



The Chemical Company

Solutions for tunneling and mining

Waterproofing

Expanding Horizons

Underground





The Bonded Waterproofing Concept

Continuous Structure with a Bonded Membrane

An innovative approach, the MASTERSEAL® 345 waterproofing membrane

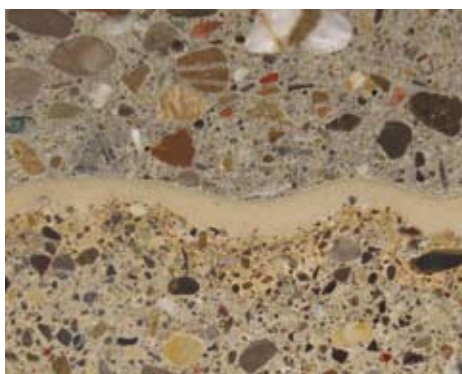
- This bonded waterproofing membrane establishes a new concept for waterproofing.
- A bonded waterproofing membrane can resolve technical problems which have proved difficult to resolve with conventional sheet membranes.
- The bonded membrane prevents migration of water along the concrete-membrane interfaces on either side of the membrane.

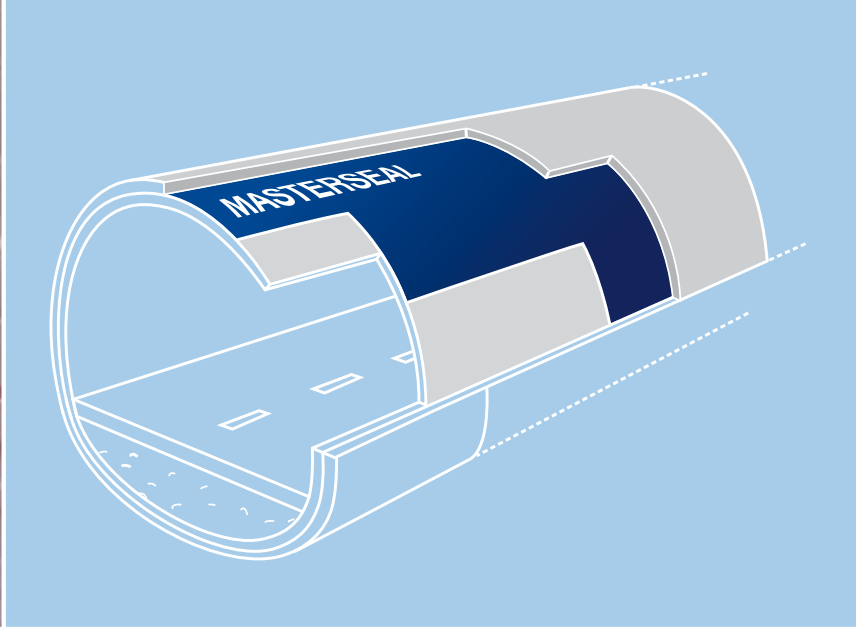
Composite Mechanical Behavior

Waterproof single-shell composite tunnel lining

- The tensile bonding and shear strengths of the concrete-membrane result in a mechanical behavior of a composite structure. Therefore the primary support lining and the inner final lining act together and can be considered as part of the permanent support structure.
- Both primary lining and secondary lining together with the bonded membrane can be designed for long-term durability: a permanent, long-term durable waterproof tunnel lining.

Permanent Long-term Durable Tunnel Lining





For Owners

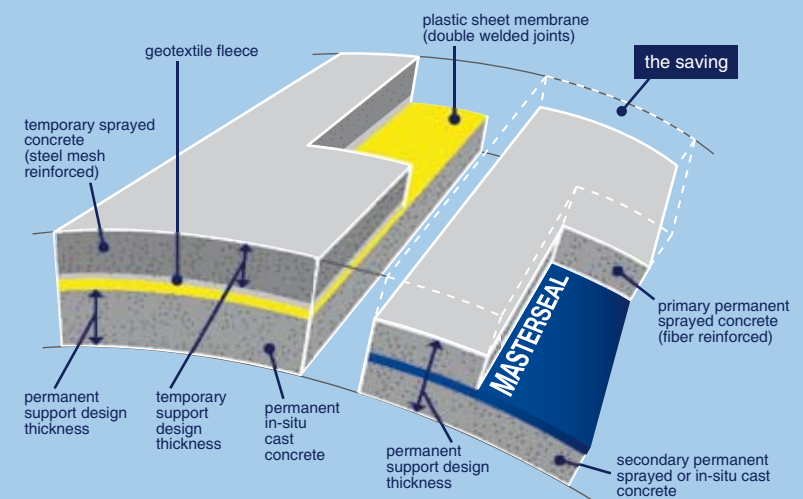
- Reduced total construction time and costs
- Reduced maintenance and operational costs
- Reliable technical solution

For Designers

- Composite waterproof tunnel lining opens up new cost-effective design opportunities
- Composite behavior of entire lining allows for significant reduction of lining thicknesses
- Compatibility with other waterproofing systems allows for combination of two systems, and hence the possibility of better technical optimization
- Exceptionally cost-effective for rehabilitation of old tunnels

For Contractors

- Simple application methodology
- High-speed application
- Robotic, fully automatic application possible with MEYCO Logica
- Fiber reinforced sprayed concrete final lining can be easily applied onto membrane





