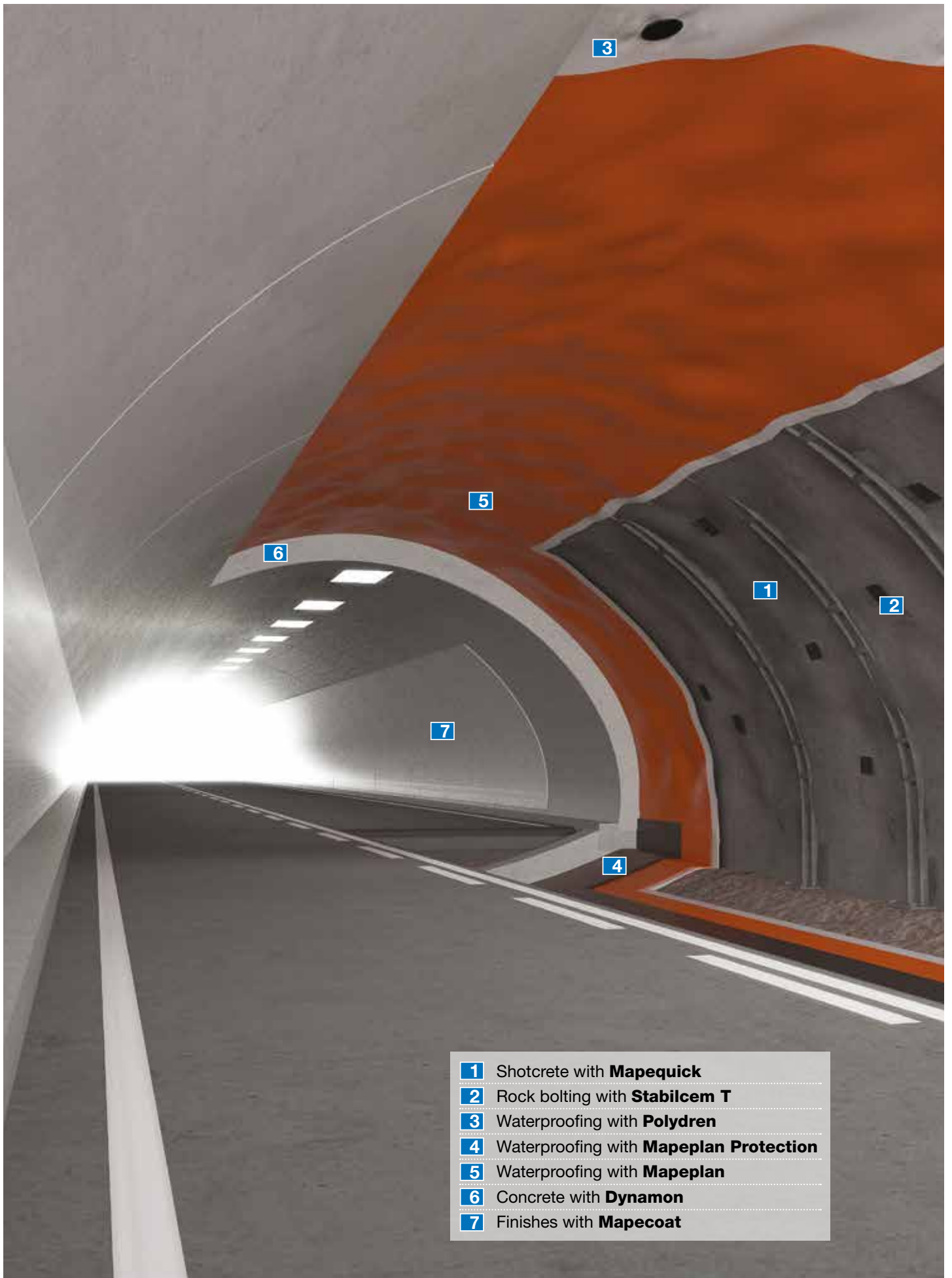


PRODUCTS FOR TUNNELLING, MINING AND UNDERGROUND CONSTRUCTION





- 1 Shotcrete with **Mapequick**
- 2 Rock bolting with **Stabilcem T**
- 3 Waterproofing with **Polydren**
- 4 Waterproofing with **Mapeplan Protection**
- 5 Waterproofing with **Mapeplan**
- 6 Concrete with **Dynamon**
- 7 Finishes with **Mapecoat**

“WE ARE IN THE TUNNEL, WITH YOU, FROM THE START TO THE END OF THE JOB”

This phrase is the one that best sums up what Mapei has to offer for the underground construction industry.

As you can clearly see from the cover, we offer support for all your underground work, from the initial steps right up until the last of the materials is applied in a tunnel construction.

Our range of products is the most complete you could wish to have, “TO COMPLETE YOUR WHOLE”. Our technologies are available right from the very start of the job, with every product you need for pre-injection for consolidating and waterproofing different types of rock and soil, our shotcrete technology with high quality, alkali-free accelerators and super-plasticizers to control water/cement ratios and maintain workability. And how could we forget the importance of rock support given by the most appropriate rock-bolt injection technology (both cementitious-based and chemical-based).

And who amongst those who work in the underground construction industry has never had to face the problem of water ingress in a tunnel at some point or other?

