



TOP. The entrance to the tunnel constructed to run powerlines underground.

Meudon and site SMP4 for the Tunnel Euroalpin Lyon Turin (TELT). Because of the constraints imposed by the mechanical properties required, along with the high pressures due to the sheer depth of the tunnel, a preliminary study had to be carried out in the Mapei laboratories. The products proposed are the following:

- MAPEQUICK CBS SYSTEM 3: a liquid product used as accelerator of cement-based mixes for injection, particularly suitable for extremely fluid mixes with a very high content of water.
- MAPEQUICK CBS SYSTEM 1: a liquid retarding agent with plasticizing effect which inhibits the setting times of cementitious mixes for long periods. It is specifically designed for cementitious mixes that need long workability times, for example, because of long transportation times or long pumping distance.
- MAPEBENT API 2: a natural sodium bentonite suitable

for every type of civil engineering application fields. It conforms the international API specifications about materials to be used for drilling fluids and bentonite based slurries and can be used in every civil engineering application fields, especially where a quick activation of bentonite in water is required and where the mix should have an easy pumpability and high volumetric stability.

*This article was taken from issue N° 52 of Mapei et Vous, the magazine published by Mapei Group's subsidiary Mapei France, whom we kindly thank.*



Find out more  
MAPEBENT API 2

**TECHNICAL DATA**

**Mesil RTE**, Seine Saint-Denis (France)  
**Period of construction:** 2021-2024  
**Period of the intervention:** 2021-2022  
**Intervention by Mapei:** supplying products for injections and TBM works

**Owner:** RTE (Réseau Transport Electricité)  
**Project manager's assistant:** Arcadis  
**Contractors:** Spie batignolles génie civil, Spie batignolles fondations, Spac and Setec TPI  
**Works direction:** Setec  
**Mapei coordinators:**

Mapei UTT Technical Services, Edgar Doledec, Jérôme Darras  
**Photos:** Edgar Doledec, Vincent Collin, Pascal Tournaire

**MAPEI PRODUCTS**

**Bentonite:** Mapebent API 2, Mapedisp FLS

**Backfill grout admixtures:** Mapequick CBS System 3, Mapequick CBS System 1

For further info on products see [mapei.fr](http://mapei.fr), [mapei.com](http://mapei.com) and [utt.mapei.com](http://utt.mapei.com)

**Bergen (Norway)**

# Løvstakken Tunnel

PRODUCTS FOR INJECTIONS TO OVERCOME THE PRESENCE OF AN AQUIFER

The Løvstakken tunnel has been constructed to provide a new link between the Fyllingsdalen district with Kristianborg and the Årstad district. To create this link, two parallel tunnels, each around 3 km long, were excavated directly into the mountain: a main tunnel for the twin-track Bybanen tramline and a safety tunnel that can also be used by pedestrians and cyclists, the longest of its kind in Europe.

Two chambers, each measuring 200 m in length, were also excavated on the western side, in Fyllingsdalen, and will be used as an underground storage area and a maintenance centre for the Bybanen trams. The two chambers will be directly connected to the tramline tunnel. The tunnels and chambers were constructed using traditional tunnelling methods and a total of around 500,000 m<sup>3</sup> of excavated material was removed.

Mid-way through 2019, the team unexpectedly hit a fault zone with groundwater. In some points, up to 1,000 litres per minute were pouring out of the bored holes. As a result, the additional pre-injections requested made operations much more difficult. The conditions of the rock represented a particularly difficult challenge for the team. Systematic pre-injections were carried out to move the water before continuing with the main operations, and

then post-injections were applied where further sealing was required.

**Admixtures and grouts for concrete and products for injections**

For this intervention Mapei AS, the Group's Norwegian subsidiary, supplied numerous admixtures for the mix-design of the concrete (DYNAMON SX-23\*, MAPE-TARD SD-2000, MAPEAIR 25\* and MAPECURE CCI-2000) and for the shotcrete (MAPEQUICK AF 118 N, MAPEQUICK AF D03 and MAPEQUICK AF-2000), mortars for the shotcrete (GROUT TECH 5000\*, GROUT TECH SYSTEM W\* and MAPEI MICRO\*) and products for the injections (MAURING\*, RESFOAM 1KM, RESFOAM 1KM AKS and ZINK-BOLT\*).

\*These products are distributed on the Norwegian market by Mapei AS.



Find out more  
RESFOAM 1K-M



**TECHNICAL DATA**

**Løvstakken Tunnel**, Bergen, Norway  
**Period of construction:** 2018-2022  
**Main contractor:** Marti Norge  
**Owner:** Bybanen Utbygging  
**Mapei coordinators:** Kenneth Gundersen, Roy Hansen, Rune Espeseth and Hans Olav Hognestad, UTT, Mapei AS (Norway)