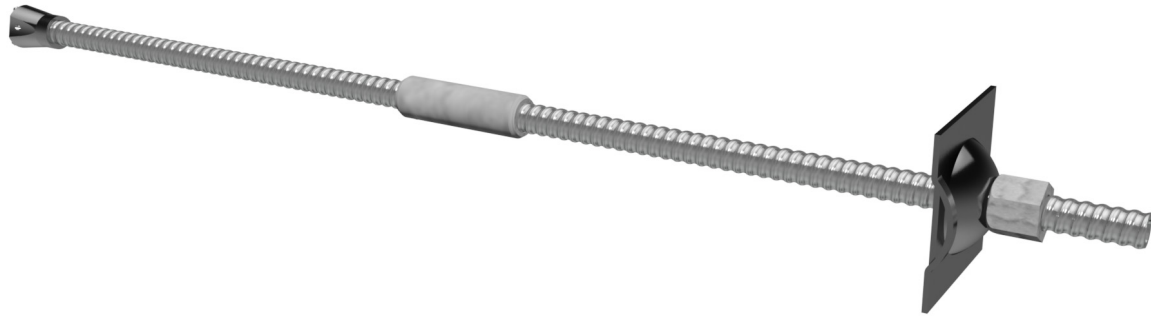


DSI self-drilling bolt

Category: Hollow bars



Introduction

The DSI Self-Drilling Bolt is a fully threaded hollow bar that serves as a drill rod during drilling and a rock bolt after being grouted. The self-drilling bolt incorporates a sacrificial bit designed for one-time use. The thread on the bolt conforms to roll thread standards. The self-drilling bolt can be anchored with silicate resin by injection through the hollow center. For use in unconsolidated ground or other difficult ground conditions. Excellent for spiling (fore-poling).

Main advantages

- Fast and safe self-drilling installation.
- Trouble-free application in unstable boreholes.
- Easy and similar operating principle using on-site personnel and standard drilling machinery.
- Installation and grouting as two-step operation or continuous one step operation.
- Proven installation process in difficult ground conditions.
- Minimizes of ground disturbance.
- Several bolt diameters are available for varying ground conditions.
- Bolts are available as one unit or multiple units using couplings.
- Broad range of strength allows dimensioning and adaptation of design.
- Robust system and high-strength thread designed for the demands of the mining and construction industries.
- High level of quality control measures among all levels of design and manufacturing
- Bolt is installed and grout is pumped through the center hole with pumpable silicate resin or cement grouts.
- The couplers are designed to exceed the ultimate load of the bar by 20% and minimize the loss of drill energy.
- Several drill bits are available. Most widely used is the EXX Tungsten carbide chisel bit for handling UCT* up to 12.5N/mm² (RQD 100%) and up to 50 N/mm² (RQD 75%).
- Standard length is 3m (9ft-10"). Longer lengths are available upon request.

*UCT is unconfined compressive strength

Technical Specifications – R Type

Bar size	R18N	R25N	R28N	R32N	R32S	R38N	R51L	R51N
Nominal Outer Diameter [mm]	18	25	28	32	32	38	51	51
Nominal Inner Diameter [mm]	8	13	17	20	18	24	35	33
Cross Section Area of Bar [mm ²]	180	240	290	350	430	590	740	940
Ultimate Load [kN] ≥	150	200	250	280	360	500	550	800
Yield Load [kN] ≥	120	150	200	230	280	400	450	630
Ultimate Strength [N/mm ²] ≥	830	830	860	800	830	840	740	850
Yield Strength [N/mm ²] ≥	660	620	680	660	650	670	600	670
Elongation A5 [%] ≥	≥6							
Nominal Weight [kg/m]	1.40	1.90	2.30	2.70	3.40	4.70	5.90	7.40
Thread [left-hand]	ISO 10208 and 1720							

Steel Grade	ASTM A519/519M-17 5140/EN 10083-1 41Cr4
Hardness [HB]	230-300
Delivery Lengths [m]	1 [m], 2 [m], 3 [m], 4 [m]. Other length can be special order