Mapei has the answer for this problematic issue:

1. **Polyurethane resins**
2. **Organic mineral resins**
3. **Acrylic gel**
4. **Engineering solutions and on-site technical support for each specific intervention**

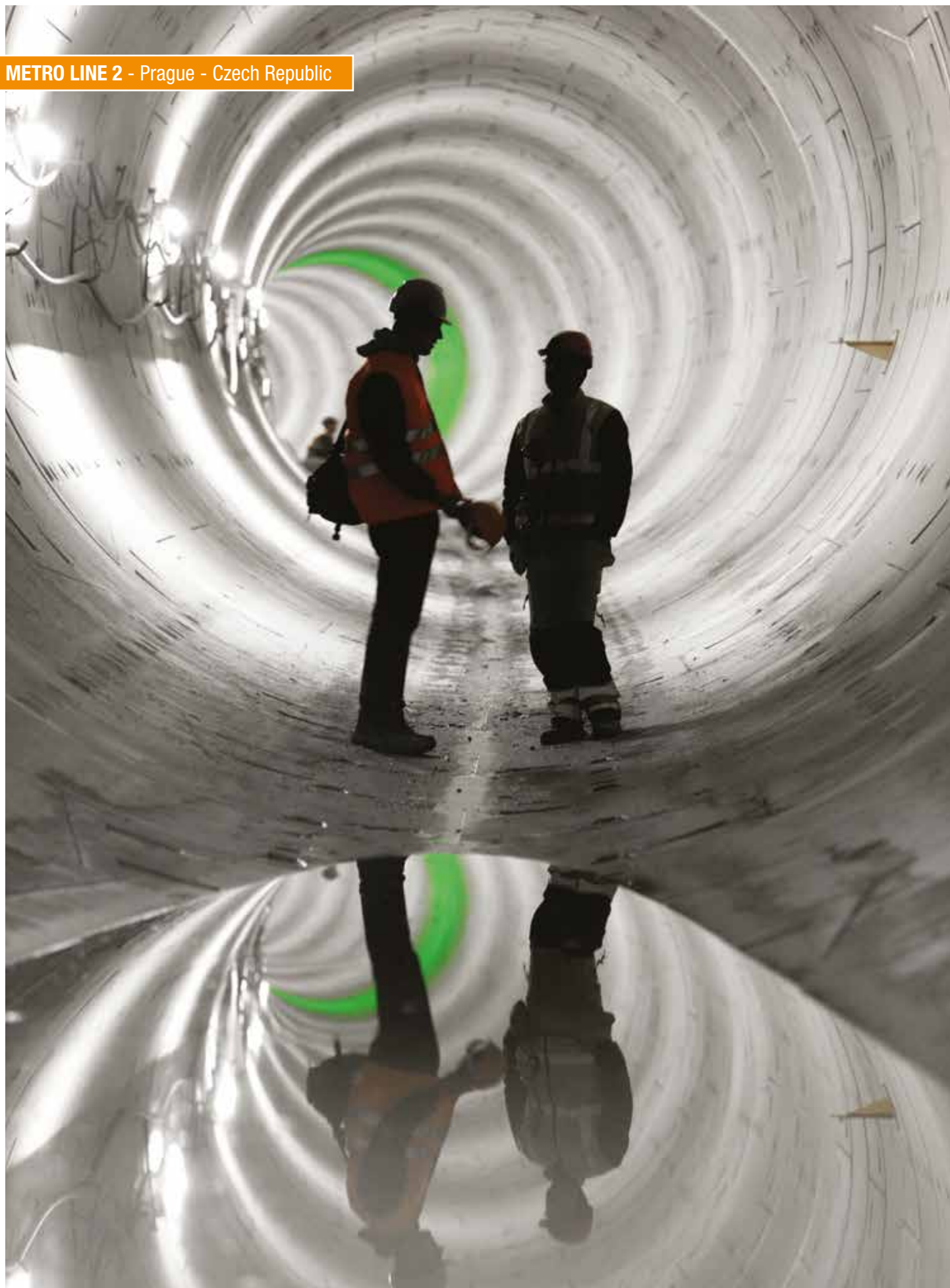
Spray-applied waterproofing membranes and PVC –P waterproofing membranes, together with a high standard of engineering expertise and technical support to help design the most appropriate system in compliance with the most recent, severe standards.

The “added value” that we supply to concrete technology, through the use of our wide range of concrete admixtures to obtain high performance concrete for cast in-situ linings and precast segmented linings. Creating a bright surface in a road tunnel to help improve the level of safety and reduce costs is just one of the results that can be achieved by applying Mapei systems for finishing and coating tunnel surfaces. All of these systems are approved and certified, with results that can be measured to ensure durable, non-toxic environments.

The impact of our technology on the environment must be low and friendly, and our mission is to contribute in providing safe and economically sustainable technology.

All our systems are certified according to the most severe international standards and the cooperation we have on a day-to-day basis with the most important Universities from around the world gives us the guarantee that we are promoting and offering our clients the best option available for every challenge they face.

This brief product guide is dedicated to our clients, our most important “asset”. So I would like to thank all of you for the trust you show in us and for giving us the opportunity to make a contribution to the success of your work and helping it become part of your great success.



PRODUCTS FOR TUNNELLING, MINING AND UNDERGROUND CONSTRUCTION

The goal we have in mind for the products and technologies manufactured by Mapei and developed by the UTT-Team is to completely satisfy all the technical requirements of our clients, from those who apply them right down to the end user.

The products have been divided into 6 categories:

1. Concrete technologies

More than 70 products are offered, ranging from super-plasticizers to accelerators and retarding agents to “accessory” products, dedicated to every type of underground concrete application: shotcrete, ready-mixed concrete and pre-cast concrete.

- Flash-setting accelerators for shotcrete
- Admixtures for shotcrete (mix base) and concrete
- Admixtures for RCC concrete
- Stabilisers
- Air-entraining agents
- Viscosity-modifying agents
- Accelerators/anti-freeze agents
- Curing agents
- Admixtures for lightweight concrete
- Pumping aids

2. Injection systems, consolidation and anchoring

A complete range of ready-to-use cementitious mixes, chemical mixes and chemical resins for underground injection in different types of rock, soil or concrete structures to improve the properties of the ground, stop water leaks, improve internal cohesion, anchoring, etc.

- Injection/consolidation
- Anchoring

3. Waterproofing systems

A wide range of waterproofing systems for all water conditions.

- Synthetic geomembranes and spray-applied waterproofing membranes
- Complementary products for waterproofing systems

4. Renovation, maintenance and repair technologies

Products for renovation, maintenance, repair and waterproofing activities, equipment for ready-to-use shotcrete and injected products.

