

UGC

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MEYCO® FIX SLF30

v1 02/2002

Soil conditioning foam for Tunnel Boring Machines

Product description

MEYCO® Fix SLF 30 is a foaming agent especially designed for soil conditioning in Shielded Tunnel Boring Machines.

Fields of application

- Soft ground tunnelling with Tunnel Boring Machines
- Dust suppression in Hard Rock tunneling

Features and benefits

- Improved soil behaviour
- Easier 'mucking'
- Environmentally friendly

MEYCO® Fix SLF 30 has been especially developed for soil conditioning in tunnelling with shielded TBM excavation. Generally the product when mixed with the soil, provides for:

- Reduced permeability and increased sealing at the face
- Creation of plastic deformation properties in the soil, which provides an even and controlled support pressure and increased face stability
- Lower inner friction and lower abrasiveness of the soil at the cutterhead through to the screw conveyor and conveyor. This reduces power consumption; enables soil extraction and conveyance, as well as reducing wear costs.
- Reduces stickiness in certain soils, which would lead to problems with blockage

- In hard rock tunnelling and mining it can be used for dust suppression

Packaging

MEYCO® Fix SLF 30 is available in standard 200 litre drums.

Bulk tanker or 1000 litre polytank supply is available on request.

Technical data

Form	Liquid
Colour Pale	Yellow
Density; kg/m ³ ; 20°C	1035 -1045
pH ; 20°C	6.5-7.5
Solubility in water	Total

Application procedure

A foam is produced by dispersion of air into an aqueous solution of the MEYCO® Fix SLF 30. MEYCO® Fix SLF 30 foam solution can be expanded with air to produce a stable foam. The foam recipe, foam expansion and the foam injection rate into the face, working chamber or screw conveyor will depend on soil conditions encountered.

Consumption

Typically the MEYCO® Fix SLF 30 is made into a 2 – 3% (typical range 2 – 6%) solution in water. MEYCO® Fix SLF P1 or MEYCO® Fix SLF P2 (see separate data sheets) can be added with the MEYCO® Fix SLF 30 to strength the foam or adjust the properties of the excavated soil.

Storage

The storage temperature of MEYCO® Fix SLF 30 is between 5°C and 35°C. If stored in original tightly closed containers MEYCO® Fix SLF 30 will have a shelf life of 12 months. Do not allow the product to freeze. It is recommended that your local UGC representative be consulted prior to the use of any product that has become frozen.

Safety precautions

MEYCO® Fix SLF 30 contain no hazardous substances requiring labeling. However, standard precautions for handling chemical products should be observed: Avoid eye and skin contact and wear rubber gloves and goggles.

If contact occurs, rinse with plenty of water. In case of eye contact seek medical advice. For further information, refer to the Material Safety Data Sheet. A Risk Assessment report on the use of MEYCO Fix SLF products in tunnels can be for downloaded from the UGC website. Or ask your UGC MBT representative for a copy.

MEYCO[®] FIX TSG6

v3 05/2004

Tail Sealant for Shielded Tunnel Boring Machines (TBM)

Product description

MEYCO[®] FIX TSG6 is a tail sealant for shielded tunnel boring machines. It effectively seals the gap between the shield and concrete segments to prevent the ingress of water, grout or soil. It is formulated to resist high water and ground pressures, and has excellent pumping properties and adhesion to all surfaces.

MEYCO[®] FIX TSG6 is designed for use in conditions where the ambient temperature will usually remain above 10°C.

Fields of application

- Tunnelling with shielded TBMs

Features and benefits

- Excellent pumping properties
- Excellent sealing properties
- Adheres to any metal or concrete surface

Packaging

MEYCO[®] FIX TSG6 is packaged in 250 kg steel drums.

Other drum sizes and pack weights are available on request.

Technical data

(Typical values)

Form	Homogenous paste
Colour	Beige
Smell	Slight odour
Density: kg / m ³ ; 20°C	1670 ± 20
Consistency ASTM D217: 1/10 mm	250±10

Consumption

Consumption will depend on a lot of factors, such as segment ring surface conditions, curve drives, grouting pressures, etc. Usual consumption rate can vary between 0.5 – 1.5 kg/m² of segment outer surface area, but may well fall outside this range.

