



Bologna-Taranto (Italy)

A14 MOTORWAY

FROM MAPEI, MINERAL FIBRES FOR PERVIOUS PAVING TO REDUCE WATER SPRAY AND THE RISK OF AQUAPLANING

A lot has been done in the last few years to reduce the number of accidents caused by wet road surfaces, which can dramatically increase the risk of them occurring: apart from stretches of motorway running through mountainous areas, almost 82% of their surface is made from a continuous wearing course layer made from pervious bituminous conglomerate. In fact, if the traditional type of materials were used on motorways in mountainous areas, the ice would persist longer on the carriageway during winter. Pervious paving not only improves visibility by reducing the amount of water sprayed up from the road surface, it also reduces the risk of aquaplaning. Mineral fibres are an essential component of bituminous conglomerate

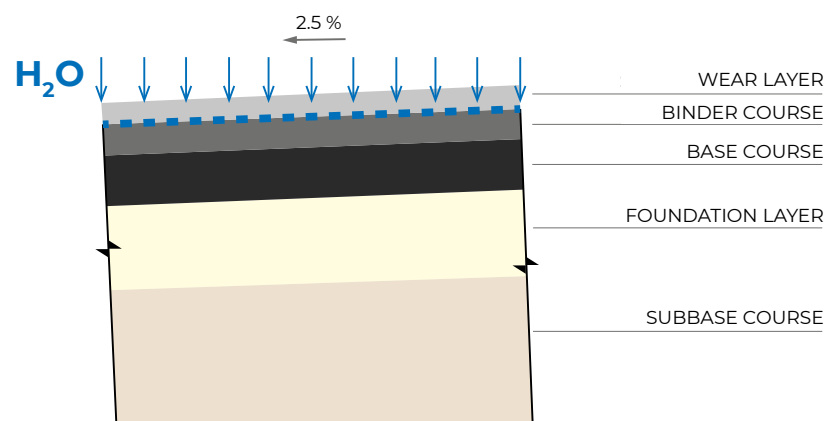


FIG. 1. Pervious paving on motorways is generally made from a foundation layer of stabilised granulated material or mixed cemented material, a base course of bituminous conglomerate, a binder course of bituminous conglomerate and a pervious wearing course of bituminous conglomerate (with 18-20% of voids). Any rainwater that passes through the pervious wearing course layer flows under the surface of the carriageway and follows the slope of the road to run off from the sides of the road.

ates used to form pervious wearing course layers on roads. In fact, the presence of these fibres has a stabilising effect on the bituminous mix, that contains a high percentage of coarse gravel and very little sand, and prevents the binder from draining away, thereby guaranteeing more and better surface contact between the larger particles of aggregates. These micro-fibres may be made from cellulose, glass, acrylic, and sometimes from carbon.

Refurbishment of the bituminous conglomerate for road surfaces

This project included the refurbishment of stretches of bituminous conglomerate between locations 155+900 and 170+400 along the A14 Motorway as required by the management company of the motorway, Autostrade SpA.

The work was carried out by milling away the wearing, binder and base course layers of the old paving and then rebuilding the road using the same stratigraphic layout, except for the wearing layer, which in this case was made from pervious bituminous conglomerate. The total thickness of the paving renewed was of 24 cm, the top 4 cm of it made of pervious wearing course. The bituminous conglomerate mix used for the pervious layer is shown below (quantities required for 1000 kg of mix):

Aggregates	950 kg
Bitumen	50 kg
Fibres	2.85 kg (0.3% by weight of aggregates)

The mix complied with the specifications prescribed in the Special Tender document issued by the client, particularly regarding the minimum percentage of voids in the bituminous conglomerate used to form the pervious wearing course layer.

Cellulose and glass fibres by Mapei

Mapei was involved in the construction of the pervious paving through the supply of MAPEFIBRE FPV glass-cellulose fibres with synthetic polymers specifically formulated for making open-grade bituminous conglomerate mixes characterised by a high percentage of voids.

It was necessary to use MAPEFIBRE FPV to compensate the irregularity of the granulometric curve, a typical characteristic of pervious bituminous conglomerate, and to significantly increase the bond between the aggregates and the adhesion of the bituminous film around the aggregates.

MAPEFIBRE FPV helps to form a thick, strong film around aggregates, thereby enabling a stable, reticular bond to be formed in the bituminous mix.

The polymers contained in the cellulose fibres also increase the plasticity of the bitumen, making the bituminous conglomerate easier to apply and reducing the risk of deformation when subjected to loads from traffic.

One of the most important properties of the fibres is their ability to stop the bitumen from draining away in mixes with a high percentage of voids.

Certain important reference specifications, such as those issued by the Milano Serravalle–Milano Tangenziale road management company for motorways in Northern Italy, specify that the drainage value must be lower than 0.2% according to EN 12697-18 (the Schellenberg method), which measures the loss in weight of bitumen in the tested mix.

Adding MAPEFIBRE FPV to the conglomerate meets the specified requirements, guaranteeing a stabilising effect and giving the bitumen a more viscous consistency that stop it draining away.

Adding MAPEFIBRE FPV also significantly improves Marshall stability and flow values in mixes, as well as their stiffness modulus.

The amount of MAPEFIBRE FPV required varies from 0.3% to 0.6% by the weight of aggregates. This amount, however, may vary after carrying out laboratory testing during the design phase of the mix.

MAPEFIBRE FPV

Glass-cellulose fibres with synthetic polymers for bituminous conglomerate

FIND OUT MORE



TECHNICAL DATA

A14 Motorway, Bologna-Taranto (Italy)

Period of renovation: 2020

Period of the Mapei intervention: 2020

Intervention by Mapei:

supplying fibres for the bituminous conglomerate used for the road surfaces

Client: Autostrade per l'Italia SpA

Design: Autostrade SpA

Contractor: F.Ili Pesaresi Giuseppe SpA

Mapei coordinators: Francesco Cerutti,

Francesco Giudici, and Gilberto Del Zoppo, Mapei SpA (Italy)

MAPEI PRODUCTS

Fibres for bituminous conglomerate: Mapeifibre FPV

For further info on products see mapei.com