- Repairs to concrete
- Other products for repair work
- Fireproof mortar

5. Coating underground constructions

Products for coating underground constructions using protective paints, cementitious mortars or ceramic coatings.

- Final coating and protection for concrete

6. Mechanised tunnelling

A range of products and on-site technical assistance services to support clients throughout complete tunnelling projects, from start to finish.

- Mechanised TBM tunnelling



SERVICES FOR TUNNELLING, MINING AND UNDERGROUND CONSTRUCTION

The **Underground Technology Team (UTT)** is the division of Mapei dedicated to underground work. When undertaking underground work, it is strongly recommended to operate together with highly specialised technicians who, with their experience and technical knowledge, are able to handle the most unpredictable situations, thus ensuring the most appropriate technical and economic solution.

Lastly, we would like to highlight the importance of assessing each and every application on a case-by-case basis, especially for underground activities, typically characterised by extremes that set them apart from most other civil works. And which is why we always recommend contacting our UTT Technical Service Staff, who are at your complete disposal for meetings in your office or directly on site.

Experience

Over 75 years of international on-site underground construction experience.

Technical consultancy

Technical consultancy service for the entire duration of your underground construction work.

Technical assistance

World-wide network of highly trained technical assistants.

Our experience provides your solutions

We provide analyses and solutions on sites all over the world.

Formulations

Development and optimisation of formulations and help in evaluating the right dosage for each ingredient.

Product classification and testing

Collaboration with external laboratories for product classification and testing in compliance with the most severe standards on the market.

Client training

Personalised practical and theoretical client training programmes to suit your needs and requirements.

RESEARCH AND PRODUCT INNOVATION FOR A HIGH SPEED MARKET.

A CONSIDERABLE PORTION OF MAPEI'S ANNUAL TURNOVER IS CHANNELLED INTO **IMPORTANT R&D INVESTMENTS**. MAPEI'S PROACTIVE APPROACH IS A CONCEPT IN CONSTANT DEVELOPMENT, IN WHICH INNOVATION BECOMES THEIR DAILY ROUTINE.





FLASH SETTING ACCELERATOR FOR SHOTCRETE

PRODUCT / DESCRIPTION

Mapequick AF 2000

Alkali-free accelerator for shotcrete.

Mapequick AF 1000

Alkali-free accelerator for shotcrete.

Mapequick AF 118

Alkali-free accelerator for shotcrete.

Mapequick AF 116

Alkali-free accelerator for shotcrete.

Mapequick AF 100 RP

Alkali free re-dispersible powder for liquid accelerator for shotcrete.

Mapequick AFK 889

Alkali-free accelerator for shotcrete.

Mapequick AFK 888

Alkali-free accelerator for shotcrete.

Mapequick AFK 777 T

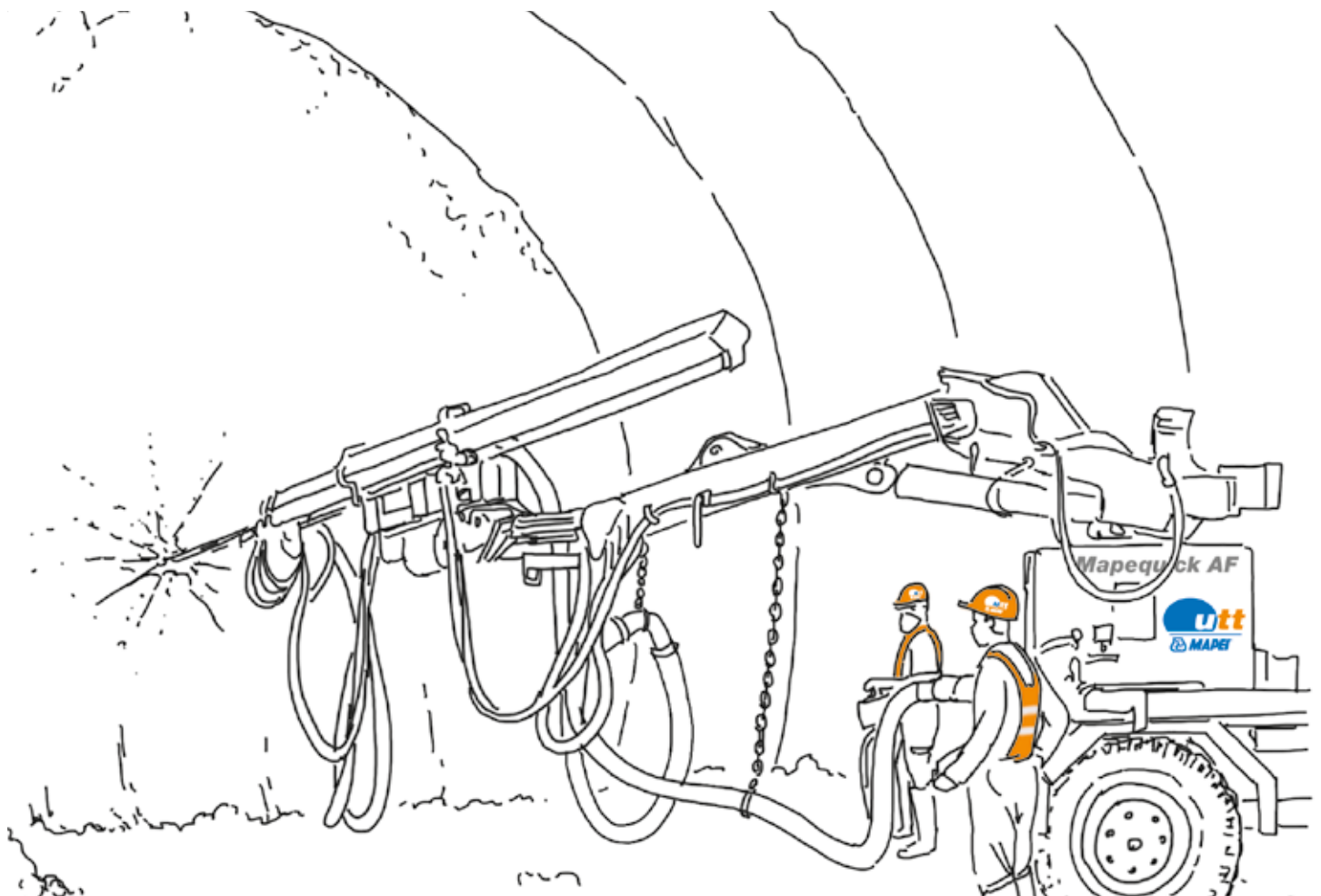
Alkali-free accelerator for shotcrete.

