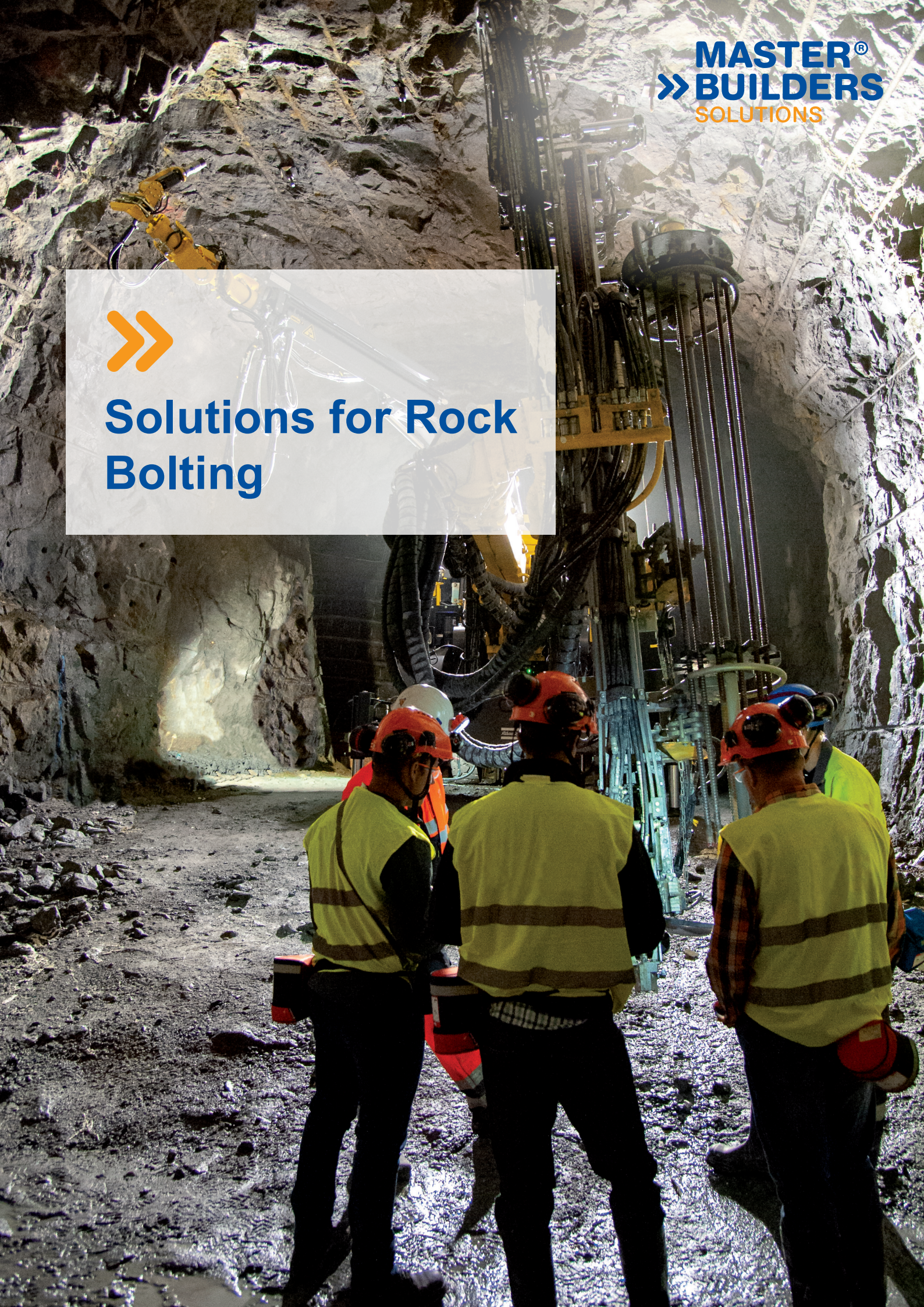




Solutions for Rock Bolting



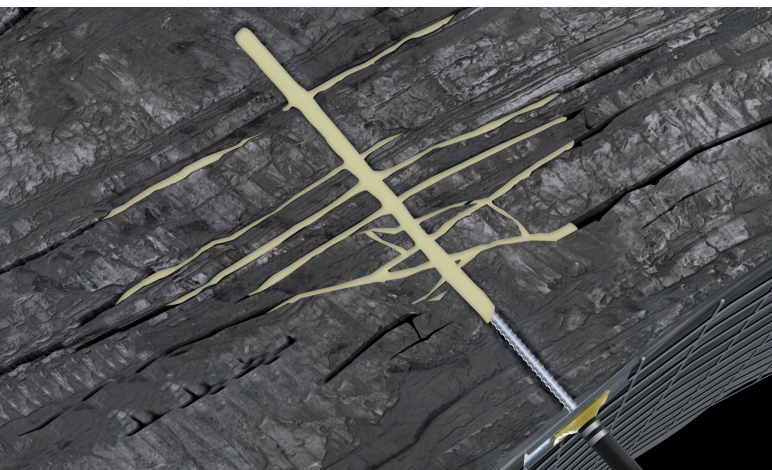


Innovative Solutions for Strata Control

The demand for the world's mined resources is forcing mine operators to work at ever greater depths. Increased excavation depths lead to higher geotechnical challenges, such as higher rock stresses affecting the stability of the strata. Working at ever greater depths with potentially unstable strata increases the need for enhanced personnel safety within the mine environment.

How fast and how safely a mine can be developed is a critical factor of efficient mining. Master Builders Solutions® offers products that facilitate safe ground stabilization while improving mine productivity. Developed for placement of cable and rock bolts in underground mines, our innovative solutions improve cycle times for both cable and rock bolt installation, while increasing worker safety and strata control.

Tested in operational mines and exposed to the most challenging of working conditions, our solutions for grouting and anchoring make mining at all conditions a safer, more productive environment.



MasterRoc® RBA 380 fills cracks down to ≥ 0.14 mm.

Tensile test with hollow rock bolts

Test No.	Setting Time	Rock Bolt Type	Maximum Tensile Load [kN]	Accompanying Displacement [mm]
1	4 hours	R32S	358	31
2	4 hours	R32S	346	22
3	4 hours	R32S	378	33

Tensile pull strength testing with 600 mm encapsulation length according to DIN 21521. In additional external tests, Master Builders Solutions® could prove final load bearing capacity after a few minutes only.

