Water and Frost Protection

Polyethylene Foam (PE) Sheets

Details provided by Skumtech AS
Following pictures from Norwegian W. Coast road tunnel (Veitastronda). Same system also used for railway tunnels.

- Foam sheet overlap = 30 cm
- Typical bolt spacing 1.2 x 1.2 m
- Bolts Ø16 mm in road tunnels and Ø25 mm in railway tunnels
- Thickness of PE sheets 50-100 mm
Fixation bolts for PE-foam sheets
Foam sheets mounted
Final steps illustration
First, permanent rock support by rock bolts and fibre reinforced sprayed concrete.

Then, PE foam sheet umbrella to divert water to invert drainage and prevent drips and build-up of ice. Foam sheets are mounted on rock bolts. Available: 45, 50, 60 and 70 mm thickness & 2x 40 mm.

Mesh reinforcement is mounted on tunnel side of PE-foam sheets at 25 to 30 mm clearance before placing sprayed concrete.

Sprayed concrete applied for fire protection and for stiffness against air-pulses created by traffic. 2 kg/m3 added PP-fibres to prevent spalling during fire.
PE-sheets alternatively mounted **without** overlap

Bolt pattern 1.38 X 1.38 m

(Note that when **frost is not an issue**, PE-sheets will be replaced by PVC or HDPE membrane)