Mapequick AFK 777 J

Low alkali content accelerator for shotcrete.

Mapequick AF 300 Dry

Powder alkali-free setting accelerator for shotcrete.



UNDERGROUND
TECHNOLOGY
BY **MAPEI**

ADMIXTURE FOR SHOTCRETE (MIX BASE) AND CONCRETE

PRODUCT / DESCRIPTION	SHOTCRETE	CONCRETE
Dynamon SX Modified acrylic super-plasticiser for concrete, characterised by its low water/cement ratio, very high mechanical strength and long workability times.	★	★
Dynamon SX14 Fine aggregate supplementing super-plasticizer for concrete with low loss of workability and high reduction of mixing water.	★	★
Dynamon SX18 Fine aggregate supplementing super-plasticizer for concrete with low loss of workability and high reduction of mixing water.		★
Dynamon SR 3 Super-plasticizers based on a modified acrylic polymer for ready-mix concrete with low water/cement ratio, extremely high mechanical strength and long slump retention.	★	★
Dynamon SR 912 Acrylic super-plasticizer for concrete, suitable in warm climates.	★	★
Dynamon SR 914 Acrylic super-plasticizer for concrete.	★	★
Dynamon NRG 1014 Super-plasticizer, hardening accelerating admixture for precast concrete.		★
Dynamon NRG 1020 Super-plasticizer, hardening accelerating admixture for precast concrete, designed for tunnel segments in warm environment.	★	★
Dynamon NRG 1022 Super-plasticizer, hardening accelerating admixture for quick stripping precast concrete.		★
Dynamon Easy 11 Modified acrylic-based super-plasticizer for ready-mixed concrete.		★
Dynamon SX L1 Super-plasticizer based on modified acrylic polymer for concrete with a low water-cement ratio, high mechanical strength and long slump.	★	★
Dynamon SX MC Modified acrylic super-plasticizer for concrete characterized by low water/cement ratio, very high mechanical strength and long workability times.	★	★
Dynamon XTEND Acrylic super-plasticizer for concrete.	★	★
Dynamon EW Modified acrylic-based super-plasticizer.	★	★
Dynamon LZ 551 Modified acrylic-based super-plasticizer.	★	★
Dynamon Power Super-plasticizer admixture in powder form for concrete.	★	★
Mapefluid N220 Super-plasticizer admixture in powder form for concrete.	★	★
Mapeplast FW Powder Admixture to improve the compacting properties and natural finish of concrete.		★
Expacrete Expansive admix for controlled-shrinkage concrete.		★

ADMIXTURE FOR RCC CONCRETE

PRODUCT / DESCRIPTION

Mapetard RCC
Liquid retarding admixture with plasticizing effect for RCC concrete.

Mapetard CBS1
Liquid set-retarding admixture for conventional and RCC concrete.

STABILIZERS

PRODUCT / DESCRIPTION	SHOTCRETE	CONCRETE
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Mapetard D Retardant admix for concrete and mortar.	★	★
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Mapetard SD2000 Set-retardant for concrete and mortar.	★	★
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AIR ENTRAINING AGENTS

PRODUCT / DESCRIPTION	SHOTCRETE	CONCRETE
Mapeair AE 10 Air entraining admixture for concrete resistant to freeze/thaw cycles.	★	★
Mapeair AE 20 Air entraining admixture for concrete resistant to freeze/thaw cycles.	★	★

VISCOSITY MODIFYING AGENTS

PRODUCT / DESCRIPTION	SHOTCRETE	CONCRETE
Viscofluid SCC/10 Viscosity modifying admixture for self compacting concrete.	★	★
Viscostar 3K High-efficiency viscosity modifying admixture used in the production of self-compacting concrete without fillers.		★

ACCELERATORS / ANTIFREEZERS

PRODUCT / DESCRIPTION	SHOTCRETE	CONCRETE
Dynamon HAA Hardening accelerating admixture for chloride-free concrete.		★
Antigelo S Chloride-free antifreeze for cementitious mortars and concrete.		★

CURING AGENTS

PRODUCT / DESCRIPTION	SHOTCRETE	CONCRETE
Mapecure SRA Curing admixture for cementitious mortar and concrete to reduce hydraulic shrinkage and the formation of micro-cracks.		★
Mapecure SRA 25 Curing liquid admixture for reducing the hydraulic shrinkage of concrete.	★	★
Mapecure E Film-forming curing compound in water emulsion for concrete.		★
Mapecure E 30 Anti-evaporation agent in water emulsion for protecting the surface of concrete against quickly drying out when exposed to sunlight and winds.		★
Mapecure S Solvent film-forming curing compound for mortar and concrete.		★
Mapecure CCI 2000 Liquid self-aging admixture for shotcrete.	★	

ADMIXTURES FOR LIGHT CONCRETE

PRODUCT / DESCRIPTION

Mapeplast LA - Liquid

Liquid admixture for light-weight mortars and concretes.

Mapeplast LA - Powder

Foaming admixture for fluid fillings and lean concrete with improved pumpability.