Storage

MEYCO[®] FIX TSG6 should be stored in unopened, original containers, preferably at 5 - 35°C. Shelf life is expected to be 12 months minimum.

Safety precautions

MEYCO[®] FIX TSG6 is an inert material and is not hazardous. It is ecologically and environmentally friendly and poses no threat to worker safety or the environment. However, it is recommended that all normal precautions be taken when handling the product, such as the use of eye protection and gloves.

An independent environmental risk assessment report is available on request.

MEYCO[®] FIX TSG7

v4 05/2004

Tail Sealant for Shielded Tunnel Boring Machines (TBM)

Product description

MEYCO[®] FIX TSG7 is a tail sealant for shielded tunnel boring machines. It effectively seals the gap between the shield and concrete segments to prevent the ingress of soil, water or grout.

MEYCO FIX TSG7 is designed as a "first fill" product..

Fields of application

- Tunnelling with shielded TBMs

Features and benefits

- Excellent sealing properties
- Adheres to any metal or concrete surface

Packaging

MEYCO[®] FIX TSG6 is packaged in 250 kg steel drums. Other drum sizes and pack weights are available on request.

Consumption

Consumption will depend on the diameter of the TBM.

Storage

MEYCO[®] FIX TSG7 should be stored in unopened, original containers, preferably at 5 - 35°C. Shelf life is expected to be 12 months minimum.

Safety precautions

MEYCO[®] FIX TSG7 is an inert material and is not hazardous. It is ecologically and environmentally friendly and poses no threat to worker safety or the environment. However, it is recommended that all normal precautions be taken when handling the product, such as the use of eye protection and gloves.

An independent environmental risk assessment report is available on request.

MEYCO® FIX ABR 5

V1 28/10/2003

Anti Abrasion Agent
for Hard Rock Tunnel Boring Machines

Product description

MEYCO® FIX ABR 5 is a liquid product, specifically designed for hard rock tunnel boring machines (TBM) operating in abrasive ground.

Fields of application

MEYCO® FIX ABR 5 is designed for use in hard rock TBM excavation. It is used to reduce abrasive wear to the cutting tools, and to reduce substantially dust formation during excavation.

Features and benefits

The use of MEYCO® FIX ABR 5 gives the following benefits with regard to TBM operation:

- Reduction of abrasive wear for cutting tools
- Improved cooling of the cutter head, improving the rubber seal durability, and extending the life of the cutter bearing assembly
- Reduce TBM down time due to less frequent cutter changes, therefore more time available for excavation
- Improved transfer of the muck from the cutter head, resulting in reduced risk of blockage, cleaner cutter discs and cutter head area, which make maintenance easier and reduce cutter disc changing time
- Overall cost saving due to higher monthly advance rate and lower maintenance cost

Effective reduction of dust formation, leading to considerably improved working environment for TBM operators.

Packaging

MEYCO® FIXABR 5 is available in standard 1000 litre containers. Other packaging is available on request.

Technical data

Form	Liquid
Colour	Yellow to brown, transparent
Density; kg/litre; 20°C	1.02 -1.04
pH ; 20°C	7.5 – 8.5
Viscosity; mPa.s; 20° C	Max. 500

Application procedure

MEYCO® FIX ABR 5 must first be turned into a foam before it can be used. For this purpose, a foam generating equipment typically used in EPB machines can be used. The recommended foam expansion ratio is 8-15, preferably 8-12. The generated foam is then injected through foam or water injection ports into the cutter head. The foam injection rate is typically 30%.

Consumption

Typical consumption rate of MEYCO® FIX ABR 5 is 1.5 – 2 kg/m³ undisturbed rock.

Storage

MEYCO® FIX ABR 5 should be stored between 5°C and 40°C. If stored in original tightly closed containers MEYCO® FIX ABR 5 will have a shelf life of 12 months. Do not allow the product to freeze. It is recommended that your local UGC representative be consulted prior to the use of any product that has become frozen.

Safety precautions

MEYCO® FIX ABR 5 contains no hazardous substances requiring labeling. However, standard precautions for handling chemical products should be observed. For further information, refer to the Material Safety Data Sheet, and relevant local regulation.

