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Improved crack inducing and sealing strip

This invention relates to improved crack inducing and sealing strips for inducing a controlled crack in concrete and thus providing a contraction joint and sealing strip for the joint.

When large areas of concrete are poured, it is necessary to divide the area into smaller areas by means of crack inducers or joint formers. These are in the form of extruded resiliently deformable strips of material which are normally introduced into the wet concrete and penetrate about one-third to one-quarter of the overall depth of the concrete slab. This strip causes a plane of weakness in the concrete as it dries and subsequently shrinks, thus inducing a controlled crack which provides a contraction joint. At the same time the strip acts as a seal.

It is important that the crack inducing and sealing strip, once inserted in the wet concrete, does not come out again due to its natural buoyancy and also it is important, after the concrete has set, that the strip cannot fall out or be removed. To ensure this, therefore, a suitable keying device is normally provided on part of the strip. What is more, once the concrete has dried it is important that water does not penetrate through the contraction joint either from above or below the concrete and likewise it is preferable that dust and other dirt does not find its way into the contraction joint when it has opened up.

Crack inducers or sealing strips of this general type are known, for example from U.S. Specification Nos. 3575094, 343401, 3871787 and 4090800. In the sealing strip disclosed in U.S. No. 3575094, the overall width of the strip is approximately the same as its depth, a major part of the width resulting from the keying devices which project laterally from each side wall by a considerable amount. Because of the construction of these keying devices there is a considerable area of concrete immediately above each keying device which can break away due to fracturing occurring when the concrete contracts and expands along a line extending between the tip of the keying device and the surface of the concrete. Should this fracturing occur, the resultant broken off pieces of concrete will eventually degrade and wash out and as a result water will gradually find its way past the sealing device, the weather will get into the concrete and it will eventually deteriorate and break up.

The joint forming device shown in U.S. Specification No. 4090800 has a plurality of fins at its lower end to prevent it from floating out of wet concrete, but these do not key the strip into the concrete in a horizontal plane. Furthermore, the strip is of two part construction, causing installation problems among others, and is incapable of lateral expansion if the concrete in which it is inserted shrinks, thus allowing ingress of moisture,

which can result in breaking up of the concrete in frosty weather.

The crack inducer and sealing strips of the present invention are designed to overcome these problems and meet the other requirements of such devices.

According to the present invention, we provide a crack inducing and sealing strip for insertion into wet concrete to provide a line of weakness and hence a contraction joint, the strip being extruded from resiliently deformable elastomeric material, being hollow, having at least one projection on the outer face of each of two side walls of the strip, which projections form a seal with the concrete once it has hardened, and the strip being several times deeper than it is wide, the projections being in the form of keying ridges generally centrally located along the depth of said side walls and the strip being hollow substantially throughout the total depth of the strip with the side walls spaced apart and joined together just along the top and along the bottom of the strip.

At its upper end the strip may be provided with a laterally extending flange on each of its side faces, and it may be provided with a generally diamond shaped enlargement at its lower end.

The strip may be divided into two portions by two bands of material which is softer than the material from which the remainder of the strip is formed.

The upper portion of the strip may be detachable from the lower portion and in one construction, therefore, the upper portion is joined to the lower portion by said bands of softer material, said bands extending completely through the said side walls of the strip. The bands may be integral with their adjacent keying ridge.

In one construction the portion joining together the side walls of the strip at their tops may be formed of softer material than the remainder of the strip.

It is preferred that the amount by which each keying device projects from its respective side wall is substantially less than the maximum width of the strip at any other location through the depth of the strip.

Two crack inducing and sealing strips according to the present invention are now described by way of example with reference to Figures 1 and 2 of the accompanying drawings, both of which are sectional views.

Referring to Figure 1 of the drawings, the strip is extruded from resiliently deformable materials, e.g. an elastomer such as a synthetic thermoplastic resinous material, in the form of a generally hollow body having a pair of spaced side walls 1 and 3 joined together at their upper end by a top wall 5, joined together at their lower end by a solid diamond shaped enlargement 7. The corners 9 of the enlarge-

ment 7 project outwardly below the walls 1 and 3 for keying purposes, whereas the corner 11 is designed to be forced down into a mass of wet concrete.