Technical Specifications – T Type

Bar size	T30N	T40L	T40N	T52N	T60N	T76L	T76N	T76S	T103N	T103S
Nominal Outer Diameter [mm]	30	40	40	52	60	76	76	76	103	103
Nominal Inner Diameter [mm]	13	24	20	30	38	54	49	44	78	51
Cross Section Area of Bar [mm ²]	400	660	770	1,100	1,300	1,650	2,080	2,460	3,200	5,200
Ultimate Load [kN] ≥	320	540	660	929	1,000	1,200	1,600	1,900	2,300	3,700
Yield Load [kN] ≥	260	425	525	730	800	1,000	1,200	1,500	1,800	2,670
Ultimate Strength [N/mm ²] ≥	800	810	850	840	760	720	760	770	710	710
Yield Strength [N/mm ²] ≥	650	640	680	660	610	600	570	600	560	510
Elongation A5 [%] ≥	≥6									
E Modulus [GPa]	195	196	198	190	192	188	208	190	190	190
Nominal Weight [kg/m]	3.10	5.20	6	8.60	10.20	12.90	16.30	19.30	25	40
Thread [left-hand]	ISO 10208 and 1720									
Steel Grade	ASTM A519/519M-17 5140/EN 10083-1 41Cr4									
Hardness [HB]	240-310									
Delivery Lengths [m]	1 [m], 2 [m], 3 [m], 4 [m]. Other length can be special order									

Notes

— Inner diameter is average values, not strict controlled data; The ultimate / yield load are measured values, strength=Load/Area; Cross Section Area, Elongation and E Modulus are average values. The weight is approx.; A5: 5.65 √S. Subject to change without notice.

Installation

The DSI Self-Drilling Bolt is typically installed using rotary percussive drilling. This technique enables high rates of installation, good directional stability and also helps to consolidate the grout within the borehole.

Rotation speeds should be sufficient to cut a true borehole (120-150 RPM for soil nails; 100-130 RPM for mini piles), as opposed to displacement of the soil with the drill bit through percussion and heavy feed pressures (driven installation). Drilled boreholes ensure enlarged grout bodies together with better permeation of the grout into the surrounding ground. Feed pressures on the drill rods should be regulated in accordance with the cutting performance of the drill bit.

Simultaneous drilling and grouting

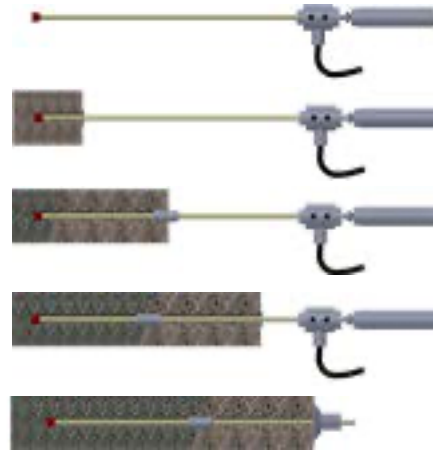
Suitable for granular soils and fills. This installation method utilizes a Grout Swivel, grout pump and drifter. The technique combines drilling and grouting as one continuous operation, ensuring that grout is placed over the full length of the borehole. For ground conditions where borehole collapse is anticipated or where subsequent grout injection down the center of the bar is problem, simultaneous drilling and grouting is the preferred solution.

Grouting pressures should be regulated to maintain circulation at all times (typically up to 100 psi), with a small amount of grout return visible at the mouth of the borehole. Pressures in excess of 100 psi are generally only required for specialist applications (i.e., anchors in cohesive soils or mining applications). The choice of grout pump varies between applications, but basic requirements are as follows:

- Thorough mixing of the grout – to avoid blockages at the drill bit,
- Delivery of a continuous volume – to ensure consistent grouting,
- Maintenance of sufficient pressure.