MEYCO® MP308

Version 1 14/07/04

Solvent-free, low viscosity, fine injection acrylic resin for permanent water sealing of underground structures

Product description

MEYCO MP308 is a solvent free, water-soluble injection resin designed to be used as a permanent water sealing resin for cracks and injection hoses in underground structures. With its low viscosity, MEYCO MP308 is used to inject damp areas and cracks in concrete, porous brick via packers and injection works via injection hoses. MEYCO MP308 is used at temperatures above 5°C and will cure to form a flexible and solid plastic, able to withstand permanent water pressure.

Injection hoses up to 10 meters can be injected and vacuumed due to the low viscosity and water soluble properties of the product. In case of small ground/structure settlement or movement within the joint or crack MEYCO MP308 will permanently seal since the product can swell up to 150% of its initial volume. **The swelling is reversible and after dry periods the resin maintains its self-healing properties.**

MEYCO MP308 is stable against acid and alkaline solutions, many solvents and fuel. It does not attack bitumen, PVC waterstops or concrete.

Features and benefits

- Resists permanent water pressure
- Suitable for crack sealing and injection hose applications

- Very low viscosity allow deep penetration into very fine cracks
- Controlled gel time
- Good bonding to wet surfaces
- Workable between +5 C and + 40 C
- Environmentally friendly
- Flexible and self healing gel allowing for structural movement
- NSF certification for use in drinking water systems (please refer to www.nsf.org)

Packaging

Resin: 2 x 10 kg

Accelerator: 2 x 1 kg

Hardener powder: 3 x 22g sachets

Plastic bottle For hardener solution

TOTAL PACK: 22.1 kg

Packs per pallet: 30

Certified to
NSF/ANSI 61

Technical data

	Resin	Accelerator	Mix
Viscosity (20°C)	50 mPa.s	n/a	40 mPa.s
Density (20°C)	1.06 kg/litre	1.1kg/litre	1.065 kg/litre
pH-Value (20°C)	5.5	11	8.5
Colour	white	Yellow Orange	yellow

Approximate values

Application procedure

Mixing

1. Pour 1 litre of resin into a bucket
2. Fill the bottle for Hardener Solution with water up to the 500ml mark and add 1 bag of Hardener Powder (22g). Shake until Powder is completely dissolved. Add Hardener solution to the resin according to the chart
3. Add accelerator to the resin according to Table 1

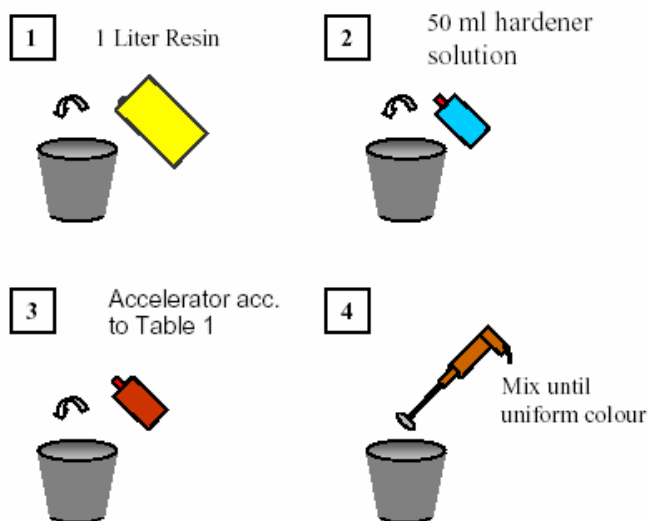
Mix injection resin until colour is uniform and inject within the pot-life

Table 1: Pot Life

		Pot-life				
		20 Min.	30 Min.	40 Min.	50 Min.	60 Min.
Processing temperature	5° C			120 / 50	105 / 50	
	10° C		142 / 50	105 / 50	80 / 50	
	15° C		82 / 50	72 / 50	65 / 50	62 / 50
	20° C	77 / 50	65 / 50	55 / 50	47 / 50	42 / 50
	25° C	68 / 50	55 / 50	45 / 50	37 / 50	32 / 50
	30° C	50 / 50	35 / 50	30 / 50	27 / 50	25 / 50
	35° C	42 / 50	30 / 50	25 / 50	22 / 50	20 / 50
	40° C	32 / 50	25 / 50	22 / 50	20 / 50	
	45° C	27 / 50	22 / 50			
	50° C					

Always add 50 ml of Hardener solution to 1 Liter of resin.
The amount of accelerator required depends on the requested Gel-time within the present temperature.
If larger quantities are mixed, the amount of Hardener solution and accelerator must be increased proportionally.
Remark: at low/high object temperatures the Gel-time of the injection resin will be longer respectively shorter
Caution: Processing of resin should be stopped 10 minutes prior the pot-life indicated in chart!

