

TUNNELLING

TBM Solutions | Sprayed Concrete & Ground Support | Grouting & Injection | Waterproofing Systems



Tunnelling

Normet Construction Chemicals are widely recognised as a major player in the global tunnelling industry. We understand the needs and requirements of our customers and can recommend products and solutions offering high productivity with a strong emphasis on safety.

From our state-of-the-art manufacturing facilities supplying the highest quality products through to our tunnelling experts who travel the world to support our customers, Normet has an enviable reputation as being a “one-stop-shop” for our international clientele. Our employees are experts in this field and bring with them a wealth of knowledge in such areas as:

TBM Solutions Sprayed Concrete & Ground Support Grouting & Injection Waterproofing Systems



In keeping with advancements in sprayed concrete technologies, Normet have developed high performance superplasticising admixtures, hydration control admixtures and alkali-free set accelerators. We can also supply a full range of equipment to handle any tunnelling project, both large and small, and can support you through on-site training and application methods for both the machinery and chemistry.

With the constant improvements in Tunnel Boring Machine (TBM) technology, together with an ever growing demand for higher TBM production and output capabilities, there is a strong requirement for improved admixture and material technology to support and enhance these increased advance rates. With this in mind, we are constantly improving and adding products to our TBM technology range, covering hard rock, EPB, open face and slurry type machines.

Soil Conditioning Foams / Clay Dispersants

We understand how the geological conditions can change from one advance to the very next and the need to adjust technology parameters [FIR & FER] such as using soil conditioning foams and polymers to ensure the highest excavation efficiency of all soil types, whether sandy silt, clay or highly abrasive rock.

Product Range

- TamSoil 100CF
- TamSoil 200CF
- TamSoil 600CP

Backfill Grout Admixtures

Normet understands the performance requirements and the difficulties our customers have in designing specific grouts, whether single component, active and non-active, A+B grout mixes, etc based on the TBM equipment and logistics available. Normet have a full range of admixtures to suit all backfill grout application methods, together with experts in the field to support you all the way.

Product Range

- TamCem 23SSR
- TamCem 8BFG
- TamCem CG
- TamCem HCA
- TamShot 10SS

Pre-excavation Injection Systems

Water ingress can cause major problems on any project, both inside the tunnel and in the surrounding geographical surface area. Our non-toxic products, such as polyurethanes, acrylics, colloidal silicas and microfine and ultrafine cementitious injection systems offer a complete solution for initially preventing water ingress through pre-injection and also sealing of water ingress in post-grouting situations.

Product Range

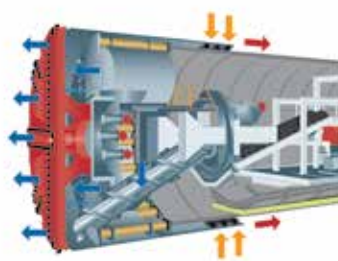
- TamAcryl 2000
- TamPur 100
- TamPur 125
- TamPur 130
- TamCrete 400CS
- TamCrete MFC
- TamCrete UFC

Tail Grease Products

We offer a selection of tail grease products inclusive of first fill grade suitable for use in shielded tunnel boring machine (TBM), where wire brushes are used to form a barrier between the tail shield and concrete segments. Our tail grease products effectively seal off any ingress of water, muck and backfill grout back into the tail end of the TBM. The tail grease range shows excellent adhesion properties to all substrates and good pumping properties.

Product Range

- TamSeal TG1
- TamSeal TG2



- water/foam/polymer/anti-clay additive
- tail sealant
- annulus grout



TBM

Pre-Cast & Lining Concrete Admixtures

High workability, high early and ultimate strengths, accelerated de-moulding time and segment durability are the main performance parameters we focus on when developing our range of pre-cast admixture technologies. TamCem high performance superplasticising admixtures provide the following benefits:

- Reduced cement consumption
- Superior surface finish
- Reduced labour and energy costs
- Increased impact resistance
- Savings on segment repair costs

Prevention is always better than cure!

Concrete Repair

Our range of TamRez epoxies have a proven track record in tunnel applications. From ultra low viscosity resins for structural crack injection to high strength bonding of pre-cast elements such as concrete segment cones and plugs.

