Process for repairing road surfacing systems, in particular for open-pore asphalts

The present invention relates to a process for repairing top layers for roads, tracks, and other areas used by traffic, by applying an amount of at least 20 g/m^2 of a polymeric material to the damaged site, applying an amount of at least 80 g/m^2 of a first polyurethane reaction mixture to the polymeric material, and applying, to the first polyurethane reaction mixture, a mixture comprising mineral aggregate and a second polyurethane reaction mixture, and allowing the material to harden. The present invention further relates to a repair kit for repairing top layers for roads, tracks, and other areas used by traffic.

Heavy traffic, or the effects of weathering, often cause(s) defects in road surfacing systems, examples being binder loss and potholes. If the intention is to avoid complete renovation of the top layer, another possibility is to repair the defects by filling. The usual method for this is what is known as the hot-mix method using bitumen-bound mineral aggregates, or what is known as the cold-mix method, using solvent-containing or emulsified bitumen and mineral aggregates. There are also approaches that use plastics-based mixtures with mineral aggregates.

In this context, CA 2236499 describes a frost-resistant top layer for roads for the resurfacing of concrete, asphalt, brick, flagstone, tile, and wood, based on polyurethanes. It is also possible here to use dissolved, bitumen-based primers.

JP 02088802 describes a repair mixture for roads, where a polyurethane-based primer is applied to the damaged site and a mixture of mineral aggregates and polyurethane prepolymer at maximum packing density is applied to said primer and the material is cured with steam.

The known processes have disadvantages due to a restricted lifetime caused by inadequate adhesion.

Open-pore asphalts are used increasingly frequently in order to reduce noise, and they also have very good drainage performance; accumulation of water on the surface can therefore be avoided and, by way of example, the risk of aquaplaning can be reduced. However, said open-pore asphalts are very expensive and generally have lifetimes of only about 10 years. Unfortunately, there is at present only an inadequate range of possibilities for the repair of defective top layers of open-pore asphalt, since known open-pore repair materials have only limited adhesion on open-pore asphalts. If repair materials are used that are not open-pore, road noise increases, and water can accumulate on the surface.

It was therefore an object of the ~~present invention~~embodiments disclosed herein to provide a process for repairing top

layers for roads, tracks, and other areas used by traffic which gives excellent adhesion to the substrate material and can be carried out simply and rapidly. A particular object of the ~~present invention~~embodiments disclosed herein was to provide a process for repairing open-pore asphalt which provides very good adhesion values and has no effect on drainage capability or the reduction of road noise.

In a first aspect, there is provided a process for repairing top layers for roads, tracks, and other areas used by traffic, by applying an amount of at least 20 g/m^2 of a polymeric material to the damaged site, applying an amount of at least 80 g/m^2 of a first polyurethane reaction mixture to the polymeric material, and applying, to the first polyurethane reaction mixture, a mixture comprising at least one mineral aggregate and a second polyurethane reaction mixture, and allowing the material to harden.

Said object is achieved via a process for repairing top layers for roads, tracks, and other areas used by traffic, by applying an amount of at least 20 g/m^2 of a polymeric material to the damaged site, applying an amount of at least 80 g/m^2 of a first polyurethane reaction mixture to the polymeric material, and applying, to the first polyurethane reaction mixture, a mixture comprising at least one mineral aggregate and a second polyurethane reaction mixture, and allowing the material to harden.

In a second aspect, there is provided a repair kit for repairing top layers for roads, tracks, and other areas used by traffic, comprising a polymeric material, optionally a first polyurethane reaction mixture, and a second polyurethane reaction mixture, and also optionally further additions and mineral aggregate.

Polymeric material used preferably comprises a polymeric material with number-average molar mass of at least 500 g/mol, particularly preferably of at least 1000 g/mol. This polymeric material has groups and structures that adhere to rock and/or bitumen, for example acid groups, isocyanate groups, ester groups, acrylate groups, methyl methacrylate groups, phenol groups, phosphate groups, amide groups, epoxy groups, silane groups, soluble bitumen fractions, hydrophobic alkyl groups as side chains or in the main chain, modified fatty acid ester groups, fatty acid derivative groups, hydrophobic polyol groups, or amphiphilic structures, for example structures composed of alkyl chains with C-chain length greater than 4, and of hydrophilic or ionic terminal groups. It is particularly preferable that the polymeric material has urea groups and/or urethane groups, optionally alongside the groups that adhere to rock and/or bitumen.

It is preferable that the polymeric materials used have been dissolved in a suitable solvent. Suitable solvents are generally those which not only have adequate properties for dissolving the polymeric material but also function as solvent or swelling agent for bitumen and evaporate sufficiently rapidly, and do not lead to any lasting damage to the asphalt requiring surfacing. Examples of these solvents are xylene, toluene,

trichloroethene, solvent naphtha, modified naphtha, ethylbenzene, oils, gasoline, diesel, acetone, methyl ethyl ketone, and also chlorinated and/or fluorinated solvents, where these can be used individually or in the form of mixtures.

The polymeric materials that can be used in the invention can also be used in the form of reaction mixtures, where the polymeric materials by way of example are produced only after application to the site requiring repair. Isocyanate-containing reaction mixtures can serve as examples of a class of polymeric materials of this type. These reaction mixtures, too, can comprise solvents.

Materials of this type are known and are described by way of example in Waterborne & Solvent Based Surface Coating Resins and Their Applications: Polyurethanes. Wiley,