The pot-life is very much dependent on ambient temperature and amount mixed at once. Table 1 shows the amount of accelerator required under different temperatures. Please note that the temperature stands for the combined value of structure, air and resin temperature.



Injection

Injection of the gel is normally carried out using one component pumps. For one component pump injection do not mix large amounts, always choose the volume mixed in accordance with the expected consumption and the time frame! Wearing parts coming in contact with MEYCO®

MP308 should be made of stainless steel or be chrome plated. Product containers should be made of plastic. Always protect gel from sunlight and excessive heat to avoid uncontrolled polymerisation.

Cleaning of injection equipment

Equipment spoiled with uncured resin and spillage on site can be cleaned with soap water

or store equipment in water. This will allow the resin to swell and enables cleaning thereafter.

Storage

MEYCO® MP308 should be stored in its original packaging at temperatures between 10° and 25° Celsius. In unopened, original containers MEYCO® MP308 has a shelf life of 12 months. For further storage details please refer to the Material Safety Data Sheets.

Safety precautions

Acrylic gels will irritate the eyes and the skin and may cause sensitisation through skin contact. Normal hygienic precautions (protective glasses, gloves and overalls) shall be taken. Wash hands before eating or smoking.

The cured MEYCO® MP 308 is physiologically harmless. Uncured MEYCO® MP 308 components must not be allowed to enter the local drainage system, rivers, lakes and ground water. Spillage must be treated with absorbent material (sand or sawdust) and disposed of in the same way as containers with residues of uncured material according to local regulations. For further information on safety measures, refer to the product Material Safety Data Sheets for the Component A, Accelerator and Hardener.

MEYCO® MP320

Solvent-free, low viscosity, hydrophilic grout for rock injection and consolidation of sand and silt strata

Product description

MEYCO® MP 320 is a "one component" injection system, based on a nanometric colloidal silica suspension of primary, discrete particles. The open time can be adjusted with an accelerator. The product may be used between +5°C and +40°C and contains neither solvents nor toxic components.

The gel time may be adjusted by varying the quantity of Accelerator for MEYCO® MP 320 added to Component A. Due to the hydrophilic nature of the product, the adhesion is also good to wet surfaces. There is no foam reaction that can negatively influence the bond. Equipment can easily be cleaned using water.

Fields of application

MEYCO® MP 320 has been developed for injection into fine joints and fissures in rock and for the consolidation of sand and silt based strata. These properties are particularly well suited for the following:

- Pre-injection grouting for tunnelling projects
- Waterproofing of existing tunnels
- Mining applications for waterproofing and stabilisation
- Slope stabilisation in rock
- As a component of ground improvement techniques

Features and benefits

- Very low viscosity
- Controlled gel time with the use of an accelerator
- Simple mixing and pumping equipment as used with cementitious grouts can be used
- Good bonding to wet surfaces
- Workable between +5°C and +40°C
- As the product is non-aggressive, it provides improved working safety, reduced environmental impact and low handling costs

Packaging

MEYCO® MP 320 is available in standard sets containing:

MEYCO® MP 320 Component A:

210 litre drums or 1000 litre containers

Accelerator for Component A:

210 litre drums or 1000 litre containers

For bulk supply, please discuss with your local Degussa UGC Representative.