The strip is formed by means of a dual durometer extrusion process and substantially midway between the top and bottom of each side wall 1 and 3, a keying ridge 13 is provided, these keying ridges being wider at their extremity than at their root and being of generally trapezium shaped construction. The keying ridges are formed of a softer material than the side walls of the strip and it is preferred that this soft material extends completely through the side walls to form bands as shown at 15 so as to provide a line of weakness in each of the side walls 1 and 3 to enable the top portion of the strip to be removed from the remainder of the strip, as will hereinafter be described.

At the top of the strip, laterally projecting flanges formed as extensions of the top wall 5 are provided so as to increase the width of the strip. As can be seen from the drawing, the strip is about 8 times as tall as its mean width, and the amount by which the ridges 13 project from each side wall is substantially less than the maximum width of the strip at any other location throughout its depth. In this way, it is unlikely, when the strip is installed in a concrete area, that pieces of concrete immediately above the keying ridges will break away from the mass of concrete, resulting in subsequent ingress of water.

The keying ridges 13, because of their shape, will form a strong key with the concrete once the strip has been inserted into the concrete, making it difficult for the strip to float out of the concrete while it is still wet. Furthermore, they will form a key with the concrete in both vertical and lateral directions and when the concrete contracts, as is customary, with the result that a contraction joint will be formed throughout the depth of the concrete beneath the strip, the ridges 13 will still remain keyed with the concrete because of their shape. Also, because they are of a soft resiliently deformable material, they will form a good seal with the concrete and if anything this seal will increase in effectiveness as the concrete contracts, due to the wedging action of the ridges 13. Of course, because the strip is hollow, the ridges 13 will be able to move with the contracting concrete to some extent, but the natural resiliency of the material of the side walls 1 and 3 will resist such movement on the whole.

The presence of the flanges 17 at the top of the strip, the upper surface of which is arranged to be flush with the upper surface of the concrete, will ensure that, even when the concrete contracts, the joint which opens up will still be overlayed by the top of the strip, thus making it difficult for dust and other particles to penetrate the joint. It is advantageous that this does not occur, otherwise, when the concrete

slab increases in temperature and expands, any particles within the joint will tend to restrict expansion of the concrete, thus causing load transference to take place, with resultant damage to the sealing strip or the slab of concrete itself.

Any moisture which may penetrate the joint either from above or below will tend to be maintained either above or below the concrete slab by the presence of the keying ridges 13 which also act as good moisture seals.

In some instances, after the concrete has dried, it is desirable to remove an upper portion of the crack inducing and sealing strip so that the contraction joint can be sealed with bitumen or another sealing compound. Because of the provision of the lines of weakness provided by the soft material 15 in the strip, all of the strip above the keying ridges 13 can be torn away from the lower portion of the strip for this purpose. This will then leave a groove in the concrete into which the bitumen or other sealing compound can be poured in known manner. The remaining part of the strip, however, will still provide a good seal across the contraction joint in the concrete.

An alternative construction of strip is shown in Figure 2, and parts similar to those of Figure 1 have the same reference numerals. The strip differs from that in Figure 1, however, in that keying ridges 13a are provided which are formed of the same material as the side walls 1 and 3. They could however be formed of a softer material.

Furthermore, the side walls 1 and 3 are joined together at their top edges by a strip of soft elastomeric material 5a which is shown as being, but is not necessarily, softer than the side walls 1, 3. This strip of material 5a could be of a foamed construction, or have passages running along its length. It will also be appreciated that the flanges 17 may be omitted.

As shown in Figure 2, the enlargement 7 is of a different construction from that shown in Figure 1. It should also be noted that the shape of the side walls may be altered. They could, for example, diverge more towards the top of the strip. It is important, however, that the side walls 1, 3 and the top 5 or 5a of the strip can flex to permit the two strips of concrete on either side of the strip to move relative to each other.