Our range of TamCrete cementitious spray and trowel applied repair systems, gunite, slow, medium and rapid set mortars have been developed with durability, strength and ease of use in mind.

Related Products

- Waterproofing membranes for spray, roller and brush applied applications.
- Re-injectable grout tubes
- Grout and chemical injection packers
- Pumps and mixers

Technical Support

We have a team of experienced TBM tunnel professionals offering full technical support, training and site services to the most important aspect of our business, our customers!

Product Range

TamCem 23SSR
 TamCem 28HE
 TamCem 53
 TamCem 60
 TamCem HCA
 TamCem PP
 TamCem PPC

Product Range

TamRez 220
 TamRez 220U
 TamRez 310
 TamCrete Plug
 TamCrete PolyPlug
 TamCrete TP
 TamCrete TopShot

Sprayed Concrete & Ground Support

The use of wet sprayed concrete has increased dramatically during the last 25 years. As both a temporary support and permanent support element, it has been accepted as a replacement for traditional lining concrete in many permanent tunnel, mine and underground construction applications. The introduction of high performance superplasticising admixtures, hydration control admixtures, fibres and alkali-free accelerators together with the existing quality control procedures at the concrete producers batching plant has assisted in the rapid growth of sprayed concrete usage across the globe.

Normet Construction Chemicals are at the forefront with our latest "state-of-the-art" admixture developments which promotes long open time, workability, low water cement ratios, high early and ultimate strength developments and lower dust emissions, creating a cleaner working environment.

Sprayed Concrete Accelerators

TamShot 80AF, TamShot 90AF & TamShot 80PAF are high performance, alkali-free accelerators for sprayed concrete applications.

With typical dosage rates of 5% - 6%, TamShot 80AF and 90AF's unique function also suppresses dust development, providing a cleaner working environment.

Product Range

TamShot 80AF
TamShot 80PAF
TamShot 90AF

TamCem Range - Admixture Technology

Our TamCem admixtures have been specially developed using cutting edge technology for all types of sprayed concrete. They are especially effective where only poor quality aggregate and sand grading are available and significantly enhance overall performance.

Product Range

TamCem 21MR
TamCem 23
TamCem 23SR
TamCem 23SSR
TamCem 60

High Performance Superplasticisers

These products ensure the highest possible strength development is achieved no matter what the quality of cement and other constituents of the mix may be. Due to the cohesiveness of the mix, both aggregate and steel fibre rebound is substantially reduced, saving both time and cost.

Product Range

TamCem 53
TamCem 60
TamCem 23SSR



Sprayed Concrete & Ground Support

Hydration Control Admixtures

TamCem HCA is a special admixture that prevents the early hydration of cement. It can be added at the concrete batching plant or directly into the truck mixer on site to extend the working life of both concrete and sprayed concrete. The dosage depends on the working time required, and the open time of sprayed concrete can be extended from between 3 hours to 72 hours. This is ideal for tunnel applications where sprayed concrete has to be available at all times during excavation in bad geology.

Product Range

TamCem HCA

Sprayed Concrete Equipment

Normet offers a complete range of equipment for all sprayed concrete applications including the Spraymec 8100 for standard large tunnel profiles, and for the extra large tunnels, the Spraymec 9150. For smaller diameter tunnels and shafts, Normet's range includes the Alpha 30 and also the Minimec spraying robot.

To complete our sprayed concrete equipment portfolio, we offer a Normet stand alone pump incorporating the Nordoser XEP electrically controlled accelerator dosing system. This versatile unit can either be used together with the Minimec spraying robot, or alternatively as a hand spraying pump.

