

DELTA® protects property. Saves energy. Creates comfort.

TECHNICAL DATA SHEET

DELTA®-MS TUNNEL LINER

Tunnel Ceiling & Wall Application

MATERIAL

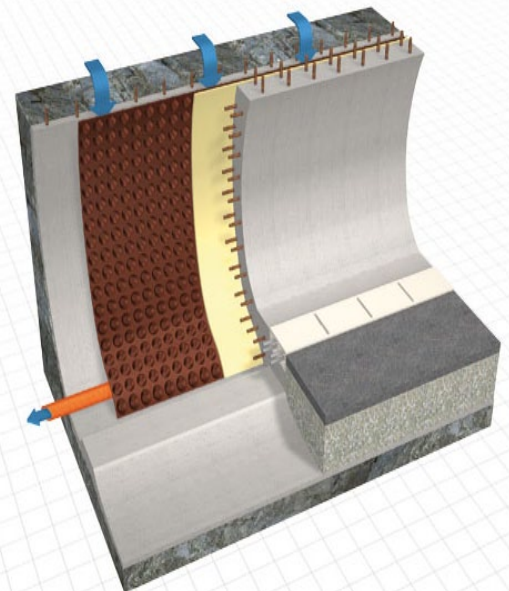
DELTA®-MS TUNNEL LINER is manufactured with an exclusive co-extrusion process, utilizing 60% recycled high-density polyethylene (HDPE) from municipal recycling programs in the middle, and two thin layers of a special virgin HDPE on the outside. The encapsulation of the recycled HDPE ensures that DELTA®-MS TUNNEL LINER is protected against degradation caused by oxidation and environmental influences like acidic soils or alkalinity (concrete). DELTA®-MS TUNNEL LINER, equipped with highly effective additive packages, provides high compressive strength, impact resistance, and chemical and environmental stress crack resistance.

PROPERTIES

DELTA®-MS TUNNEL LINER is a dimpled membrane, impermeable to water and water vapor. The dimple pattern creates an air-gap that forms a continuous system of channels. This continuous drainage space will convey any water coming from the ground towards the drainage systems without impeding its flow. DELTA®-MS TUNNEL LINER is also available in a highly fire-resistant version, with the B1 fire rating (DIN 4102).

APPLICATION

DELTA®-MS TUNNEL LINER is installed by rolling out the panning material in the machine direction (roll length). The bedrock is pre-drilled through the membrane, then the membrane is secured with the Hilti IDP insulation anchor system. Any holes in the membrane made to accommodate the structural dowel anchors in the adjacent bedrock for the reinforcing steel connections of the tunnel structure can be sealed using fibrated mastic or DELTA®-FLEXX-BAND to ensure a water tight seal around the dowels. The installation of the Hilti anchors must be done in a manner that provides positive support for the DELTA®-MS TUNNEL LINER until the tunnel concrete is in place. DELTA® Accessories complete the tunnel liner installation.



Technical Data

Product name	DELTA®-MS TUNNEL LINER	
Color	chocolate brown	
Material	Recycled high-density polyethylene, encapsulated between two layers of special virgin HDPE	
Dimple height	5/16" (8mm)	ASTM D6364-06
Compressive strength	approx. 5,200 psf (250 kN/m ²)	ASTM D6364-06
Fire resistance	B2	DIN 4102
	B1 available upon request	
Flow rate / unit width @ Hydr. grad. 1; 100 kPa	10.6 gal/min/ft (132 l/min/m)	ASTM D4716-08
Flow rate / unit width @ Hydr. grad. 0.1; 100 kPa	3.0 gal/min/ft (37.5 l/min/m)	ASTM D4716-08
Air-gap volume between dimples	apprx. 0.13 gal/ft ² (5.3 l/m ²)	ASTM D4716-08
Water penetration resistance	> 120 psi (815 kPa)	AATCC 127-1995
	Watertight	
Water vapor transmission	< 22 ng/(Pa s m ²)	ASTM E96, Meth. A
Vapor permeance	< 0.3 perms [grains/h/ft ² /in Hg]	ASTM E96, Meth. A
Temperature range	-22°F to +176°F (-30°C to +80°C)	ASTM D5261-92
Chemical properties	Excellent chemical resistance, resistant to root-penetration, rot-proof	
Toxicity	non-toxic, non-polluting	
Weight per unit area	approx. 17.1 oz/yd ² (580 g/m ²)	ASTM D5261-92 (2003)
Roll size	5' x 60' (1.5 m x 18.2 m)	
Service life expectancy	> 25 years (at pH between 4 and 9, and temperature below 77°F / 25°C). Do not expose to UV light for more than 30 days.	
DELTA® Accessories	DELTA®-MULTIBAND DELTA®-FLEXX-BAND DELTA®-COLDJOINT BARRIER	

DELTA® products support sustainable and energy-efficient building practices, including efforts toward achieving LEED® certification (LEED® for New Construction & Major Renovations, LEED® for Core and Shell, LEED® for Existing Buildings and LEED® for Homes).

For technical support, call our technical support team at 1-888-4DELTA4 (1-888-433-5824) extension 326, or visit www.cosella-dorken.com.

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