaining a near constant confinement force between the paddle sets.

The multiple paddle-set design ensures that if a stem section of the bolt fails or a paddle-set loses anchorage to the rock mass, the reinforcement function of the remaining stem sections and paddle-sets along the bolt will remain unaffected.

BENEFITS

- Versatile permanent support, ideal for mines that may experience high-stress or seismicity during their operational life.
- Designed to offer initially stiff support but also able to resist and absorb seismic energy.
- Excellent control of squeezing rock areas.
- Support redundancy should a portion of the bolt fail.
- Can be pre-tensioned in grout installations when equipped with the mechanical end-anchor option.
- The installation method mirrors that of standard resin bolts.
- Can be installed with manual hand-held equipment or mechanized bolting equipment.
- Can be coupled for longer lengths using a coupling version of the D-bolt®.



RANGE AND SPECIFICATIONS

Description		20 mm D-Bolt®	22 mm D-Bolt®
Yield Strength	Typical	510 MPa	691 MPa
Yield Load	Typical	165 kN	197 kN
Ultimate Tensile Load	Typical	224 kN	267 kN
Material Elongation		18-22% Selectable	
Charpy Test Impact Resistance		126 - 148 K / cm²	
Static Displacement Capacity*		138 mm ± 11 mm	153 mm ± 11 mm
Dynamic Energy Capacity*		40 kJ	50 kJ
Installation Hole Diameter		29-33 mm	32-36 mm
Bar Nominal Diameter		20.3 mm ± 0.2 mm	22.0 mm ± 0.2 mm
Cross Sectional Area		~324 mm²	~387 mm²

**Canmet MMSL report 12-039 (CR) and 10-043 (CR) , 2100 mm samples*

- Available in lengths from 1.8 m to 3.0 m.
- For longer lengths, a coupling version of the D-Bolt® is available allowing multiple D-Bolt® segments to be joined together.
- Accessories include Hex/Dome Nuts, Spherical seats and couplers.

DEFINING THE FUTURE

UNDERGROUND