PUMPING AID

PRODUCT / DESCRIPTION	SHOTCRETE	CONCRETE
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Mapestart 1

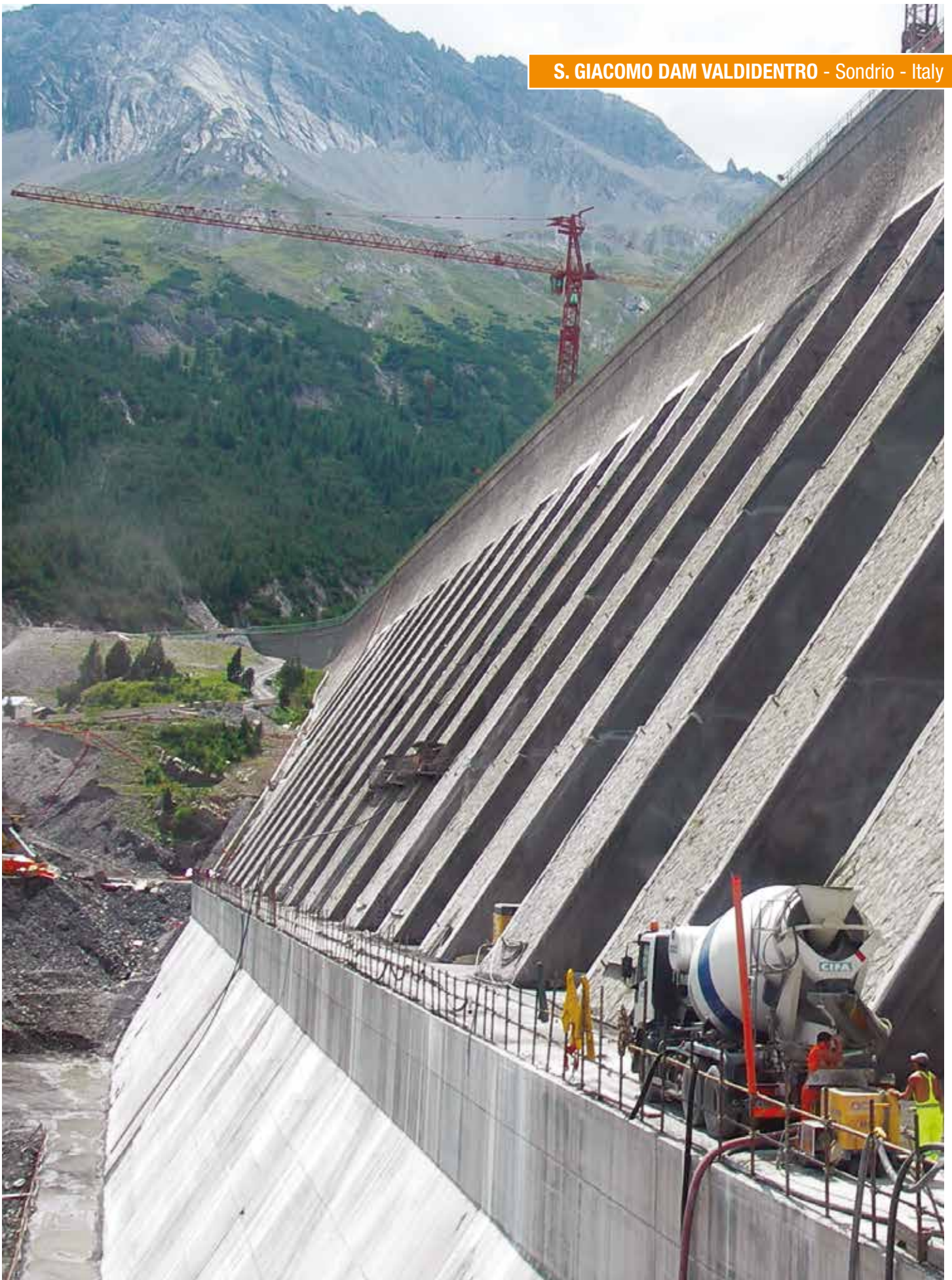
Pumping aid admixture for concretes.



Mapeplast UTT

Pumping aid admixture for shotcretes.