Technical data

MEYCO® MP 320 Component A

Colour	Whitish/clear
Viscosity (20°C, AP-014)	~10 mPa.s
Density (20°C, AP-005)	1.3 kg/l
pH (20°C, AP-009)	9.5 to 9.8
SiO ₂ concentration	40 ± 1 %

MEYCO® MP 320 Accelerator

Colour	Clear
Viscosity (20°C, AP-014)	~1 mPa.s
Density (20°C, AP-005)	1.07 kg/m ³
pH (20°C, AP-009)	7

Mixed material (values given are dependant on mix)

Colour	Whitish/clear
Viscosity (20°C, AP-014)	~5 mPa.s
Density (20°C, AP-005)	~1.25 kg/m ³
pH (20°C, AP-009)	~9 dependent on ratio

Application procedure

The accelerator is added to component A at the required ratio. Ensure component A is continuously stirred during the addition of the accelerator, and fully pre-mixed prior to pumping. The mixture of MEYCO® MP 320 and accelerator for MEYCO® MP 320 is pumped with a one component pump, such as a cement grout injection pump, through an injection packer system into the strata. For slow migration into sand and gravels, a worm pump may also be considered.

To achieve controlled, targeted injection into sands and gravels, it is advised to use double packers within tube à manchette injection tubes (often referred to as "TAMs" or "SPPs") with port centres dependant on the fineness of soils, and degree of stabilisation required.

Gel time

MEYCO® MP 320 is produced in three different facilities worldwide. It is important to distinguish which product you have been supplied to establish correct accelerator dosage for a given gel time.

The gel time of MEYCO® MP 320 is controlled by the dosage of accelerator and effected by temperature. The gel time can be adjusted between 10 minutes and up to several hours as

indicated in Figure 1. For long gel time, the temperature will have big influence.

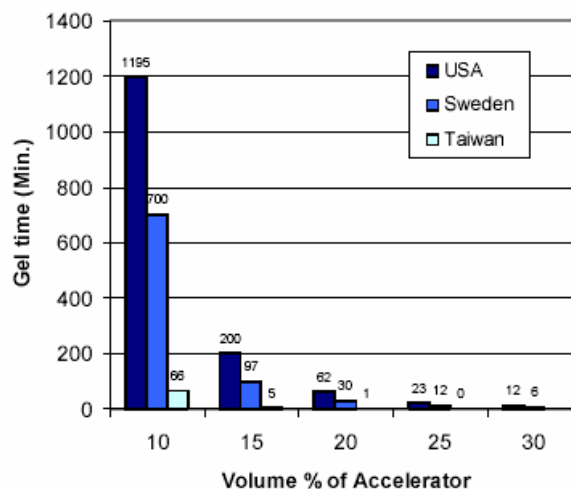


Figure 1: Adjustable gel time with varying accelerator dosage. Values given are at 8°C.

Cleaning of injection equipment

All equipment can be cleaned with fresh water.

Storage

In unopened, tightly closed original containers, the components of MEYCO® MP 320 may be stored for up to 18 months, if kept dry and within a temperature range of +5 to +35 C. Protect from sunlight.

Safety precautions

Colloidal silica will irritate the eyes and the skin. Normal hygienic precautions (protective glasses, gloves and overall) should be taken. Wash hands before eating or smoking. The cured MEYCO® MP 320 is physiologically harmless. For further information, refer to the product Material Safety Data Sheet.

MEYCO® MP355 1K

Watertight injection foam for filling holes and jointed rock, as well as cutting of running water

Product description

Meyco® MP 355 1K is a solvent free, single component polyurethane foam.

Fields of application

Meyco® MP 355 1K is recommended for:

- Pre injection of jointed rock
- Stabilisation of jointed rock
- Sealing off flowing water
- Stabilisation of coarse sand and gravel
- Filling of water bearing voids

Features and benefits

Meyco® MP 355 1K is a solvent free, injection and filling material based on polyurethane. The product reacts specially under wet conditions.

- Reacts in moist surroundings
- Good bonding to wet surfaces
- Sealing off running water

Packaging

Meyco® MP 355 1K: 25 kg cans

Accelerator for Meyco® MP 355 1K : 2.5 kg cans

Technical data

Meyco® MP 355 1K

Density, 20°C	1.15 g/cm ³
Viscosity, 23°C	300 mPa.s
Flash point	180°C
Odour	none
Colour	Brown
Application temperature	+ 5°C to 40°C
Foam expansion at 23°C at 10%	Free foam
accelerator dosage	1:25-30

Accelerator for Meyco® MP 355 1K

Density, 20°C	1.10 g/cm ³
Viscosity, 23°C	70 mPa.s
Flash point	110°C
Odour	Pungent
Colour	Clear to yellowish

Application procedure

Wet conditions:

1. Add the accelerator to Meyco® MP 355 1K (between 2-10%, depending on the required reaction time) mix well (See Table 1).
2. Inject this mixture through a single component injection pump. The moisture / water from the rock will cause the foaming reaction.

