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. With the Master Builders Solutions range, BASF 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.

Tensile test with hollow rock bolts

<table>
<thead>
<tr>
<th>Test No.</th>
<th>Setting Time</th>
<th>Rock Bolt Type</th>
<th>Maximum Tensile Load [kN]</th>
<th>Accompanying Displacement [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4 hours</td>
<td>R32S</td>
<td>358</td>
<td>31</td>
</tr>
<tr>
<td>2</td>
<td>4 hours</td>
<td>R32S</td>
<td>346</td>
<td>22</td>
</tr>
<tr>
<td>3</td>
<td>4 hours</td>
<td>R32S</td>
<td>378</td>
<td>33</td>
</tr>
</tbody>
</table>

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

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

- **Higher Mine Efficiency**
  - Increase in development rate
  - More efficient use of equipment
  - Immediate re-entry time

- **Pumping capability up to 30 meters**

- **Workability even at temperatures down to 5°C**

- **Increased Safety**
  - Improved strata control
  - Secure and precise injection
  - Ideal load transfer between rock bolt and strata

- **Minimum 12 months shelf life**

- **Improved Quality**
  - Improved corrosion protection through full encapsulation of bolts
  - Real thixotropic behavior

- **Penetration capacity down to 0.14 mm**
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

Rock Bolting Portfolio

BASF 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
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
10. Flotation
11. Tailing Pond
BASF, 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.

BASF 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 BASF 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 from BASF

The Master Builders Solutions brand brings all of BASF’s expertise together to create chemical solutions for new construction, maintenance, repair and renovation of structures. 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 BASF 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 world-wide. We leverage global BASF 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.

Our comprehensive portfolio

- Concrete admixtures
- Cement additives
- Chemical solutions for underground construction
- Waterproofing solutions
- Sealants
- Concrete repair and protection solutions
- Performance grouts
- Performance flooring solutions
Master Builders Solutions from BASF for the Construction Industry

MasterAir
Complete solutions for air entrained concrete

MasterBrace
Solutions for concrete strengthening

MasterCast
Solutions for the manufactured concrete product industry

MasterCem
Solutions for cement manufacture

MasterEase
Low viscosity for high performance concrete

MasterEmaco
Solutions for concrete repair

MasterFinish
Solutions for formwork treatment and surface improvement

MasterFlow
Solutions for precision grouting

MasterFiber
Comprehensive solutions for fiber reinforced concrete

MasterGlenium
Solutions for high performance concrete

MasterInject
Solutions for concrete injection

MasterKure
Solutions for concrete curing

MasterLife
Solutions for enhanced durability

MasterMatrix
Advanced rheology control for concrete

MasterPel
Solutions for water tight concrete

MasterPolyheed
Solutions for mid-range concrete

MasterPozzolith
Solutions for water-reduced concrete

MasterProtect
Solutions for concrete protection

MasterRheobuild
Solutions for high strength concrete

MasterRoc
Solutions for underground construction

MasterSeal
Solutions for waterproofing and sealing

MasterSet
Solutions for set control

MasterSuna
Solutions for sand and gravel in concrete

MasterSure
Solutions for extraordinary workability retention

MasterTop
Solutions for industrial and commercial floors

Master X-Seed
Advanced accelerator solutions for concrete

Ucrete
Flooring solutions for harsh environments

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 (11/2017).

® = registered trademark of BASF group in many countries.