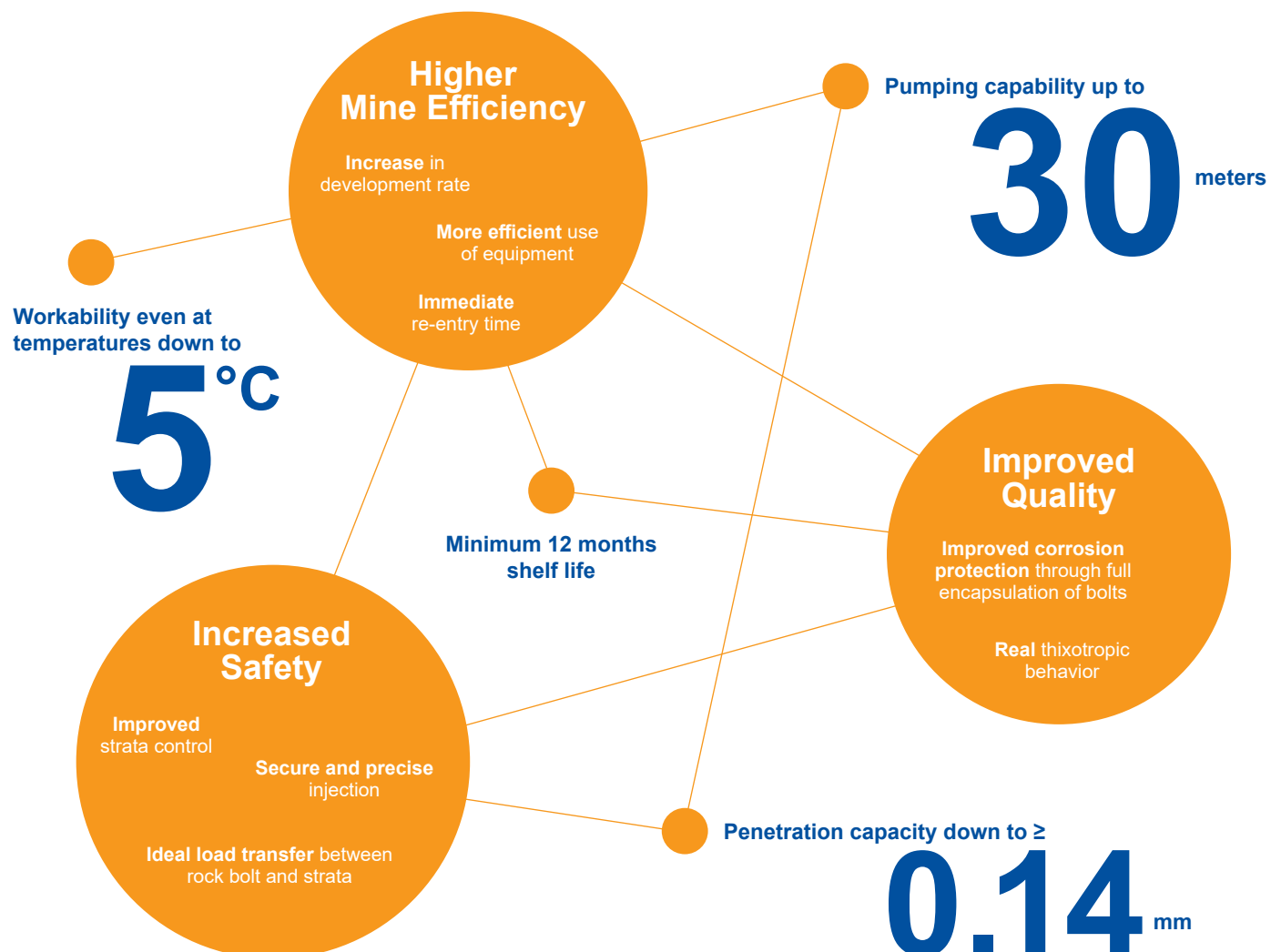


Improve Your Rock Bolting Performance

MasterRoc® RBA 380 is a fast reacting two component polyurea silicate injection resin for rock bolt installations. It offers many advantages due to its unique thixotropic behavior which allows for overhead applications without

additional sealing. It fills even the smallest cracks (≥ 0.14 mm). The long-distance pumping capability is up to 30 meters. It keeps miners safe during bolting due to its fast curing and strength development.

Benefits at a glance:





Versatile System Tailored to Your Underground Construction Needs

The conditions underground vary from mine to mine: Rock temperatures ranging from -5 °C up to 60 °C influence the curing speed of reactive resins. Different pumping lengths require different set times. The Master Builders Solutions® specialists advise customers about the optimum product choice for their application.

For the installation of various rock bolt types:

- Self-drilling anchors (SDA)
- Full rebars
- Cable bolts
- Composite fiber bolts
- Hollow bars

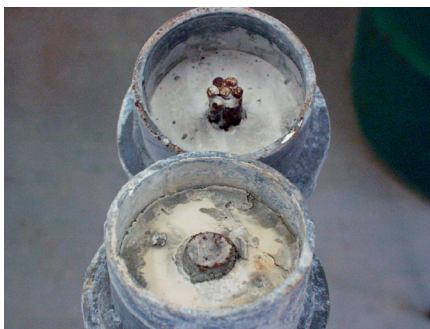


Self-drilling anchor with MasterRoc® RBA 380

Rock Bolting Portfolio

Master Builders Solutions® offers a wide range of rock bolting solutions. Besides reactive resins from the MasterRoc® RBA 38X range the portfolio includes also ready-to-use cementitious products and various admixtures for OPC based grouts to adjust the behavior in terms of shrinkage compensation, corrosion protection, pumping capacity, and bond improvement.

