

# Mineral Bolt

Product code: SIL 2C

Product specification: Organo-Mineral Thixotropic Resin for Bolting

Category: Urea-silicate

## Introduction

Mineral Bolt is a two-component, organic and mineral resin with high strength, designed for the installation of rock bolts. It is suitable to firmly fix mechanical bolts or anchors in the borehole (e.g. in combination with the DSI Hollow Bar System), grout stabilization (for heavily cracked rock mass), sealing of gas penetration, and stopping of water inflows. Mineral Bolt is available in several versions, varying in reaction times and the thixotropy effect.

- Adjustable setting time.
- Can be used in a broad range of ambient temperatures.
- Excellent for mechanized automatic application.
- Automated rock bolting prevents from possible mixing errors of an applicator.
- Optimisation of tunneling performance through rapid response and fast curing of the resin (long-time waiting until the cement is cured can be avoided).
- Excellent for challenging on-site conditions and problems with ground/soil.

## Components

	Unit	Mineral Bolt comp. A	Mineral Bolt comp. B
Appearance	-	Pale yellow liquid	Dark brown liquid
Density at 20 °C	g/cm <sup>3</sup>	1.40±0.06	1.20±0.06
Viscosity at 25 °C	mPa*s	300±90	220±90
Viscosity at 10 °C	mPa*s	950±250	850±250

## Material properties

	Unit	25 °C	10 °C
Foam Factor	-	1.0	1.0
Max. Reaction Temp.	°C	< 140	< 125
Compressive Strength*	MPa	> 30	> 30
Flexural Strength*	MPa	> 15	> 15
Pull-out strength according to DIN 21521 Mineral Bolt FAST	kN	> 220 after 3 minutes > 310 after 15 minutes	> 220 after 3 minutes > 310 after 15 minutes

\* Results obtained under laboratory conditions.

**Reaction parameters (versions: MEDIUM, SLOW, ULTRA SLOW)**

	Unit	MEDIUM	SLOW	ULTRA SLOW
Texture after mixing (A+B)	-	viscous liquid	viscous liquid	viscous liquid
Reaction Start Time	s	~105	~180	~285
Tack Free Time	s	150-210	350-400	400-600
Shore Hardness after 15 minutes	°	65D	65D	65D
Shore Hardness after 60 minutes	°	67D	67D	69D

\* Results obtained under laboratory conditions at 22 °C.

**Reaction parameters (versions: MI20, MI55, MI100, MI300)**

	Unit	MI 55	MI 55	MI 100	MI 300**
Texture after mixing (A+B)	-	very high viscous liquid	very high viscous liquid	very high viscous liquid	very high viscous liquid
Reaction Start Time	s	10	25	50	180
Tack Free Time	s	~20	~55	~100	~300
Shore Hardness after 15 minutes	°	65D	65D	65D	65D
Shore Hardness after 60 minutes	°	67D	67D	67D	67D

\* Results obtained under laboratory conditions at 22 °C.

\*\* Special version recommended for cable installation

**Application**

The components Mineral Bolt A and Mineral Bolt B can be applied at the volumetric ratio of 1:1 by means of any two-component pump that are commonly used in the mining and tunneling industries. It is recommended to use a static mixer of the type: M-10x360 (part no. M-10x360) or an equivalent one.

**Mixing ratio of the components:**

	Mineral Bolt component A	Mineral Bolt component B
by volume v/v	100	100

If components A and B are mixed at a different mixing ratio, the reaction time and mechanical properties may deviate from specifications as above.

**Cleaning of the Injection Pump and Accessories**

After application, the processing equipment, i.e. the pumping system, valves, mixing devices, and hoses, must be thoroughly cleaned to remove all remnants of materials. The cleaning must be carried out immediately after completion of the injection process to prevent the curing of resins inside the equipment.

**A-Component**

The A pump stage and all associated equipment, from the suction hose to the Y-piece, must be thoroughly rinsed with clean water. Then the pump should run for at least 3 minutes with clean water in circulation. Do not use any cleaner/solvent for cleaning the A-side, as this may react violently with the water glass component (A-component) of the system.

**B-Component**

Thoroughly flush out the B-component, which has not reacted. Use a gasket-friendly cleaning agent, change the cleaning liquid several times during each cleaning process, and collect it for disposal. To be sure, carefully read the operation manual of the injection pump and the data sheet of the cleaning agent to be used. If the pump is out of operation for more than 24 hours, replace all water on the A side and the cleaner/solvent on the B side with a preservative liquid. Remnants of resin cured in the pump circulation system can only be etched and mechanically removed.