Because the strips are formed of resiliently deformable elastomeric material, the keying wedges 13, 13a, after the concrete has contracted, form an extremely effective moisture seal or barrier between the top and bottom of the joint, due to the tension set up as a result of the side walls of the strip being moved apart slightly during contraction.

Claims

1. A crack inducing and sealing strip for insertion into wet concrete to provide a line of

weakness and hence a contraction joint, the strip being extruded from resiliently deformable elastomeric material, being hollow, having at least one projection (13 or 13a) on the outer face of each of two side walls (1, 3) of the strip, which projections form a seal with the concrete once it has hardened, and the strip being several times deeper than it is wide, characterised in that the projections (13, 13a) are in the form of keying ridges (13 or 13a) generally centrally located along the depth of said side walls (1, 3), and in that the strip is hollow substantially throughout the total depth of the strip, and in that the side walls (1, 3) are spaced apart and joined together just along the top (5) and along the bottom (7) of the strip.

2. A crack inducing and sealing strip according to claim 1 characterised in that the strip is divided into two portions by two bands (15) of material which is softer than the material from which the remainder of the strip is formed.

3. A crack inducing and sealing strip according to claim 2 characterised in that an upper portion of the strip is detachable from the lower portion, detachment occurring along the lines of said bands (15).

4. A crack inducing and sealing strip according to claim 3 characterised in that the upper portion is joined to the lower portion by said bands (15) of softer material, the bands (15) extending completely through the side walls (1, 3) of the strip and each being located in the region of its respective keying ridge (13).

5. A crack inducing and sealing strip according to any of claims 1—4 characterised in that the keying ridges (13) are formed of a softer material than the remainder of the strip.

6. A crack inducing and sealing strip according to claim 5 when dependent on claim 4 characterised in that the keying ridges (13) and bands (15) of softer material on each side walls (1, 3) are integral with each other.

7. A crack inducing and sealing strip according to any one of the preceding claims characterised in that the side walls (1, 3) of the strip are joined together at their tops by material (5a) which is softer than the remainder of the strip.

8. A crack inducing and sealing strip according to any one of the preceding claims, wherein the amount by which each keying device (13) projects from its respective side wall (1 or 3) is substantially less than the maximum width of the strip at any other location through the depth of the strip.

Revendications

1. Bande de génération de fissure et d'étanchéité destinée à être insérée dans une masse de béton humide pour créer une ligne d'affaiblissement et par conséquent un joint de contraction, la bande étant formée par extrusion d'une matière élastomère élastiquement déformable, étant creuse et comportant au moins

une saillie (13 ou 13a) sur la face extérieure de chacune des deux parois latérales (1, 3) de la bande, lesdites saillies formant un joint d'étanchéité avec le béton une fois que celui-ci a durci et la bande ayant une profondeur plusieurs fois supérieure à sa largeur, caractérisée en ce que les saillies (13, 13a) se présentent sous la forme de nervures de blocage (13 ou 13a) qui sont généralement placées au centre le long de la profondeur desdites parois latérales (1, 3) en ce que la bande est creuse essentiellement sur toute sa profondeur et en ce que les parois latérales (1, 3) sont espacées l'une de l'autre et reliées juste le long du haut (5) et le long du bas (7) de la bande.

2. Bande de génération de fissure et d'étanchéité selon la revendication 1, caractérisée en ce que la bande est divisée en deux parties par deux rubans (15) d'une matière qui est plus molle que la matière dont est formé le reste de la bande.

3. Bande de génération de fissure et d'étanchéité selon la revendication 2, caractérisée en ce qu'une partie supérieure de la bande est détachable de la partie inférieure, le détachement se produisant le long des lignes définies par lesdits rubans (15).

4. Bande de génération de fissure et d'étanchéité selon la revendication 3, caractérisée en ce que la partie supérieure est reliée à la partie inférieure par lesdits rubans (15) de matière plus molle, lesdits rubans (15) s'étendant complètement au travers des parois latérales (1, 3) de la bande et étant chacun placés dans la zone de sa nervure de blocage correspondante (13).