Procedure

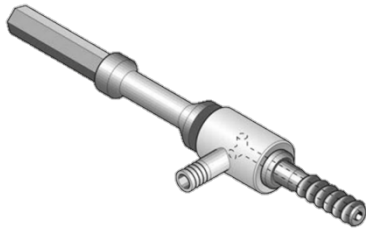
- Assembly of the Self Drill Hollow Bar System and connection to the rotary injection adapter
- Rotary self-drilling installation and simultaneous grouting
- Optional extension using coupling
- De-coupling from the rotary injection adapter
- Assembly of anchorage or head construction (plate and nut), depending on the application



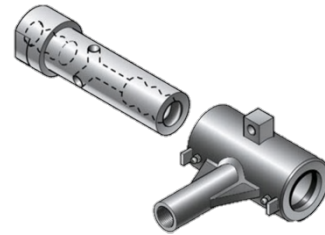
Accessories

Grout Swivels

Grout Swivels are used for simultaneous drill and grout installation, to inject grout into the bore of a rotating DSI Drill Hollow Bar. The unit comprises of a heat-treated shaft (to withstand the impact energy from the hammer drive) and a housing into which the grout is pumped. Inlet ports within the shaft enable grout to be pumped into the bore of the bar. A locator frame is required (bolted to the drill sledge) to prevent the housing from rotating with the shaft, as well as positioning it at the correct location to enable unrestricted operation of the hammer.



Grout Swivel (rig installation)

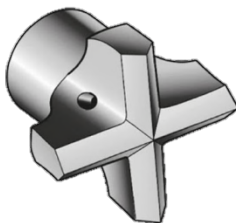


Grout Swivel (handheld installation)

Drill bits

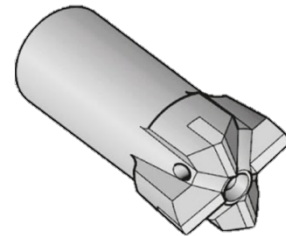
EX/EXR

Hardened crosscut drill bit, suitable for the majority of applications including narrow bands of soft rock. (EXR denotes retro flush version) Soil types: Fills, Shales, and Gravels.



EXX

Tungsten carbide chisel drill bit. EXX is the hardest drill bit available, for strong rock, hard seams, and concrete footings. Rock types: Strong rock, Metamorphic and Igneous Rocks i.e. Slate and Granite.

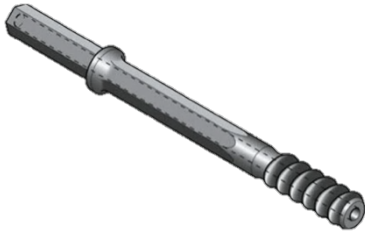


Diameters available for both drill bit types

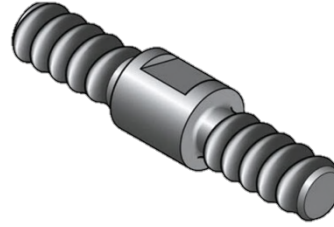
- R25 1.65", 2"
- R32 2", 3"
- R38 3", 3.5"
- R51 3.5", 4.53"

Drill tooling

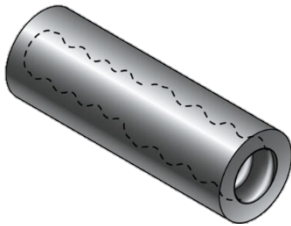
A range of drill accessories are available, to enable connection between the output drive of the drilling head and the different DSI Underground Bar diameters.



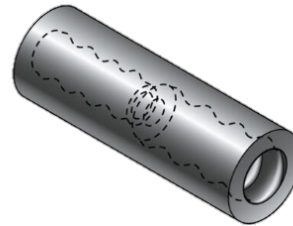
Air Flush Shank (handheld installation)



Balance Rod



Reducing Coupler



Reducing Coupler (with center bridge)

Legal disclaimer

All dimensions, weights, quantities, and specifications are those applicable at the time of this publication and may be amended from time to time. Please contact your local representative for final confirmation of any key specifications.

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