



# Tunnel Construction

## Waterproofing

### A10 Tauern motorway near Zederhaus – noise reduction tunnel

Motorway enclosure with innovative geosynthetic waterproofing system



A10 motorway enclosure near Zederhaus, Salzburg-bound direction

### Background

The A10 motorway in Austria is one of the key north-south links through the Alps. To reduce noise disturbance to the village population in Zederhaus, the decision was taken to enclose a 1.5 km long section of the motorway. The waterproofing system specified for installation by the general contractor had the disadvantage that any leakages would have allowed the uncontrolled spread of water below the membrane, with large-scale structural damage as a possible consequence.

### Solution

For the waterproofing subcontract tender, HUESKER provided the project team with a conclusive, reliable and economical solution to this problem by developing the “infiltration-proof double membrane”.

The adopted solution involves the placement of fill material in the trapezoidal gap between the cut-and-cover tunnel tubes prior to the start of waterproofing so as to create a single, integral profile embracing both tubes.



Motorway enclosure after completion of works

The resulting crossfalls ensure that the water drains away easily from the critical area. The first component of the double membrane system, the Tektoseal Clay NA 5000+ geosynthetic clay liner (GBR-C), is installed directly on to the concrete surface as the secondary waterproof barrier. The factory-applied bentonite edge layer ensures that even vertical overlaps remain watertight. The direct contact pressure with the concrete automatically prevents the infiltration and spread of water behind the liner.

The Tektoseal Clay NA 5000+ GCL also provides a suitable base for the immediately overlying primary waterproofing layer, comprising a 2 mm PE-HD polymer membrane, type GSE 2.0 HD. The hot-wedge weld seams, arranged perpendicular to the longitudinal tunnel axis are testable with compressed air. In the unlikely event of any leakages in this membrane, the underlying Tektoseal Clay liner provides an “infiltration-proof” second line of defence to





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Installation of Tektoseal Clay 5000+ as self-healing, secondary waterproof barrier



Installation of primary 2.0 mm PE-HD waterproof barrier, welded and leakage-tested.



Installation of drainage and protection mat as third geosynthetic layer

prevent the uncontrolled spread of water over the concrete surface. To protect the waterproof barrier while facilitating the run-off of precipitation, a FabriNet HF-E B200 drainage and protection mat is installed directly over the double membrane as the top system layer.

Finally, the entire enclosure is covered over with some 260,000 m<sup>3</sup> of soil and vegetation. For the 1,200 residents of the municipality of Zederhaus, the motorway enclosure scheme will result in a significant improvement in their quality of life.

### Benefits

With its testable hot-wedge double seams arranged perpendicular to the tunnel axis, the primary PE-HD waterproof barrier offers long term reliability, with additional protection offered by the self-healing, secondary Tektoseal Clay NA 5000+ geosynthetic clay liner. Thanks to its straightforward and efficient installation, the innovative, sustainable waterproofing system also delivers a highly cost-effective solution.

- Project:** Noise reduction tunnel (enclosure), A10 motorway near Zederhaus
- Location:** A-5584 Zederhaus (Province of Salzburg)
- Client:** Autobahnen- und Schnellstraßen-Finanzierungs-Aktiengesellschaft (ASFINAG)
- Designer:** GEOCONSULT ZT GmbH, Salzburg
- Contractor:** General contractor: Felbermayr Bau GmbH, Waterproofing: ISO-M GmbH
- Built:** August 2013 to July 2017
- Products:** Tektoseal Clay NA 5000+, Polymer membrane, GSE 2.0 mm Drainage and protection mat, type FabriNet HF-E B200

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