5. Bande de génération de fissure et d'étanchéité selon l'une quelconque des revendications 1 à 4, caractérisée en ce que les nervures de blocage (13) sont formées d'une matière plus molle que le reste de la bande.

6. Bande de génération de fissure et d'étanchéité selon l'une des revendications 4 ou 5, caractérisée en ce que les nervures de blocage (13) et les rubans (15) de matière plus molle prévus sur chaque paroi latérale (1, 3) sont solidaires l'un de l'autre.

7. Bande de génération de fissure et d'étanchéité selon l'une quelconque des revendications 1 à 6, caractérisée en ce que les parois latérales (1, 3) de la bande sont reliées à leurs parties supérieures par de la matière (5a) qui est plus molle que celle du reste de la bande.

8. Bande de génération de fissure et d'étanchéité selon l'une quelconque des revendications 1 à 7, caractérisée en ce que la distance dont chaque élément de blocage (13 ou 13a) dépasse de sa paroi latérale respective (1 ou 3) est bien inférieure à la largeur maximale de la bande en tout autre endroit de la profondeur de la bande.

Patentansprüche

1. Band zur Bildung und Abdichtung einer

Reißfuge in Beton, das in den frischen Beton zur Bildung einer Schwächungslinie und damit einer Kontraktionsfuge einzusetzen ist, das aus elastisch verformbarem Elastormerematerial stranggepreßt und hohl ist und wenigstens einen Vorsprung (13 oder 13a) an der Außenfläche von jeder von zwei Seitenwänden (1, 3) des Bandes aufweist, wobei die Vorsprünge mit dem erhärteten Beton eine Dichtung bilden und das Band mehrfach tiefer als breit ist, dadurch gekennzeichnet, daß die Vorsprünge (13, 13a) die Form von Verriegelungsleisten (13 oder 13a) aufweisen und im allgemeinen mittig in bezug auf die Tiefenerstreckung der Seitenwände (1, 3) angeordnet sind, daß das Band im wesentlichen über die gesamte Bandtiefe hohl ist und daß die Seitenwände (1, 3) Abstand voneinander aufweisen und nur entlang dem oberen (5) und dem unteren (7) Rand des Bandes miteinander verbunden sind.

2. Band nach Anspruch 1, dadurch gekennzeichnet, daß es durch zwei Streifen (15), die aus einem weicherem Material als demjenigen des übrigen Bandes bestehen, in zwei Teile geteilt ist.

3. Band nach Anspruch 2, dadurch gekennzeichnet, daß ein oberer Teil des Bandes von dem unteren Teil entlang dem Streifen (15) abtrennbar ist.

4. Band nach Anspruch 3, dadurch gekenn-

zeichnet, daß der obere Teil mit dem unteren Teil durch die Streifen (15) aus weicherem Material verbunden ist, wobei die Streifen (15) sich vollständig durch die Seitenwände (1, 3) des Bandes erstrecken und jeweils im Bereich der zugeordneten Verriegelungsleiste (13) gelegen sind.

5. Band nach einem der Ansprüche 1 bis 4, dadurch gekennzeichnet, daß die Verriegelungsleisten (13) aus weicherem Material als das übrige Band bestehen.

6. Band nach Anspruch 5, zurückbezogen auf Anspruch 4, dadurch gekennzeichnet, daß die Verriegelungsleisten (13) und Streifen (15) aus weicherem Material an jeder Seitenwand (1, 3) miteinander einstückig sind.

7. Band nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die Seitenwände (1, 3) des Bandes an ihrem oberen Ende durch Material (5a) verbunden sind, das weicher als das übrige Band ist.

8. Band nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die Strecke, um welche jede Verriegelungseinrichtung (13 oder 13a) von der zugehörigen Seitenwand (1 oder 3) vorragt, wesentlich geringer als die maximale Breite des Bandes an irgendeiner anderen Stelle des Bandes über dessen Tiefenerstreckung ist.

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