



Tunnel Rastatt (D) Cross-Passage Waterproofing

Country	Germany
Type	TBM-Tunnel, Cross-Passage
Client	DB Netz AG (German Railway), DB Projektbau GmbH
Main Contractor	Ed. Zueblin AG, Hochtief Solutions AG
Execution of the work	Renesco GmbH
Designer	DB Netz, Prof. Kirschke
Construction Period	2021/2022

Project Description

The railway project involves the construction of two single-track tubes with an inner diameter of 9.60m with a length of approx. 4,270m as well as the upstream and downstream located open cut constructions. The tunnel crosses under the urban area of Rastatt and the Federbach lowlands, partly within a groundwater basin.

Due to the geological and hydrological conditions, two tunnel boring machines are used to drive the tunnel sections, which are used as hydro shields. In the area of the Federbach lowlands, tunnelling is carried out under an icy roof. Beneath the Rhine Valley Railway (in the Niederbühl area), tunnelling takes place under the protection of a ring of ice. The two tubes of the tunnel will have a circular cross-section and will be lined with single-shell precast reinforced concrete segments. The connecting structures are driven out of the tunnel tubes in two shells using shotcrete construction to protect them from freezing.

Scope of Service

The 8 cross-passages are to be designed as double-shell tunnels with an outer shell made of shotcrete and an inner shell made of watertight concrete. The connecting structures must meet the tightness requirements of class-1 according to Ril 853 (German standard) and consequently receive a loose-laid sheet waterproofing membrane fully around (360°) between the outer and inner shell, which is to be tightly connected to the segmental lining.

- 3.2mm FPO/TPO flexible sheet waterproofing membrane with an E_{1-2} modulus of $\leq 65\text{N/mm}^2$
- Geotextile, Polypropylene ($1'000\text{g/m}^2$)
- FPO/TPO Protection sheet membrane (3mm)
- FPO/TPO Water barriers (600mm, 6 ribs, 30mm)
- Remedial Grouting System & Concept
- Penetration devices, steel-flanges
- 6 x termination to the segments via adhesive tape/strip
- 2 x termination to the segments via steel loose-flange construction
- Hydrophilic profiles
- Injection hoses systems



1. Cross-passage
2. Penetration devices, steel-flanges
3. Sheet waterproofing membrane, crown