

SPECIFICATION

A method of sealing bridge deck joints

- 5 The present invention relates to a method of sealing bridge deck joints.

It is current engineering practise to construct bridges, in particular, motorway bridges, of decks of concrete supported on pillars, the supports usually only occurring at the junction of two deck members. The deck members are then covered usually with hot rolled asphalt including a base layer and a covering wearing layer which extend continuously over the bridge so that the junction between the deck members is not visible.

Particularly in motorway use, in which heavy vehicles continuously pass over the bridges, cracks tend to occur over the joints in the concrete deck members.

20 In order to overcome this problem, it has been conventional to cut a channel in the hot rolled asphalt surface about 30 cm wide at the location of the joint between the deck members and to apply on to the concrete deck members two strips of epoxy mortar known as "epoxy nosing", these being about ten to twelve cms wide and having a gap of two to three cms therebetween. Into this gap there is applied a continuous strip of plastic or rubbery sealing material. This is generally satisfactory but does give rise to considerable problems. Since the vehicle wheels usually pass over exactly the same spot, tracking occurs and potholes appear on either side of the very hard epoxy nosing. Thus, although the problem at the juncture of the deck members is reduced, the asphalt nonetheless is damaged on either side thereof. Furthermore, since the epoxy nosing is very hard, and since the shocks imparted are not absorbed, there is a tendency for the concrete decking and pillars to crack.

40 It is now proposed, according to the present invention, to provide a method of sealing bridge deck joints covered with a road surfacing material, such method comprising providing a channel in the road surfacing material at the location of the joint, the channel extending through the full depth of the road surfacing material across the width of the bridge and filling the channel substantially completely with a flexible composition of chips of aggregate of a given mesh size in a rubberised binder consisting mainly of bitumen, pitch, pitch-tar or tar, together with rubber, the chips occupying 40 to 70% by volume of the composition.

With such a method, the resulting bridge deck joint utilizes the aggregate which extends from the bottom of the channel substantially to the top of the channel to take the majority of the loading. Since the aggregate is of a given mesh size, preferably of the

order of 20 millimetres mesh size, there is a constant amount of void between the particles of aggregate and these voids are filled with the rubberised binder which gives the resulting joint the necessary flexibility to accommodate expansion and contraction of the joint, and to be able to withstand the heavy loading applied by the traffic.

65 While the flexible composition should have between 40% and 70% of the total volume, 50% aggregate is suitable for most roads and 60% aggregate for traffic loads are to be supported, the higher the proportion of stones are to be used.

The rubberised bitumen is preferably a hot poured bitumen composition in which a high proportion of rubber is necessary to give the desired flexibility.

In use, the area to be filled is prepared by cutting out and cleaning, e.g. by using a thermic lance. The advantage of using a thermic lance is that it ensures the removal of loose particles and that the material surrounding the cut-out portion is hot. Thereafter, heated stones and hot matrix material are then mixed *in situ* by a method suitable to ensure a high stone content. Alternatively, premixed hot rubberized aggregate and binder can be produced separately, e.g. in a lorry similar to a cement carrying lorry provided with a heater, and the premixed material is inserted while the road surfacing material is still hot. Since the road surface material on each side of the cut-out portion is still hot, in either event, this ensures a better bond with the flexible composition which is inserted according to the invention. Using a vibrating poker or plate has been found useful for this purpose.

In a further arrangement according to the invention, premoulded blocks of chips of aggregate in a matrix of rubberized binder can be made and these can be inserted into the previously cut out area which has been cut out as before, the insertion taking place while the road surfacing material is still hot. This has the advantage that the joint will cool off much more quickly and will be ready for use much earlier.

Finally, the surface may be tamped, with the addition of smaller stones, if necessary, so as to bring the profile up with the profile of the road, while maintaining a high stone content in the surface layer.

It has been found that, by utilizing the method of the present invention, an extremely flexible structure is achieved, which is capable of withstanding very heavy loading and reducing the tendency for cracks to form in the surface layer or in the bridge structure, that is in the concrete decking or pillars.

Three suitable compositions for the rubberized bitumen matrix are given in the Table below:-

	1	2	3
Bitumen	57.1%	54.1%	66.7%
Tyre crumb rubber	14.3%	13.5%	16.6%
Fine sand	28.6%	27.0%	—
Limestone powder	—	5.4%	16.7%

In the accompanying drawing, there is shown schematically a cross-section through a bridge structure, which comprises a pillar 10 supporting two bridge deck members 11 and 12. Superimposed on the bridge members is the conventional hot rolled asphalt including a lower base layer 13 and an upper wearing layer 14.

According to the present invention, the asphalt is cut back, to provide a trough across the bridge which has been indicated in chain-dotted lines by the reference numeral 15, and final preparation carried out using a thermic lance. Within this base there is inserted, while the bridge is still warm and dry from the thermic lance, a mixture of rubberized bitumen, of the type indicated previously, and for example one of the compositions shown in the Table above, this being indicated by the reference numeral 16. Granite chips, for example of twenty millimetre mesh size, applied in layers, indicated by the reference numeral 17 are inserted throughout the trough and are bound in place by the hot rubberised bitumen 16. On the final surface, smaller stones are inserted. As indicated, the compaction of the lower stones can be caused by using a vibrating poker or plate and the top surface can be tamped with the addition of the smaller surface stones 18.

CLAIMS

1. A method of sealing bridge deck joints covered with a road surfacing material, such method comprising providing a channel in the road surfacing material at the location of the joint, the channel extending through the full depth of the road surfacing material across the width of the bridge and filling the channel substantially completely with a flexible composition of chips of aggregate of a given mesh size in a rubberised binder consisting mainly of bitumen, pitch, pitch-tar or tar together with rubber, the chips occupying 40 to 70% by volume of the composition.

2. A method according to claim 1, wherein the channel is prepared by cutting out the road surfacing material and cleaning with a thermic lance and a flexible composition of chips of aggregate and binder are heated and inserted into the removed area while the latter is still hot.

3. A method according to claim 1, wherein the channel is prepared by cutting out the road surfacing material and cleaning using a thermic lance and premixed hot rubberised aggregate and binder are inserted while the road surfacing material is still hot.

4. A method according to claim 1, wherein the channel is prepared by cutting out the road surface material and cleaning using a thermic lance, and pre-moulded blocks of chips of aggregate in a matrix of rubberised binder are inserted while the road surfacing material is still hot.

5. A method according to any preceding claim, wherein the surface is tamped with the addition of small surface stones to bring the profile of the joint up to the profile of the road surface while maintaining a high stone content in the surface layer.

6. A method according to any preceding claim, wherein the chips are of 20 mm mesh size.

7. A method of sealing bridge deck joints substantially as hereinbefore described with reference to and as illustrated in the accompanying drawing.

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3. A method according to claim 1, wherein the channel is prepared by cutting out the road surfacing material and cleaning using a thermic lance and premixed hot rubberised aggregate and binder are inserted while the road surfacing material is still hot.

4. A method according to claim 1, wherein the channel is prepared by cutting out the road surface material and cleaning using a thermic lance, and pre-moulded blocks of chips of aggregate in a matrix of rubberised binder are inserted while the road surfacing material is still hot.

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