Safety precautions

Dry conditions:

1. For injection purposes, flush holes with water to thoroughly wet the injection area.
2. Add accelerator to Meyco® MP 355 1K (between 2-10% depending on the required reaction time) (See Table 1), mix well.
3. Inject this mix through a single component injection pump.

Note. After injection work has been finished, it is recommended to pump some flushing oil through the pump. In this way the pump stays clean until the next use. When this is not done there might occur a reaction between the residual product left in the pump and injection lines and the air humidity.

Alternatively, after injection, pump some Meyco® MP 355 1K without accelerator through the pump. This will reduce any reaction between the product and moisture in the equipment.

Reaction Time

The reaction time depends not only on the temperature in the rock, but also on the temperature of the product itself. The example of reaction times with different accelerator dosages (see Table 1) have been measured in the laboratory. It is normal to get the required reaction time on site. Therefore site trials should be performed initially.

Storage

Meyco® MP 355 1K must be stored in airtight containers in a cool, dry place. If stored in tightly closed original containers under the above mentioned conditions the self life of Meyco® MP 355 1K is 12 months. Both components of Meyco® MP 355 1K must be protected from freezing.

Meyco® MP 355 1K is based on 4,4'-Diphenylmethandiisocyanate (MDI), whilst the accelerator is based on an amine.

Table 1:

Reaction Times with 10% water and 10% accelerator				
Initial Temperature °C	5	10	15	20
Start of reaction (sec)	120	60	25	10
End of reaction (sec)	300	200	110	50
Foam factor	ca 25	ca 25	ca 25	ca 30

Meyco® MP 355 1K is physiologically not hazardous once reacted. However follow standard safety procedures when handling the product and wear gloves and face / eye protection.

Avoid eye and skin contact. If skin contact occurs, wash with plenty of water and soap. In case of eye contact rinse with plenty of water and seek medical advice. For further information refer to Material Safety Data Sheet.

Not reacted material should not be disposed of except to special sites. It is better to let the product react with water to form foam and afterwards dispose on landfill.

MEYCO® MP355/A3

Highly reactive, two component polyurethane injection foam

Product description

MEYCO® MP355/A3 is a two component, solvent-free polyurethane injection resin specifically designed for rapid water stopping and ground stabilisation.

Fields of application

- Control of high volume water ingress
- Stabilisation of fractured rock, sands and gravels and land-fill materials
- Void filling
- Repair of concrete structures

Features and benefits

- Fast reacting material where structural strength or rigidity is required
- MEYCO® MP355/A3 always reacts with and without water. This is a significant safety advantage as the material is always will be cured
- When in contact with water, the product forms a rigid foam. Without the presence of water, the product also reacts and forms a stiff, rubber-like material
- Fast reaction with water, and reaction completed within a short period of time
- Modification of the reaction can be achieved using a separately supplied accelerator and thixotropic agent to Component A.

Packaging

MEYCO® MP355/A3 is available in the following packaging:

Component A: 25kg cans, or 200kg drums

Component B: 30kg cans, or 240kg drums

Technical data

	Colour	Viscosity mPa.s	Density kg/m ³
Component A	Brown	250	1.00
Component B	Dk brown	200	1.25
Accelerator for MP355/A3	Lt brown	500	1.00

Taken at 20°C

Application procedure

Components A and B are delivered ready-to-use. They are injected in the proportion of 1:1 by volume using a two component injection pump equipped with a static in-line mixer nozzle, as shown below.



Special Requirements

Please Note: The foaming reaction time is significantly dependant on the temperature of the PU resin, the rock and the ground water. The resin MEYCO MP355 A3 can be given two fundamentally different properties by the use of two different accelerators:

- MEYCO MP355 A3 ACCELERATOR 10
- MEYCO MP355 A3 ACCELERATOR 15

For a high foaming factor (approximately 20-25) and a rapid reaction for water cut-off injection: Add the Accelerator 10 to component A by 0.5 - 1% dosage (by weight of component A) For a dense foam (foam factor 7-9) with high mechanical strength for gound improvement: Add the accelerator 15 to component B by 0.5 - 1% dosage (by weight of component A).