Product Range

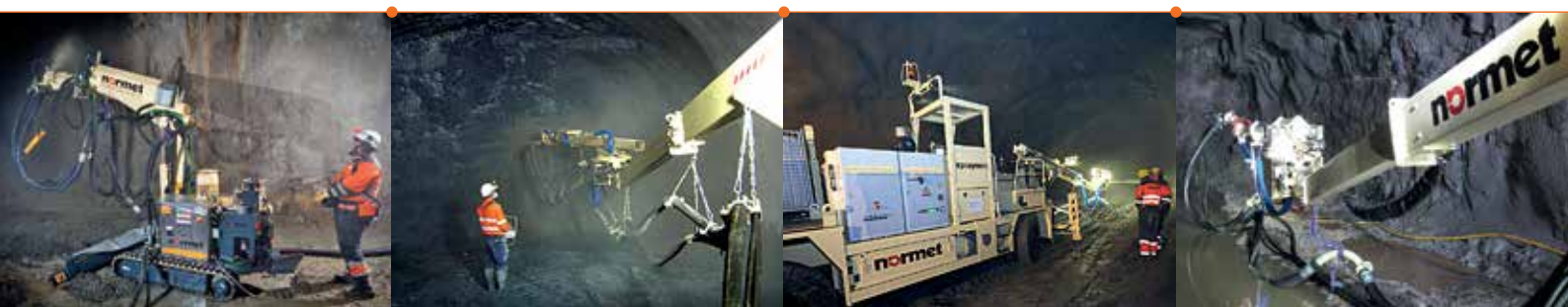
Normet Alpha 30
Normet Minimec
Spraying Manipulator
Normet Spraymec
7110 series
Normet Spraymec
8100 series
Normet Spraymec
9150 series
NorRunner

Temporary Ground Support

TamCrete TG is a third generation thin spray applied liner specifically developed for temporary support of various rock and soft geological ground conditions. Typically used in smaller diameter shafts and tunnel excavations, due to the unique combination of reduced material requirement per m², together with its compact application equipment.

Product Range

TamCrete TG



Grouting & Injection

Water ingress in tunnels can have catastrophic consequences to the structural integrity, the surrounding environmental area, safety and to the cost of a project. This has created a demand for higher performance grouting materials.

Normet Construction Chemicals have developed an extensive range of pre and post injection technologies to suit all rock and soil conditions, including microfine and ultrafine cements, colloidal silica gels, polyurethanes, acrylic gels and combination grouts.

Microfine and Ultrafine Cementitious Injection Systems

Our TamCrete Microfine and Ultrafine cements are produced from pure ground portland cements and therefore have total blaine particle sizes ranging from 650 to 900 m²/ kg, and D95 of < 15 microns down to < 10 microns. These unique products allow the adoption of ultra high water / cement ratios which provide excellent results in terms of penetration, ultra low bleed (< 2% characteristics) and initial setting times of less than 60 minutes. This helps to accelerate grout cycle times and reduce project costs.

Product Range

TamCrete MFC
 TamCrete MFC SR
 TamCrete UFC
 TamCem HCA
 TamCem 23

Colloidal Silica Gel

Colloidal silica is considered to be the lowest viscosity grouting material available. Our TamCrete 400CS system is an ultra-low viscosity, nano-solution silica gel that has a highly variable gel-time depending on the accelerator dosage used. This environmentally-friendly system ensures excellent penetration of fine fissures, sands and silt where micro-cements cannot penetrate. TamCrete 400CS can be mixed with any traditional grout mixing and pumping equipment and is injected as a single component material.

Product Range

TamCrete 400CS



Grouting & Injection

Grout Enhancing Admixtures

Driven by technology advancement, Normet have developed a range of grout enhancing admixtures which improve the stability of active cementitious and non-active lime grouts. Our technologies offer stabilisation, anti-washout, low water /cement ratio's, highly flowable grouts, reduction of bleed water, long open times and enhance early and ultimate compressive strengths.

Product Range

TamCrete CG
 TamCem 77TG
 TamCem 23SSR
 TamCem HCA

Acrylic Gels and Grouts

The TamAcryl range of acrylic gels and combination grouts offer total flexibility to adjust the gel times from seconds to hours, achieve variable gel consistencies and adjust compressive, bond and tensile strengths through the addition of various inert components. TamAcryl gels and grouts can be injected as 2-component systems where rapid gel development is required for water sealing or as a single component system where high penetration capabilities are required. All of our acrylic gels and grouts are non-toxic, environmentally friendly and carry potable water certification. None of our acrylic technologies contain acrylamides.

Product Range

TamAcryl 2000

Polyurethanes

Normet have long been considered the industry leaders in the development of polyurethane grouts both for leak sealing and ground consolidation.