Design Flexibility

Cost-effective Waterproof Single-shell Tunnel Linings

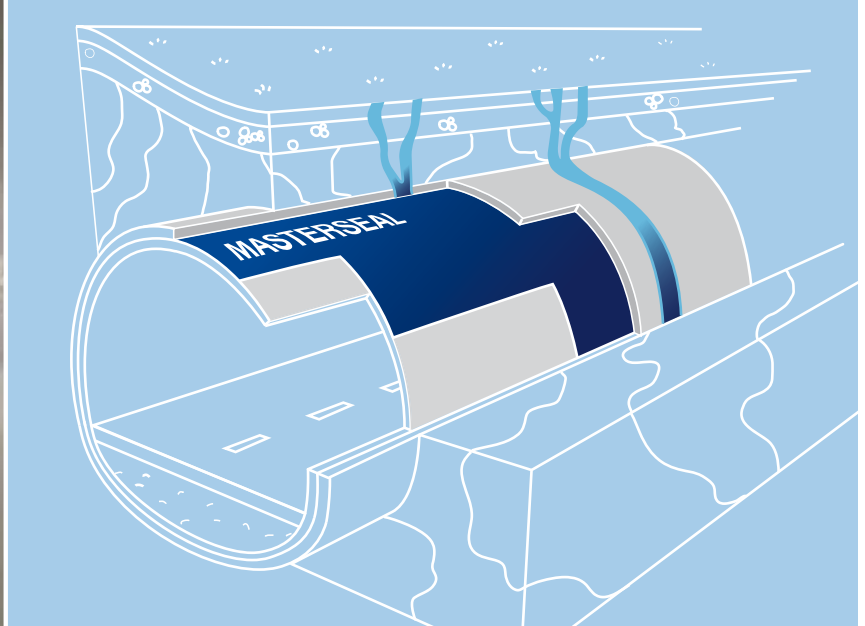
Drained and Undrained Design Options Possible

Ideal for Complex Shapes of Underground Structures

Enhanced opportunities

- The spray-applied membrane facilitates the construction of monolithic, single-shell tunnel linings using permanent sprayed concrete. Recent projects adopting this approach have shown significant project savings over the double-shell method. MEYCO can assist you with this design concept.
- MASTERSEAL 345 in combination with sprayed concrete offers unique advantages in refurbishment projects such as the maintenance of the existing tunnel profile.
- MASTERSEAL can be used in combination with sheet membranes. Standard joint details between MASTERSEAL and sheet membranes have been established, making the system totally flexible.
- Both undrained and drained lining designs are possible. For drained solutions, geotextile or systematic drainage pipes are used.
- MEYCO can supply you with a generic specification compiled by an international tunnel consultant.
- The MASTERSEAL spray applied system is ideally suited to underground structures with complex geometries, such as lay-by niches, cross passages, turnouts and crossover caverns.
- MASTERSEAL may be applied to limited sections to provide isolated waterproofing, such as in the crown sections of tunnels where conductor cables for electrical trains are situated.
- MASTERSEAL is a continuous waterproofing system without discrete joints, and does not require water stops or compartmentalization.





Application

Cost-effective in Challenging Conditions

Simple Surface Preparation

Fast and Safe Application with a Small Working Team and Simple Equipment

Final Inner Lining

Simple and flexible application methods

- Manual application rates up to 100 m²/hour.
- Mechanized robotic application rates up to 180 m²/hour.
- A small team of 3 operators is required for application.
- Water seepages in substrate are handled using small temporary drainage holes.
- Suitable surface roughness for the application of MASTERSEAL 345 is achieved through adjustments of the mix design of the primary lining sprayed concrete.
- Application using dry spraying equipment (e.g. MEYCO Piccola).
- Entirely safe for the application crew and the environment.
- MASTERSEAL 345 can be used in conjunction with fiber reinforced concrete.
- The final inner lining is applied when the waterproofing membrane has achieved a sufficient curing condition.
- Final inner lining is established by either cast or sprayed concrete.





Operational Security

Less Risk of Water Ingress

- Technically functional and reliable system.
- The bonding characteristics of MASTERSEAL 345 ensure that the migration of water along the concrete membrane interface cannot develop.

Low Maintenance and Repair Costs

- Eventual rehabilitation or repair of leaks is far simpler compared to most other waterproofing systems.

Long-term Durability

- MASTERSEAL 345 contains long-term durable chemical compounds.
- No decomposition of MASTERSEAL 345 under most known groundwater conditions.
- Functional requirements for waterproofing fulfilled over the design life of the underground facility.

New Life to Old Tunnels

- A unique asset of the MASTERSEAL 345 system is its versatility and cost-effectiveness in rehabilitation situations.





Know-how and Service

Assistance During Design

MEYCO provides assistance to owners and designers in the layout of complete system solutions with permanent sprayed concrete and Masterseal 345.

Important issues in this process are:

- interface possibilities with other waterproofing systems
- specification details of the required properties of sprayed concrete
- correct substrate characteristics

MEYCO brings extensive know-how gained through many years' experience solving challenging situations.

Practical Training and Technical Service

MEYCO provides technical training of operator personnel for all phases of the application of Masterseal 345. Technical training is generally offered as on-site practical education in which all details of the application process, including the correct substrate treatment, are covered. During ongoing works with the application of Masterseal 345, technical specialists from MEYCO are available for assistance and troubleshooting in order to secure a good technical result, as well as optimizing the application process.



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Documentation available on request:

- Reference list
- Project reports
- Design guidelines
- Method statements
- And more

Certified quality

Product Development Process
is certified according to



Pictures of the Hindhead project are courtesy of Highways Agency and Balfour Beatty