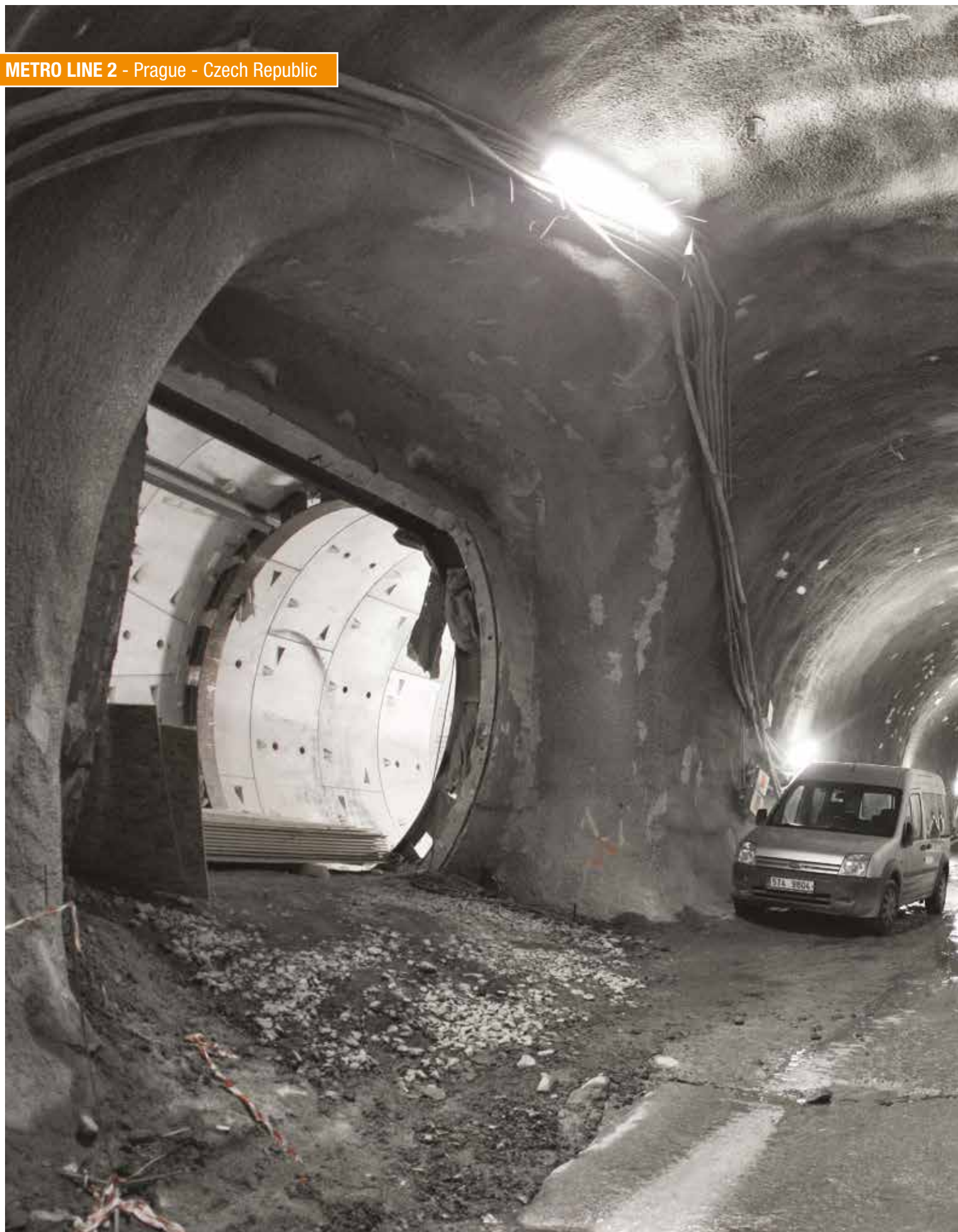
CONCRETE REPAIRING PRODUCTS

PRODUCT / DESCRIPTION	WET APPLICATION	DRY SHOTCRETE
Mapegrout Gunita One-component pre-packed multi-purpose non-accelerated cementitious mortar applied using either the dry or damp spraying technique.		★
Mapegrout Gunita 300 AF Pre-packed one-component cementitious mortar with accelerated setting for dry mix shotcrete.		★
Trockenspritzmörtel GK 8 Shotcrete with setting accelerator.		★
Mapegrout T 60 Fibre-reinforced, sulphate-resistant thixotropic mortar for repairing concrete.	★	
Mapegrout Tissotropico Fibre-reinforced, compensated-shrinkage mortar for repairing concrete.	★	
Mapegrout LM2K Two-component, thixotropic, fibre-reinforced, cementitious mortar with a low modulus of elasticity and added organic corrosion inhibitor for repairing concrete, applied in a single layer at a thickness of from 3 to 20 mm.	★	
Triblock TMB Three-component, self-levelling, epoxy-cementitious coating for layers from 1.5 to 3 mm thick.	★	
Mapefinish Two-component cementitious mortar for finishing concrete.	★	
Planitop Fast 330 Quick-setting, fibre-reinforced cementitious levelling mortar for internal and external floors and walls, applied in layers from 3 to 30 mm to even out irregularities.	★	
Mapegrout 430 Fine-grained, fibre-reinforced, normal-setting thixotropic mortar for repairing concrete.	★	
Planitop Fix Cementitious, low dust shrinkage-compensated, polymer modified, fast setting repair mortar for fast assembly in building and civil engineering.	★	
Mapegrout SV Quick-setting and hardening, compensated-shrinkage hi-flow mortar for repairing concrete and fixing drains, manholes and urban architectural fittings in place.	★	
Mapefer Two-component, anti-corrosion cementitious mortar for steel reinforcement rods.	★	
Planitop 100 Fast-setting light grey-coloured fine mortar for repairs and finishing of concrete and renders.	★	

FIRE PROOF MORTAR

PRODUCT / DESCRIPTION
Ignisiliex Malta 4 Cementitious based passive fire protection barrier for underground constructions.