Cementitious grout with and without corrosion inhibitor



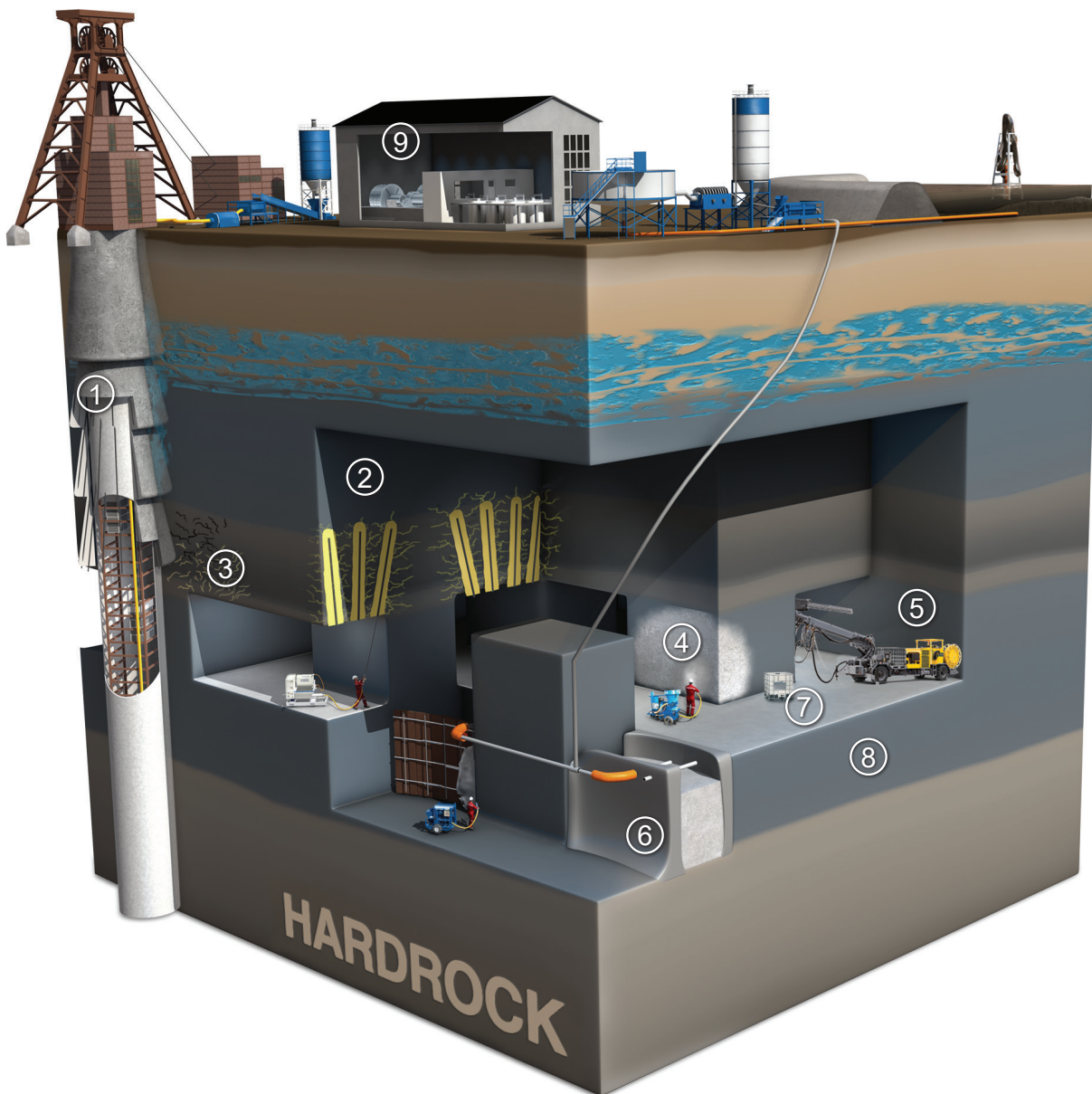
With corrosion inhibitor



Without corrosion inhibitor



Our Comprehensive Portfolio for Mining



- ① Pre-Injection
- ② Rock Bolting
- ③ Injection
- ④ Thin Spray-on Liner (TSL)
- ⑤ Sprayed Concrete
- ⑥ Mine Backfill
- ⑦ Admixture for Concrete
- ⑧ Roadway Concrete
- ⑨ Grinders



Global Network of Underground Specialists

Master Builders Solutions®, with its global underground construction team, is a world leader in the provision of reliable, customer-oriented solutions focused on your needs in the tunneling and mining industries. We recognize that your success is underpinned by our ability to deliver solutions that meet or exceed your critical needs.

By accompanying you from the start of your project and understanding the issues that are important to you, we can contribute to your success. We support you with product training and quality control, and our professional technical services team is on hand around the clock, helping you with technical advice and trouble shooting.



