

DELTA®

DELTA® protects property. Saves energy. Creates comfort.

COSELLA DÖRKEN

DELTA®-MS

Tunnel Liner
High Capacity Drainage.™
Highly resistant to compression and degradation.



PREMIUM QUALITY

■ Drainage systems

■ For commercial construction and civil engineering

■ High performance in vertical and horizontal applications and tunnel linings



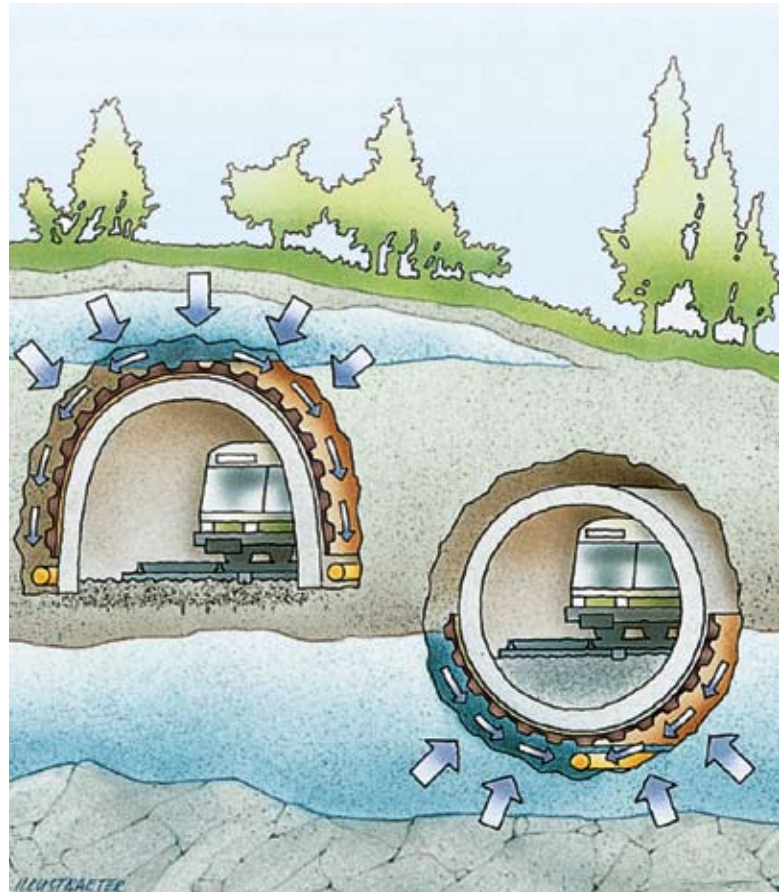
DELTA®-MS & DELTA®-MS 20

Systems for Underground

The Situation:

Efficient drainage is of paramount importance while a tunnel is actually being built as well as after its completion. Depending on the local conditions and rock consistency, the upper arch as well as the floor of the tunnel may be impacted by aquifers and seepage water. In the long run, both the durability and the usability of a tunnel largely depends on the extent to which its inner shell and floor have been reliably protected against the incursion of water and any subsequent frost damage. This being so, it is

advisable to manage water between the inner and the outer shell of the tunnel both along the arch and the floor of the tunnel in suitable drainage and seepage layers and to drain it away under controlled conditions. This holds particularly true for tunnels built using waterproof concrete, which may neither come into contact with seepage water nor be exposed to hydrostatic pressure while it is setting.





ound Tunnel Construction.

DELTA®-MS

A Continuous and Safe System of Channels.

DELTA®-MS is a sensible and reliable solution for coping with the influx of water in tunnel projects of any kind. Installed with its dimples facing outward, i.e. towards either the rock substrate or a shotcrete layer applied for stabilization and filtration purposes, the air gap between the dimples will form a continuous system of channels.

This continuous drainage space will convey any water coming from the

ground towards the drainage system without impeding its flow. The inner waterproofing layer of the system, which may be attached directly to the dimpled sheet by any of a number of methods, is never impacted by water pressure. DELTA®-MS may serve as permanent shuttering, in structures made of waterproof concrete, keeping away any seepage water while the concrete sets.

DELTA®-MS 20

For Ultimate Drainage Capacity.