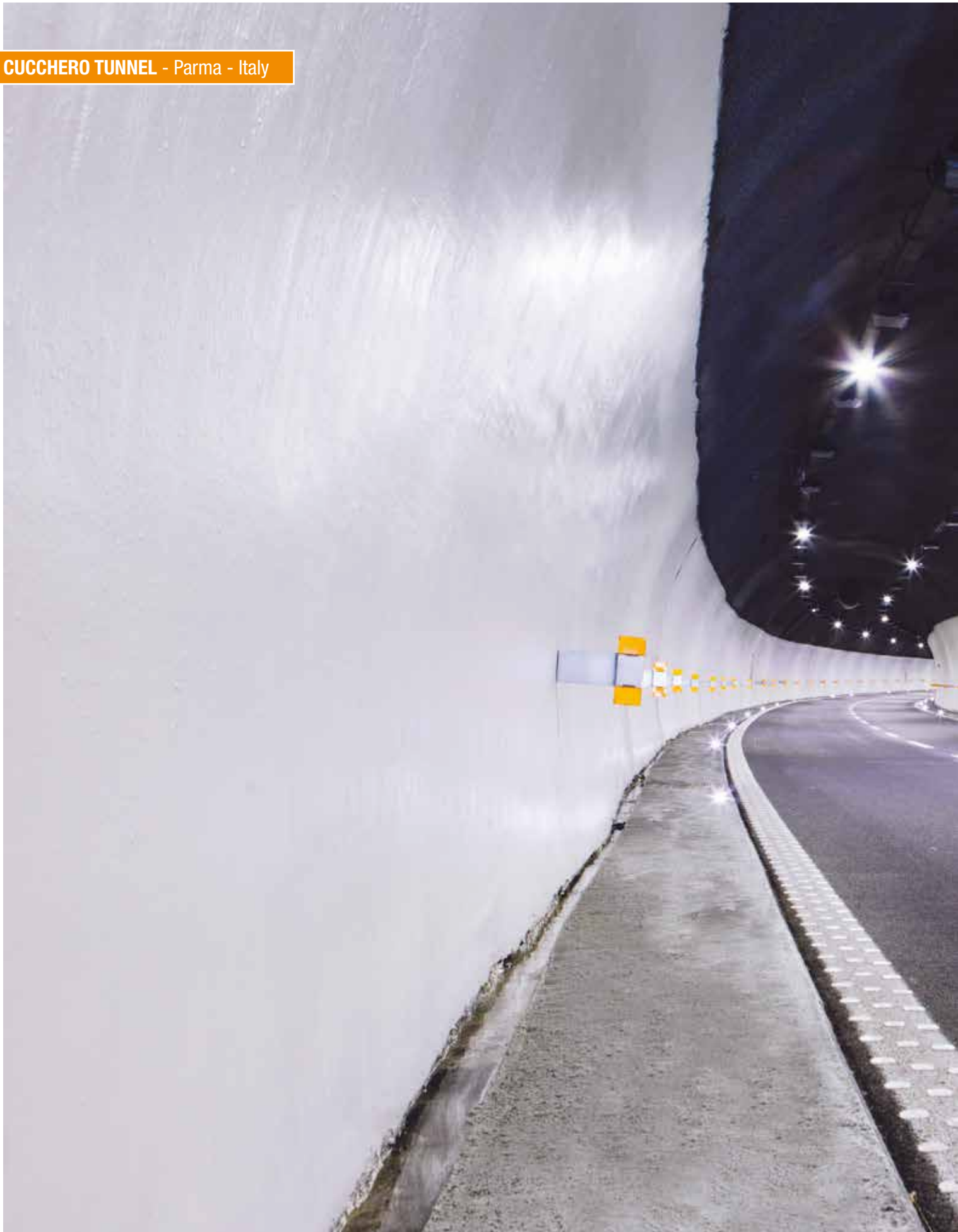
FINAL COATING AND CONCRETE PROTECTION

PRODUCT / DESCRIPTION	COATING	PROTECTION	PRIMER
Mapecoat SE/TT White color two-component epoxy-siloxane finish for the protection of cementitious substrates.	★		
Mapecoat SE/TB Transparent two-component epoxy-siloxane finish for the protection of cementitious substrates.	★		
Mapecoat TU/S One-component acrylic resin water-based finish for protection of cementitious substrates.	★		
Mapecoat I 600 W Two-component, transparent epoxy impregnator in water dispersion.	★		
Mapecoat I 650 WT Two-component, transparent epoxy impregnator in water dispersion.	★		
Mapecoat T 100 One-component titanium bi-oxide water-based finish with photocatalytic action for protection of cementitious substrates .	★		
Mapecoat T 200 One-component titanium bi-oxide water-based finish with photocatalytic action for protection of cementitious substrates.	★		
Mapecoat W HRI Two-component, epoxy water-based impregnator.	★		
Mapecoat W SP Two-component epoxy paint in water dispersion for the protection of cementitious substrate.		★	
Malech Acrylic water-based primer.			★
Primer G Synthetic-resin-based water-dispersion primer with very low volatile organic compound (VOC).			★
Mapecoat WT Epoxy finish water-based for protection of cementitious substrates.	★		
Primer SN Rasante Two -component solvent-free epoxy skimming product.	★		
Mapecoat I 914 Two-component epoxy primer for priming cementitious bridge deck substrates before waterproofing with an asphalt or synthetic membrane layer.			★



UNDERGROUND
TECHNOLOGY







INJECTIONS / CONSOLIDATION

PRODUCT / DESCRIPTION	INJECTION GROUT	INJECTION CEMENT	INJECTION RESIN	INJECTION ADMIXTURE
Microcem 8000 / 12000 Micro-fine hydraulic binder with pozzolanic action for ground consolidation and ground waterproofing throughout injections of cementitious mixes.		★		
Resfoam 1 KM and 1 KM FLEX Ultra-fluid, flexible one-component polyurethane injection resin for waterproofing structures.			★	
Foamjet F Ultra rapid setting two-component polyurethane resin with fluid consistency, to be injected for consolidating and waterproofing of structures subject to weal water ingress.			★	
Foamjet T High viscosity ultra rapid setting two-component polyurethane resin, to be injected for consolidating and waterproofing of structures subject to strong water ingress.			★	
Foamjet 260 LV Two-component polyurethane elastic and low viscosity resin for injection and waterproofing.			★	
Purgel Polyurethane one-component expansive resin for injection.			★	
Silicajet EXP Two-component organo-mineral fast reacting and high foaming resin for void filling.			★	
Silicajet EXP/4 Two-component organo-mineral fast reacting and moderate expansion properties.			★	
Silicajet ST and ST HP Two-component fluid resin used for injections in all types of soil, rock and/or concrete with high mechanical characteristics.			★	
Mapegel UTT System Three-component hydrophile gel for consolidating grounds and for creating barriers through injection in the concrete.			★	
Epojet Two-component, super-fluid epoxy resin for injections and anchorings.			★	
Epojet LV Two-component epoxy resin with a very low viscosity for injecting into micro-cracks.			★	
Foamjet F ST Rapid setting two-component polyurethane resin with fluid consistency with high mechanical characteristics, to be injected for consolidating and waterproofing of structures.			★	
Mapejet System N, C40,LP NS 15 Two-component cement free liquid binder for low and very low permeable ground consolidation.			★	
Twinjet System Two-component system for cementitious based injections with variable consistency.				★
Mapegrout Compact, Compact AWM, Compact VV, Compact PS Compact HP Pre-mixed injecting grout characterized by great resistance to wash-out and controlled rheology and fluidity.	★			
Expanjet Special hydraulic binders with high degree of fineness and expanding behavior.	★			
Idrostop Multi St Mechanical injection packer.			★	
Expanfluid Plasticizing and anti-shrinkage agent for slurries for injection.				★
Cablejet Plasticizing and high-performance anti-shrinkage agent for slurries for injection.				★