Our extensive portfolio includes rigid, flexible, semi-flexible, water activated and silicate/polyurethane hybrids. Our 2-part structural and expanding polyurethane grouts have proved invaluable to our customers where rapid water sealing is required. We also offer a selection of two-component polyurethane products designed for rapid stabilisation of soft ground geologies, rapid cavity fillings and strata consolidation together with fire resistant properties. Our products are used when enhanced structural integrity of the rock is required, while providing strength and flexibility.

Product Range

TamPur 100
 TamPur 116
 TamPur 117
 TamPur 125
 TamPur 130
 TamPur 150



Waterproofing Systems

“A watertight structure” is a frequent term used in many modern tunnel and underground structure specifications. Tunnel waterproofing is no longer solely based on Pre-formed Polymer Sheet Membrane (PPM) especially when adopting a Permanent Sprayed Concrete Lining system. The use of spray applied waterproofing membranes offers a fast and efficient system and simple, lightweight application equipment enhances the user friendliness and safety. Normet have developed a range of robotic and manually applied waterproofing systems for tunnels and underground construction.

TamSeal 800 - a high performance, single component, spray applied membrane which offers a tough, but highly flexible waterproof membrane. Application is by a simple dry rotor machine process and excellent production rates can be achieved (> 200 m² / hour). Excellent bond strength to concrete, sprayed concrete and steel (rock bolts and protrusions) offers a robust and versatile waterproofing system.

TamSeal 10F - a two-component, flexible spray or hand applied waterproof membrane for tunnels and water retaining structures.

TamSeal Drainage Fleece - a lightweight, double sided polyester needle felt with integrated polyurethelene sheet for use in various locations that require pressure relief such as drained tunnel areas. TamSeal Drainage fleece is also used to provide a dry substrate on which to apply the TamSeal range of waterproof membranes.



Tunnel Support Systems

Normet are now successfully marketing and supplying Tunnel Support Systems which includes the design, profile and manufacturing of Lattice Arch Girders, Canopy Tube systems (including drill bits and rods), Titanex Friction Rock Bolts and the D-Bolt. The D-bolt is an energy rock bolt with unique anchoring system that enables unmatched energy absorption, combining high strength with elongation tolerance. Please contact your local Normet sales representatives for more details on our tunnel support systems.

Normet Construction Chemicals does much more than provide solutions to tunnelling projects

Normet Construction Chemicals has over 30 years of problem-solving experience in locations around the world.

Other Normet Construction Chemicals product groups

Normet also manufactures and distributes products for -



> Mining

Complete range of specialist resins and grouts for water control, pre-injection, fissure grouting, void and cavity filling, stabilisation and rock support. Injection packers, rock bolting systems, along with high performance sprayed concrete and mine backfill additives.



> Rehabilitation and Maintenance

Comprehensive range of leak sealing resins, cement and epoxy based structural repair mortars and grouts, bonding agents, additives, protective coatings and impregnation systems.



> Ground Engineering

Specialist resins and cement based injection grouts for permeation grouting, fissure grouting, underpinning, void filling and ground stabilisation.



> Readymix and Precast

Solutions to enhance concrete placing efficiency and optimizes overall concrete performance for all types and grades of pre-cast, pumped and sprayed concrete.



> Watertight Structures

Includes a range of coating and liquid applied systems along with in-depth, integral and impregnating materials.

Please ask for more information or visit
www.normet.com

Note to Specifiers

Normet's technical team are available to assist you with any questions on product suitability along with technical support on the installation or application of our tunnelling materials and systems.