Hands-on exercises and training



Master Builders Solutions® provides technical injection training courses on a frequent basis centrally located in the Hagerbach underground facility in Switzerland. The courses are organized both as demonstration workshops in realistic underground settings and as practical injection operators training. The demonstration workshops are “show-and-tell” sessions that aim to visualize and explain the possible types of application and the technical performance of our injection systems. The practical injection operators

training is offered exclusively to injection customers who are working with Master Builders Solutions® injection systems. During this training the participants are given the chance to work in small groups, taking part in hands-on exercises under the supervision of experienced instructors. The main objective is to gain practical skills for the correct application and execution of injection work. In addition, customized training is available for individual projects worldwide when required by customers.



Master Builders Solutions

The Master Builders Solutions® brand brings all of our expertise together to create chemical solutions that inspire people to build better. Master Builders Solutions® is built on the experience gained from more than a century in the construction industry. The know-how and experience of a global community of construction experts form the core of Master Builders Solutions®.

We combine the right elements from our portfolio to solve your specific construction challenges. We collaborate across areas of expertise and regions and draw on the experience gained from countless construction projects worldwide. We leverage global technologies, as well as our in-depth knowledge of local building needs, to develop innovations that help make you more successful and drive sustainable construction.

The comprehensive portfolio under the Master Builders Solutions® brand encompasses concrete admixtures, cement additives, and solutions for underground construction.

Our comprehensive portfolio

- Concrete admixtures
- Cement additives
- Chemical solutions for underground construction





Master Builders Solutions® for the Construction Industry

MasterAir®

Complete solutions for air entrained concrete

MasterCast®

Solutions for the manufactured concrete product industry

MasterCem®

Solutions for cement manufacture

MasterCO₂re™

Solutions for low-clinker concrete

MasterEase®

Low viscosity for high performance concrete

MasterFinish®

Solutions for formwork treatment and surface improvement

MasterFiber®

Comprehensive solutions for fiber reinforced concrete

MasterGlenium®

Solutions for high performance concrete

MasterKure®

Solutions for concrete curing

MasterLife®

Solutions for enhanced durability

MasterMatrix®

Advanced rheology control for concrete

MasterPel®

Solutions for hydrophobization, anti-efflorescence and surface protection

MasterPolyheed®

Solutions for mid-range concrete

MasterPozzolith®

Solutions for water-reduced concrete

MasterRheobuild®

Solutions for high strength concrete

MasterRoc®

Solutions for underground construction

MasterSet®

Solutions for set control

MasterSphere®

Solutions for guaranteed freeze-thaw resistance

MasterSuna®

Solutions for sand and gravel in concrete

MasterSure®

Solutions for extraordinary workability retention

Master X-Seed®

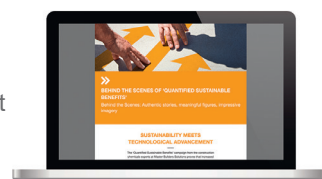
Advanced accelerator solutions for concrete



QUANTIFIED SUSTAINABLE BENEFITS ADVANCED CHEMISTRY BY MASTER BUILDERS SOLUTIONS

Let the numbers do the talking: We have portrayed some of our most eco-efficient product solutions for concrete and precast production, construction, and civil engineering.

sustainability.master-builders-solutions.com



**Master Builders Solutions
Deutschland GmbH**
Glücksteinallee 43-45
68163 Mannheim, Germany
ugc@masterbuilders.com

**Master Builders Solutions
Admixture Systems US, LLC**
23700 Chagrin Blvd
Beachwood, OH 44122, USA
P +1-216-839-7500
admixtures@masterbuilders.com

The data contained in this publication are based on our current knowledge and experience. They do not constitute the agreed contractual quality of the product and, in view of the many factors that may affect processing and application of our products, do not relieve processors from carrying out their own investigations and tests. The agreed contractual quality of the product at the time of transfer of risk is based solely on the data in the specification data sheet. Any descriptions, drawings, photographs, data, proportions, weights, etc. given in this publication may change without prior information. It is the responsibility of the recipient of our product to ensure that any proprietary rights and existing laws and legislation are observed (07/2023).

® = registered trademark of Master Builders Solutions in many countries of the world

MBS-01-2021-UGC-0047-EN