ANCHORING

PRODUCT / DESCRIPTION	ANCHORING MORTAR	INJECTION RESIN
Mapefix PE SF Styrene-free, polyester resin chemical fastener for heavy loads.		★
Mapefix VE SF Styrene-free, hybrid vinyl resin-based chemical anchor for structural loads.		★
Mapefix EP 385 Pure epoxy, resin-based chemical anchor for structural loads. Certified for threaded bar, construction bars, core-drilled holes and C1 seismic loads.		★
Stabilcem T One-component pre-blended thixotropic mortar with controlled shrinkage for anchoring, by injection, of tie rods and bolts in all types of grounds.	★	
Stabilcem T/HSR One-component shrinkage-compensated pre-blended thixotropic mortar, highly resistant to sulphates, for anchoring, by injection, tie-rods and bolts, in all types of ground.	★	

GEOSYNETHIC AND SPRAYABLE WATERPROOFING MEMBRANE

PRODUCT / DESCRIPTION	WATER INLET	SURFACE WATERPROOFING	WORKING JOINTS
Mapeplan TU and TU S Synthetic waterproofing membrane for tunnels and underground works.		★	
Mapeplan TU WL and TU S WL Synthetic waterproofing membrane for tunnels and underground works.		★	
Mapeplan TT Transparent synthetic waterproofing membrane for tunnels and underground works.			
Mapeplan Protection Black PVC protection membrane.		★	
Mapelastic TU System One-component membrane for spray application for waterproofing every type of concrete supports, included sprayed concrete.		★	





WATERPROOFING ANCILLARY PRODUCTS

PRODUCT / DESCRIPTION	WATER INLET	SURFACE WATERPROOFING	WORKING JOINTS
Lamposilex Ultra quick-setting and hardening hydraulic binder for blocking seeping water.	★		
Mapeproof Swell Hydro-expansive, rubber-based hydrophilic sealant paste in tubes, applied using an extrusion pistol.	★		
Plastimul Fiber One-component, solvent free, fibre reenforced bitumen waterproofing emulsion.		★	
Plastimul 1K Super Plus Mono-component, solvent-free, quick-drying, low-shrinkage, high-yield, high flexibility bitumen waterproofing emulsion containing polystyrene spheres and rubber granules.		★	
Plastimul 2K Plus Two-component, solvent-free, quick-drying, low-shrinkage, high flexibility bitumen waterproofing emulsion containing cellulose fibres.		★	
Adesilex PG1 - PG4 Two-component, thixotropic epoxy adhesive with modified rheology for bonding MAPEBAND, MAPEBAND TPE, PVC strips and Hypalon and for structural bonds.			★
Mapeband Flex Roll Tape for the flexible waterproofing of expansion joint and cracks.			★
Mapeband PE 120 PVC tape for waterproofing systems made from liquid membranes.			★
Mapeband TPE TPE tape for flexible sealing and waterproofing of expansion joints and cracks subject to movement.			★
Idrostop PVC BI / BE PVC waterstop with internal lug for sealing structural joints.			★
Idrostop Uno Hydrophilic, expanding rubber profiles for waterproof working joints.			★
Idrostop Hydrophilic, expanding rubber profiles for waterproof working joints			★
Mapeflex PU 45 Paintable polyurethane sealant and adhesive with a high modulus of elasticity for movements up to 20%.			★
Ultrabond MS Rapid Rapid-setting assembly adhesive for internal and external use with a high sucker effect.			★
Mapegrout Shotgun Flash set mortar.		★	
Mapeplan Tape Flexible PVC tape for waterproofing joints and membrane interruption.		★	
Mapeplan Waterstop PVC-P PVC-P profiles for every type of joints and waterproofing compartments.			★
Mapeplan Disc PVC-P fixing element.			★
Idrostop Multi 11 / 19 PVC-P re-injectable hoses for waterproofing systems.			★
Polydren PP Non-woven geotextile to be used as compensation, levelling, protection and filter layer.			





HIGH SPEED RAILWAY - Sabadell - Spain



CENTRAL SUBWAY TUNNELING PROJECT - San Francisco - USA



UNDERGROUND
TECHNOLOGY

MECHANIZED TBM TUNNELLING

PRODUCT / DESCRIPTION

Stabilfoam

High performance liquid foaming agent for soil conditioning.

Polyfoamer

Liquid foaming agent based on biodegradable anionic surfactant combined with natural polymer.

Polyfoamer Eco

Liquid foaming agent based on 100% biodegradable anionic surfactant combined with natural polymer.

Mapedrill SA

Super absorbent liquid and powder polymer.

Mapequick CBS System

Two-component system for cement-based grout injections.

Defoamer

Liquid defoaming agent for conditioned soil treatment.

Mapedisp

High performance liquid dispersing agent for tunnelling and drilling.

Mapeoil HFR 46 - 68

High performance hydraulic oil for TBM.

Mapeblox/T

Tail seal grease for mechanized tunnelling with TBM.

Mapeblox/PKG

Packing grease for mechanized tunnelling with TBM.

Mapeblox/H

Main bearing sealant for mechanized tunnelling with TBM.

Mapeblox/EP

Packing grease with fire-resistant components for mechanized tunnelling with TBM.

Mapeblox/Ep Eco

Packing biodegradable grease with fire-resistant components for mechanized tunnelling with TBM.

FORM-RELEASE AGENTS AND ANTI-ENCRUSTATION LIQUIDS

PRODUCT / DESCRIPTION

Mapeform Eco 91

Chemical-action vegetable oil-based form-release agent in water emulsion to improve exposed surfaces. Also suitable for steam curing cycles.

Mapeclean Defender

Protective anti-encrustation liquid.

Mapetard Form

Surface retarder for exposed aggregate finish.



UNDERGROUND
TECHNOLOGY
BY MAPEI





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