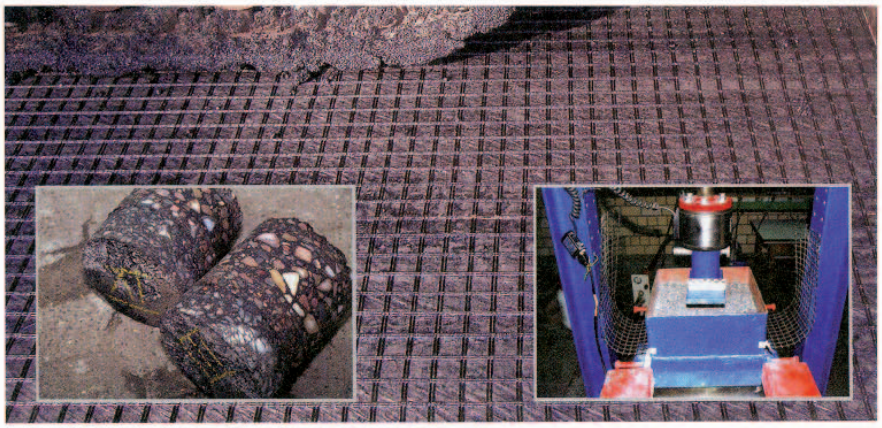
Source: World Highways July/August 2005



The demands of asphalt reinforcement

HaTelit C40/17 installed on a milled surface with (inset left) cores showing a perfect bond, and (right) installation impact testing on the reinforcing grid

A good bond between asphalt layers is essential for sustaining high traffic loading without incurring damage. For that reason, asphalt reinforcement should not reduce the bond between layers.

The long term interaction of the reinforcement and the asphalt layers is crucial to the proper functioning of asphalt reinforcement.

Furthermore, the reinforcement must resist as much damage as possible from the stresses and strains applied during installation and overlaying/compaction of the asphalt.

The reconstruction and maintenance of asphalt-surfaced roads using polyester reinforcement grid is often an economically viable alternative to conventional construction solutions, says Dipl.-Ing. Andreas Elsing of German company Huesker.

Experience gained over 35 years using such material has given very good results. For example, continuous product development and optimisation has produced the HaTelit C 40/17 reinforcement grid made from polyester, its properties being favourably compatible with the elasticity and stress-strain behaviour of asphalt.

To ensure the minimal effect on the bond between the asphalt layers, HaTelit reinforcement grid is bituminously coated, thus providing good adhesion to the adjacent asphalt layers. For the past ten years, HaTelit C 40/17 has been produced with a very light, nonwoven backing, also impregnated with bitumen. This combination of a grid and a very thin nonwoven is helpful during installation, ensuring good adhesion to the underlying layer and making reinforcement placement straightforward, says Dipl.-Ing. Elsing.

As the nonwoven is fully impregnated with bitumen, only a small amount of additional bituminous spray tack coat (bitumen emulsion) needs to be applied on site, which reduces the danger of bleeding resulting from too much spray being applied, or the danger of a poor bond resulting from too little spray being applied.

Since 1994, more than 100 cores containing HaTelit C 40/17 reinforcement have been taken from various projects and compared to corresponding unreinforced samples. Tests to determine the bond have been carried out by various testing laboratories, and results confirm that the use of HaTelit C 40/17 has no significant detrimental effect on the bond.

The shear strength measured in the tests was very high on all the cores and in some instances even higher in the reinforced samples than in the unreinforced. However, it cannot be deduced from this that HaTelit C 40/17 improves the bond, but it is clear that the bond is not reduced, observes Dipl.-Ing. Elsing.

Reinforced samples without a bitumen coating and composite products (reinforcement with a non-impregnated nonwoven) all showed a considerable reduction in the bond between the layers. In many instances these samples broke up during coring.

In composite products, the bitumen-impregnated nonwoven is designed to have a SAMI (stress absorbing membrane interlayer) effect and the grid a reinforcing function. If, however, the nonwoven reduces the bond between layers, then the reinforcement cannot mobilise the tensile force. A reinforcing effect can only occur if there is sufficient bond between the layers to transfer the forces. The two effects cannot simply be added together.

Even during installation the reinforcement may be subjected to high loading, when trafficked by tracked pavers or 'blacktop' lorries. Very high forces can also be applied to the individual strands of the reinforcement by aggregate movement in the hot blacktop during compaction.

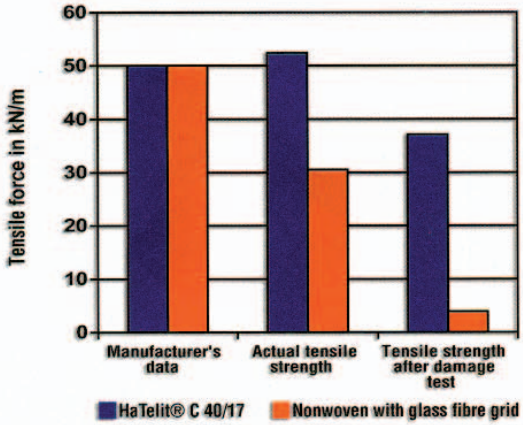
Currently there is still no specific test to determine the amount of installation damage to reinforcement in highway asphalt by the loads mentioned above. However, the standardised test in ENV ISO 10722-1, 'Procedure for the simulation of damage during installation', can be used to compare the resistance of reinforcement materials to mechanical damage.

"The very high resistance to mechanical damage also allows HaTelit C 40/17 to be placed directly onto milled surfaces," says Dipl.-Ing. Elsing.

Manufacturers of glass fibre grids point out that, because of its fragility and brittleness (the low shear strength of glass fibre and the resulting high risk of damage), glass fibre should not to be placed directly onto milled surfaces. How glass fibre reinforcement behaves when placed directly over the sharp edges of cracks, especially during compaction, has not been clarified up to now and requires further investigation.

"All the important properties that reinforcement requires are tested and proven in the case of HaTelit C 40/17," says Dipl.-Ing. Elsing ■

Diagram 1. Results of the tensile strength tests



● *This report was compiled from a fuller version prepared by Dipl.-Ing. Elsing, which can be found at* **www.worldhighways.com**