MAPEPLAN JOINT SEALING SYSTEM

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1. MANUFACTURER PROFILE

Founded in Milan in 1937, Mapei is today one of the most affirmed world leaders in the production of chemical products for the civil construction field, with a large worldwide development; in fact, Mapei Group nowadays counts 89 subsidiaries with 83 production facilities in operation over 36 countries and 5 continents.

Mapei has always placed great emphasis on research. In fact, the Group invests 12% of its company's total work-force and 5% of its turnover in R&D; in particular, 70% of its R&D efforts are directed to develop eco-sustainable and environmentally friendly products which meet LEED requirements. Furthermore, Mapei has developed a sales and technical service network with offices all over the world and offers an efficient Technical Service that is valued by architects, engineers, contractors and owners.

1.1. INTRODUCTION TO UTT (UNDERGROUND TECHNOLOGY TEAM)

In 1999, Mapei founded its UTT department. The Underground Technology Team comprises of industry experts that are strategically located worldwide. The fact that UTT staff is from the Industry and not typically from a sales background means that they are able to visit a jobsite, understand the situation and provide a solution. UTT staff also understands that by providing competent technical and economic service means that in the future our customers will return again and again.

2. SCOPE AND REQUIREMENTS

The scope of this document is to serve as a basis for performance and installation requirements for the application of a precast segment joint sealing system after the installation of rings inside the tunnel.

It may happen in fact that some joints are not perfectly sealed due to segment misalignment or due to damage on gaskets.

This document covers the application of a special profile to be introduced inside joints of tunnel segmental lining, followed by the sealing injection with a proper injection resin.

This method is an alternative compared to the system where it is required to drill through the thickness of the segment and injecting at the extrados inside the annual space between the concrete structure and the ground.

3. MATERIAL AND SPECIFICATION

Waterproofing a concrete joint is an important task to ensure the watertightness of the tunnel.

In several situations it is not necessary to inject behind the concrete lining and it is sufficient to treat the joint directly. This operation must be carried out ensuring fast application, effectiveness of the intervention, long term durability of the same.

MAPEPLAN JOINT sealing system is made by the following selected products:

- MAPEPLAN JOINT, a selected PVC profile whose special formulation has been achieved at Mapei S.p.A. laboratories;
- RESFOAM 1KM HS, one component injection resin, able to properly seal the gap between MAPEPLAN JOINT and the inner concrete joint;
- MAPEPUR UNIVERSAL FOAM, a ready to use expandable resin, able to immediately seal the junction between longitudinal and transversal joints.

The selection of these materials brings to a long term result of the treated joint.

MAPEPLAN JOINT is characterized by a shape able to be easily introduced in the joint without needing particular tools, but at the same time very difficult to be pulled out from the joint or pushed our by the injection pressure.

MAPEPLAN JOINT has a V0 flammability class as per UL94 test.

RESFOAM 1KM HS is characterized by a good and rapid foaming factor getting a fast sealing of the gap between MAPEPLAN JOINT and segment gasket once in contact with water.

MAPEPUR UNIVERSAL FOAM is characterized by a rapid expansion after the product is extruded, due to the contact with the humidity in the air. It hardens rapidly to form a stable closed-cell structure with excellent mechanical characteristics.

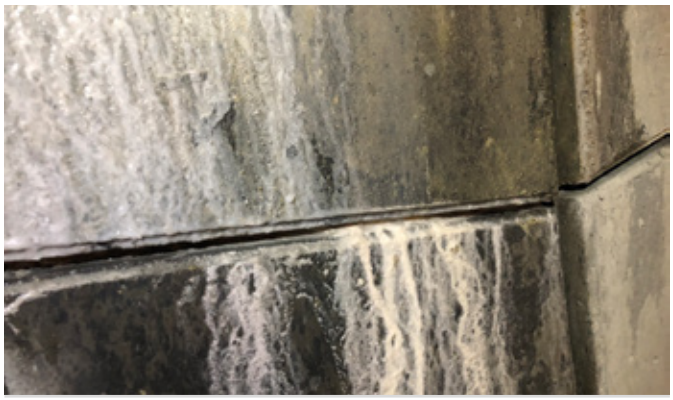
4. APPLICATION PROCEDURE

4.1 CLEANING

It is necessary to clean the joint from dust/mud and from $CaCO_3$ residuals which may be visible along the joint surface.

Cleaning of the joint has to be carried out with hand tools and / or with high pressure water jets, starting from the top of the tunnel down to the invert.

Surface inspection: address the segment jont that shall be sealed



Example of segment joint partially clogged by $CaCO_3$ deposit

Surface joint cleaning

4.2 MAPEPLAN JOINT INSERTION

Following the cleaning step, it is necessary to introduce MAPEPLAN JOINT in the joint, starting from the transversal joint and then to the longitudinal ones.

MAPEPLAN JOINT installation

MAPEPLAN JOINT installation by using hand tool

MAPEPLAN JOINT T Joint – junction between longitudinal and transversal joints

4.3 JUNCTION BETWEEN TRANSVERSAL AND LONGITUDINAL JOINTS

Junctions between transversal and longitudinal joints must be sealed with MAPEPUR Universal.

4.4 INJECTION

The joint is now ready for the injection with RESFOAM 1KM HS in order to fill the gap between MAPEPLAN JOINT and the gap on the joint.

RESFOAM 1KM HS has to be prepared following the instructions in the technical data sheet. Once ready, the fluid has to be pumped to MAPEPLAN JOINT INJK, injection needle selected to be able to be easily installed across the joint and reused several times.

Head joint sealing by using MAPEPUR UNIVERSAL

MAPEPLAN JOINT INJK

It is recommended using a one-component pump for PU products, with a proper retaining net to avoid dirt reaching MAPEPLAN JOINT INJK and causing blockages.

Injection of the cavity between the gasket and MAPEPLAN JOINT by using RESFOAM 1KM HS

Once the injection is completed, the hose and the injection needle must be carefully washed with an hydraulic oil or a proper thinner.

5. INVENTORY AND LOGISTIC PLANNING

To be checked depending on the job site location and organization.

6. HEALTH & SAFETY STANDARDS

Background: the Manufacturer and Applicator recognize health of personnel, safety of operations and environmental protection as the highest corporate priorities, and as a determinant key to sustainable development. The HSE management system is therefore integrated into the business as an essential element of management.

Employees of an applicating agency shall:

- Know, understand, and comply with the Health, Safety and Environmental requirements where applicable to the work they perform.
- Report to their Supervisor any equipment malfunction that may affect the safe operation of the equipment.
- Advise their immediate Supervisor whenever unsure of the instructions for a task or where concerned about the safety status of any task.
- Participate to the training courses as scheduled.
- Have a detailed working knowledge of the permit to work procedure applicable to their own operation or activities.
- Collaborate where necessary with all accident/incident investigations.

Working at Site with MAPEPLAN JOINT system materials: anyone working at a jobsite shall wear the project required safety equipment. A copy of the Safety Data Sheet (SDS) for any chemicals or other products being utilized for these works must be on site and available for review. Any additional safety or protective equipment stipulated in the SDS must be worn and available.

To ensure protection of the environment, any protection measure as outlined in the SDS must be completed on site to ensure materials do not damage the environment. Ensure materials are stored away from waterways and stormwater drainage systems. Also ensure spill kits are maintained and readily accessible in the proximity of the application area works at all times.

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