If there is no water in the ground, or a particularly rapid reaction is required, one can premix water to component A, 2% by volume of component A. After the addition of either Accelerator or water to the Component A, the can should be shaken vigorously to ensure even dispersion throughout the resin prior to injection works. To achieve the best mixing of the components during injection, the inclusion of a static in-line mixer in connection with the mixing head is strongly advised. The length of the static mixer should be approximately 50cm for correct mixing.

Cleaning of injection equipment

For short breaks in injection, pump only Component B through the in-line static

mixer nozzle. After injection and storage of the equipment pump clean engine or hydraulic oil through the pump and injection lines.

For cleaning, the use of a flushing agent for polyurethane resin should be used.

Storage

If stored in dry conditions, in unopened, tightly closed original containers and within a temperature range of +5°C and +35°C, the components of MEYCO[®] MP355/A3 have a shelf life of 12 months.

Safety precautions

Refer to the Material Safety Data Sheet for safety measures.

Avoid contact with skin and eyes by using the required personal protective equipment, such as overalls, gloves and eye goggles.

If contact with skin occurs, wash thoroughly using soap and water. If contact with eyes occurs, rinse thoroughly with an eyebath filled with boracic solution and seek medical advice.

The cured products are harmless.

Uncured products should be prevented from entering local drainage system and water courses.

Spillage must be collected using absorbent materials such as sawdust and sand, and dispose of in accordance with local regulations.

RHEOCEM® 650/650SR

Superfine portland cements for injection of rock and soil

Description

RHEOCEM® 650 and 650SR are superfine Portland cements for rock and soil injection. RHEOCEM® 650 / 650 SR have higher strength and faster setting than normal cements. Because of a small particle size and specially adapted admixture system, they penetrate very well into small cracks and fissures and give a good sealing effect against ground water flow.

RHEOCEM® 650 and RHEOCEM® 650 SR are two different cement types. RHEOCEM® 650 is a well graded cement milled from pure Portland cement clinker to become a microfine cement with a blain value of 650m²/kg. RHEOCEM® 650 SR is a micro cement with a blain value of 650m²/kg which is milled from sulphate resistant Portland cement with a low C₃A and low alkali content. RHEOCEM® 650 SR complies with BS 4027 sulphate resisting Portland cement.

Both products are quality assured by the Cement Industry Quality Assurance Scheme, independently monitored by the British Standards Institution (BSI QAS 2420/47).

Typical uses

- Rock injection: tunnels, caverns, etc., as pre- or post-stabilisation injection. Ground water sealing and ground stabilisation.
- Soil injection: Ground stabilisation, ground water sealing.

RHEOCEM® 650 and RHEOCEM® 650 SR show improved penetration capacity into microcracks, compared to normal fine cement and many other microfine cements.

RHEOCEM® 800 and RHEOCEM® 900 have further reduced particle size and may be chosen when requirements on penetration cannot be met by RHEOCEM® 650.

RHEOCEM® 650 has an open time of about 1½ hours, and a very short setting time. The grout has final set after about 2½ hours, and this will reduce the waiting time for the next activity to start to a minimum.

RHEOCEM® 650 SR has the same open time as normal fine cements.

- Standard cement injection technology and equipment can be used.
- Better penetration in small cracks and fissures and improved sealing.
- Fast setting.
- Better working environment and no hazardous components.
- No frost problems.
- Good durability.
- Economical solution.

Adding Value to Concrete

Packaging

RHEOCEM® 650 and 650SR are supplied in either 25kg or 1000kg bags.

Technical data*

* Properties listed are only for guidance and are not a guarantee of performance.