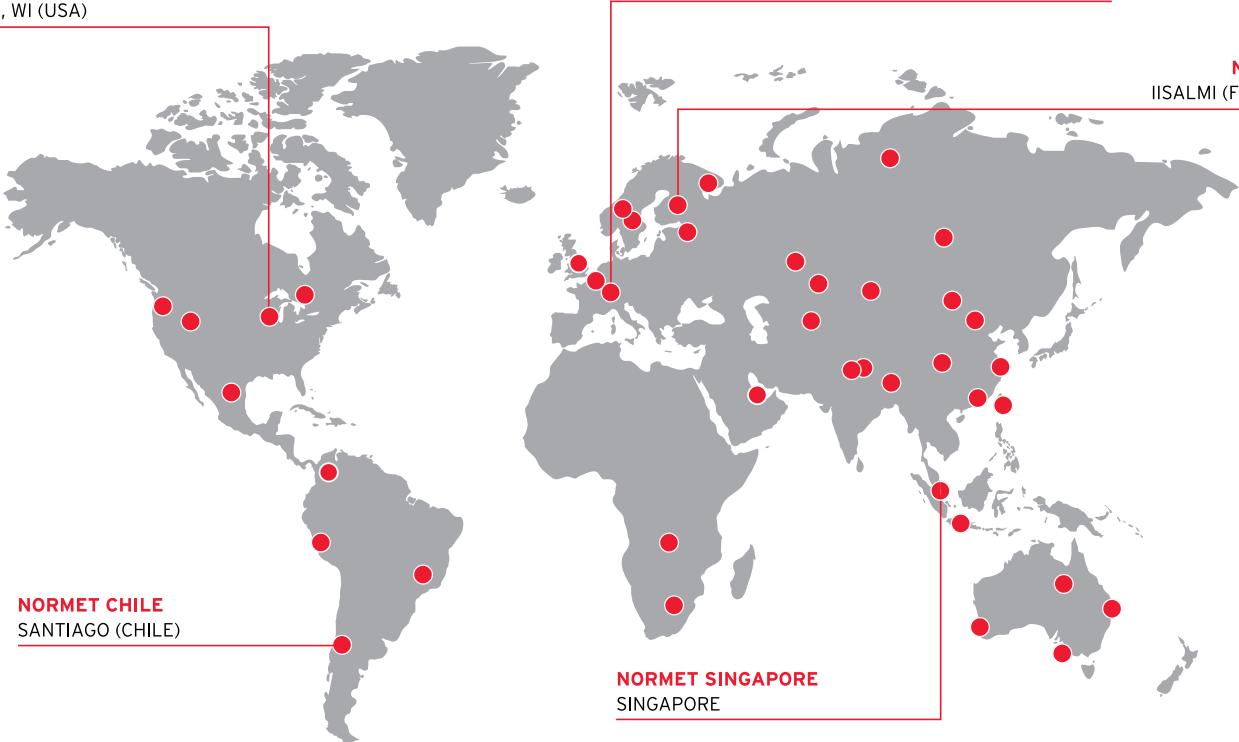
Please contact your local Normet office, distributor or applicator for further advice or information.

Global Presence / Local Support

NORMET AMERICAS
UNION GROVE, WI (USA)

NORMET INTERNATIONAL
HÜNENBERG (SWITZERLAND)

NORMET
IISALMI (FINLAND)



NORMET CHILE
SANTIAGO (CHILE)

NORMET SINGAPORE
SINGAPORE

NORTH AMERICA

- Canada
- Mexico
- USA

SOUTH AMERICA

- Brazil
- Chile
- Colombia
- Peru

EUROPE

- Finland
- France
- Norway
- Russia
- Sweden
- Switzerland
- United Kingdom

AFRICA

- South Africa
- Zambia

ASIA

- China
- Hong Kong
- India
- Indonesia
- Kazakhstan
- Mongolia
- Qatar

- Russia
- Singapore
- Taiwan
- Uzbekistan

AUSTRALASIA

- Australia

For more information, please contact your local Normet representative,
visit www.normet.com for contact details.

NORMET BROCHURES

GENERAL

FOR TOUGH JOBS

LTC - LIFE TIME CARE

EQUIPMENT

CONCRETE SPRAYING & TRANSPORT

CHARGING

LIFTING & INSTALLATIONS

SCALING

UNDERGROUND LOGISTICS

SEMMCO PRODUCT LINE

ESSVERK PRODUCT LINE

CONSTRUCTION CHEMICALS

CONSTRUCTION CHEMICALS

MINING

› TUNNELLING

REHABILITATION & MAINTENANCE

GROUND ENGINEERING

READYMIX & PRECAST

WATERTIGHT STRUCTURES

ROCK REINFORCEMENT

ROCK REINFORCEMENT