The drainage capacity of DELTA®-MS 20 is many times higher than that of DELTA®-MS, providing even more safety. Thanks to its thickness of 0.79" (20 mm), the air gap offers high drainage capacity reserves to cope with extreme amounts of water.



TECHNICAL DATA

DELTA®-MS

Material:	Special High-Density PE
Dimple height :	approx. 5/16" (8 mm)
Compressive strength:	approx. 5200 psf (250 kN/m ²)
Drainage capacity :	approx. 12 gal/(min x ft) (149 l/(min x m))
Air volume between dimples:	approx. 0.13 gal/ft ² (5.3 l/m ²)
Service temperature range:	- 22 °F to + 176 °F (- 30 °C to + 80 °C)
Fire resistance rating :	Standard flammability as per DIN 4102 class B2; optional DIN 4102 class B1 for special requirements
Roll size:	6.5' x 65.5' (2 m x 20 m)

DELTA®-MS 20

Technical data as for DELTA®-MS except

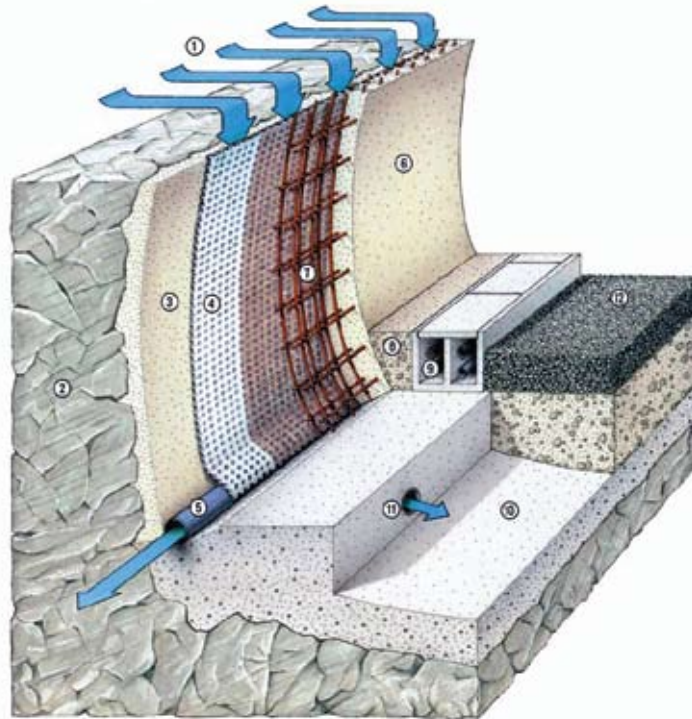
Dimple height :	approx. 0.79" (20 mm)
Compressive strength:	approx. 3120 psf (150 kN/m ²)
Drainage capacity :	approx. 48 gal/(min x ft) (600 l/(min x m))
Air volume between dimples:	approx. 0.34 gal/ft ² (14 l/m ²)

High drainage capacity in double-shell structures.

DELTA®-MS:

- is a durable dimpled sheet made from special high density polyethylene with high chemical and compression resistance.
- offers outstanding drainage performance thanks to its dimple design.
- resists degradation in soil and chemical attack.
- non-polluting for drinking water.
- may be applied as a cost-effective, permanent horizontal or vertical shuttering between a shotcrete shell or curtain wall and a structural concrete wall.
- is ideal for coping with water-related problems in tunnel construction. With the dimples facing outward, the sheet forms a continuous system of channels by which water is guided towards the drain.
- drains off water emerging from the rocky subsoil when vertically applied.
- drains off water emerging from the rocky subsoil when vertically applied.
- controls rising ground water when laid horizontally between the foundation and the surface layer and conveys it towards the drain.

DELTA®



- ① Water influx through fusers
- ② Bedrock
- ③ Shotcrete
- ④ DELTA®-MS dimpled sheeting
- ⑤ Drainage pipe
- ⑥ Tunnel tube (shotcrete)
- ⑦ Reinforcement
- ⑧ Lean concrete
- ⑨ Cable ducts
- ⑩ Floor vault
- ⑪ To collector pipe
- ⑫ Aggregate base

The information printed in this brochure reflects product information and specifications at the date of printing. The manufacturer reserves the right to make changes when necessary.

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