	RHEOCEM® 650	RHEOCEM® 650SR
Blaine	694m ² /kg	685m ² /kg
Particle size		
<40 micron	100%	100%
<30 micron	99%	99%
<20 micron	98%	97%
<15 micron	94%	93%
<10 micron	77%	79%
<5 micron	44%	47%
<2 micron	16%	18%

RHEOCEM® 650:

Initial setting 60-120 mins
(measured by Vicat needle)
Final setting: 120-150 mins
(1mm penetration by Vicat needle)

RHEOCEM® 650 SR:

Has the same setting as normal fine cement
Alkali (Eq Na₂O) 0.3-0.5%
Tricalcium aluminate 0.5-2.5%
(C₃A)

Injection grout properties indicated below relate to a mix containing 1.5% Rheobuild 2000PF:

Mud Balance 1.48-1.50kg/l
Water / cement ratio 1.0
Flow cone 32-34 sec.
Bleeding maximum 1%

Application procedure

Mixing:

RHEOCEM® 650 and 650SR shall always be used with the RHEOBUILD 2000PF as admixture (1.0-3.0% by weight of cement). Water / cement ratio should normally be between 0.5-1.0.

1. Fill water in the mixer, and add cement. Mix for 2 minutes.
2. Add Rheobuild 2000PF and mix for another minute.

It is very important to use an efficient mixer. Colloidal mixers are the best, but also high speed paddle mixers are acceptable, when using sufficient mixing time.

Minimum rpm for colloidal mixers 1500 rpm.
Minimum rpm for paddle mixers 400 rpm.

NB: Do not mix for too long. Too long mixing time may cause temperature increase which itself can cause setting in the pump and hoses.

Pot life

Immediately after mixing is finished, the grout shall be transferred to the agitator. In the agitator, the mix shall be kept in constant movement.

Adding Value to Concrete

Injection

High-pressure piston pumps are normally used to pump the suspension into the rock. To make sure that the suspension keeps on penetrating into the fissures, the mix should be used within 30-40 minutes after mixing. If a longer open time is required, this can be achieved by using Delvocrete Stabiliser Hydration Control Admixture. An alternative in such a case is to use RHEOCEM® 650 SR, which gives longer open time.

Hardening

RHEOCEM® 650 has normally set sufficiently to allow start of control hole drilling or blast drilling after 2-2½ hours.

Storage

Stored in original closed bags and in ventilated dry areas, RHEOCEM® has a shelf life of 6 months.

The reason for this relatively short shelf life is that micro cements are hygroscopic and will flocculate due to air humidity. Flocculation will reduce the penetrability normally achieved with a fresh cement. This is common property of all micro cements.

Safety precautions

Any physical contact (e.g. through sweat or eye fluid), made with RHEOCEM® concrete or mortar should be avoided, as it may cause irritation, dermatitis or burns.

If such contact occurs, the affected area should be washed with plenty of clean water. In case of eye contact, seek immediate medical advice.

Quality

All products produced by Degussa certified manufacturing facilities, are produced to conform to systems designed to meet internationally recognised quality standards.

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RHEOSOIL 211

Anti clay agent for TBM tunnelling

Product description

Rheosoil® 211 is a liquid product designed for use as an anti clay agent for TBM tunnelling application, particularly for the EPB machines.

Fields of application

For tunnel boring machines in clay containing ground.

- It increases soil consistency, and reduces torque.
- It reduces stickiness of the soil, and reduces the chance of blockage in the cutter head and conveying system.

Features and benefits

- Ready to use
- Cost effective anti clay agent
- Reduces the stickiness of the soil without reducing the consistency.
- Helps to increase the rate of advance of the TBM
- Compatible with the MEYCO® Fix SLF range of foam additives.
- Environmentally friendly

Packaging

Rheosoil® 211 is supplied in 1250 kg containers, or other container types as required.

Technical data

Form	Liquid
Appearance	Clear yellow
Density kg/m ³ ; 20°C	1270
Solids content ; % (1 hour ,130°C)	44± 1
pH; 20°C	7.3±0.3
Brookfield Viscosity RVT (mPa.s)	250 ±100
Dispersion in water	total

Application procedure

Rheosoil® 211 can be added with the foam solution or directly into water applied to the cutterhead or working chamber.

Consumption

The consumption depends on many factors such as ground type, water injection rate and soil consistency desired. Typically a dosage rate of 0.1-5 kg per m³ soil is required.

Storage

Store in temperatures between 5°C and 35°C in original containers. Consult your UGC representative if the product becomes frozen.

Safety precautions

Rheosoil® 211 is non-hazardous and requires no transport labelling. However, it is recommended that all necessary precautions are taken when handling chemicals, such as the use of gloves and eye protection.