Timo Peltonen 5.12.2018

Letter of Reference

Client: SealedAir
Order: 29.11.2018
Client name: Claes Hermansson

APPLICATION OF ETHAFOAM AS A BALLAST MAT IN THE HELSINKI METRO AND THE WEST METRO LINE

1 BACKGROUND

The West Metro is an extension of the Helsinki metro line to Matinkylä, Espoo. It was opened in 2017. The metro line runs in double tunnels blasted into bedrock, with hundreds of dwellings, schools and other noise sensitive buildings directly above or in the immediate vicinity of the metro line. Akukon Ltd provided the noise and vibration related design and consulting services for the project, including the design and dimensioning of isolation solutions against ground borne noise from the metro traffic.

Ethafoam 400 has been used in the West Metro project as one of the ballast mat solutions to effectively mitigate against groundborne noise from the metro traffic to the surrounding environment.

2 REFERENCE OF LONG-TERM PERSISTENCE

Ethafoam ballast mats were originally installed in the Helsinki metro line in 1992, for a total length of 2,4 km of underground tracks between Kamppi and Ruoholahti. The material was installed in two 30 mm layers, with interleaving seams. No geotextile was used.

In 2013, samples of this original ballast mat were excavated from beneath the old track structures in Ruoholahti, when a new switch was installed for the West metro line. The recovered ballast mats were wet and the top surface of the boards had some dents from the ballast stones. However, lab testing of the dynamic stiffness showed that the material was still providing sufficient isolation against ground-borne noise after 21 years of continuous use beneath the metro tracks.

3 TECHNICAL SUITABILITY FOR GROUND BORNE NOISE ISOLATION

The West Metro's technical prerequisites for ballast mat materials included requirements of dynamic and static stiffness with prescribed loads and frequency ranges. Proof of compliance was required with laboratory testing made according to DIN 45673-5. The suppliers of the ballast mats were also required to provide sufficient evidence of mechanical durability during installation and usage, protection against point loads, mechanical and chemical durability, adequate support against horizontal forces from metro traffic, and the persistence of the material's isolation properties over the assured lifetime.

SealedAir provided sufficient technical documentation and proof that the properties of Ethafoam 400 fulfilled the stated requirements. The product received technical approval for the West Metro project. Ethafoam 400 ballast mats were installed in the West Metro line for a total track length of over 21 km. Geotextiles were installed beneath and above the ballast mat for mechanical protection. The installation procedures were approved by the client before the construction phase.

In 2017, a series of approval measurements was made after the West Metro construction phase to verify the required attenuation of ground borne noise levels in dwellings resulting from the metro traffic. The measurement results showed that Ethafoam 400 provided the specified isolation against ground borne noise as designed.

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