**Packaging (versions: MEDIUM, SLOW, ULTRA SLOW)**

Type of packaging	Component	Weight kg	Shipping code
Plastic container	A	37	MB-VER-A-25P-CC
	B	30	MB-B-25P-CC
Metal container 20 l	A	28	MB-VER-A-20M-CC
	B	23	MB-B-20M-CC
Metal drum 200 l	A	290	MB-VER-A-200M-CC
	B	240	MB-B-200M-CC
IBC container 1000 l	A	1450	MB-VER-A-1000-CC
	B	1200	MB-B-1000-CC

Other packaging is possible on the request.

For selected resin use the appropriate version (VER) descriptor:

- Mineral Bolt Medium = M, Mineral Bolt Slow = S, Mineral Bolt Ultra Slow = US
- For instance, for Mineral Bolt Medium Component A, the version descriptor is F (VER = M), shipping code: MB-M-A-25P.
- CC – use the right Country Code for the label, for instance, EN

**Packaging (versions: MI20, MI55, MI100, MI300)**

Type of packaging	Component	Weight kg	Shipping code
Plastic container	A	35	MB-VER-A-25P-CC
	B	30	MB-MI-B-25P-CC
Metal container 20 l	A	27	MB-VER-A-20M-CC
	B	23	MB-MI-B-20M-CC
Metal drum 200 l	A	270	MB-VER-A-200M-CC
	B	230	MB-MI-B-200M-CC
IBC container 1000 l	A	1400	MB-VER-A-1000-CC
	B	1200	MB-MI-B-1000-CC

Other packaging is possible on the request.

For selected resin use the appropriate version (VER) descriptor:

- Mineral Bolt MI 20 = MI20; Mineral Bolt MI 55 = MI55; Mineral Bolt MI 100 = MI100; Mineral Bolt MI300 = MI300
- For instance, for Mineral Bolt MI20 Component A, the version descriptor is MI20 (VER = MI20), shipping code: MB-MI20-A-25P
- CC – use the right Country Code for the label, for instance, EN

**Transport and storage**

The both components of the resin are delivered in jerry cans made of plastic or sheet metal (other packaging is possible on request). They should be stored in dry and airy rooms, at a temperature from 10 [°C] to 30 [°C]. The guaranteed shelf life from the date of manufacture is 12 months for Mineral Bolt A Component and Mineral Bolt B Component provided that the product is kept in unopened original packaging.

### Tests and approvals

The system meets the German mining approval standards according to the Arnsberg District Government Department 6 Mining and Energy/ NRW-Requirements:

1. Reaction temperature and flash point. DMT GmbH.
2. Material consistency and auto-ignite determination. DMT GmbH.
3. Determination of compressive, bending, and tensile strength. Central Mining Institute.
4. Compilation with NSW Australian Mining Standards. Mine Safety Technology Centre.
5. Determination of water tightness. IMBiGS.
6. Utility tests of rock bolt resin Mineral Bolt Fast and Ultra Slow with hollow rock bolts R32-360 according to DIN 21521.
7. Mining hygiene testing and assessment of two-component systems for rock consolidation in accordance with §10 of the Mining Ordinance for Hard Coal Mines (BVOSt) and §18 of the Mining Ordinance for ore mines, rock salt mines, and for rock and earth operations (BVOESSE) in conjunction with DIN 22100. Hygienic Institute, Gelsenkirchen, August 2018

### Environment and safety instructions

Empty containers can be disposed only via authorized companies, subject to their terms and conditions. The materials cannot be returned to the production site or to the distribution depots. Remnants of the material can be disposed via local authorized companies in line with applicable environmental regulations. Please refer to the safety data sheets (MSDS) for more information on the disposal of remaining leftovers, as well as of empty containers.

Product must be applied in strict compliance with all applicable protective regulations and with the Material Safety Data Sheets (MSDS) issued by DSI Schaum Chemie. According to Annex II of EU Regulation 1907/2006, safety data sheets must be available to all persons responsible for occupational safety, health protection and for handling of the materials. Product application and cleaning of the equipment may only be carried out in protective clothing with safety gloves and goggles. According to current knowledge, the use of a suitable skin protection cream is recommended. Skin contamination must be cleaned with soap and water. If splashes get into the eye, rinse eyes with copious amount of water and consult a doctor. The components or mixed material must not be allowed to enter sewage systems or the ground.

### Liability disclaimer

The information in this leaflet is based on our knowledge and experience. It is assumed to be up to date at the time of printing, as stated above. Therefore, please make sure that you always use the most recent version of it. The description of product properties as laid down in this data sheet is general and cannot take account of all special conditions and circumstances that affect application of the product. Since the product handling and application are beyond our control, it is the exclusive responsibility of a user to make sure that the product is suitable for the intended application and enables achieving the desired results.

All information contained in this leaflet is given in good faith but without warranty or guarantee of any kind whatsoever, whether implied or expressed. Every user is held responsible for reviewing details contained herein and assess whether the product in the appropriate or not.

No statement in this leaflet constitutes a warranty in the legal sense.