

The invention relates to a tube clip according to the precharacterising part of Claim 1.

A known tube clip (DE-AS 20 43 551) is provided in its channel bottom with an evasion groove of a V-shaped cross section, the depth of which changes in the longitudinal direction of the channel. In its completely compressed state, the tube is wider than the channel bottom so that the roller forces a part of the tube into the evasion groove. In that case, the tube settles on the inclined edges of the channel, only. Although the provision of such a channel is to improve the relaxation behaviour, i.e. the re-formation behaviour, of the tube by preventing cold flow and like symptoms of fatigue, a well-defined constancy of the drop rate, caused by the crushing of the tube, is not obtained since the position taken by the tube inside the channel and, particularly, in the evasion groove, largely depends on chance.

US-A-4 270 725 describes a tube clip in which the channel bottom is provided with a longitudinally extending evasion groove of arcuate cross section. This requires a very exact adaptation of the cross sections of the channel and the evasion groove to the cross section of the tube. Even if the cross section of the tube is only slightly too large, upsetting and kinking will occur, which prevents obtaining a defined flow rate.

It is the object of the invention to provide a tube clip of the type described in the precharacterising part of Claim 1, wherein the tube is taken up by the evasion groove in a predetermined way so that, in the crushed or squeezed state, the volume of the opening does not change and the flow rate remains constant.

This object is solved, according to the invention, with the features mentioned in the characterising part of claim 1.

In the tube clip according to the invention, the part of the tube profile that is pressed into the evasion groove is supported by a support surface on the bottom of the evasion groove, so that, once it is supported on the support surface, the depth of the escaping section is defined and it cannot increase afterwards. Thus, no creeping widening of the cross section of the opening of the tube into the evasion groove is possible. The initially set cross section of the tube's opening remains constant throughout the duration of the set condition. The fact that the width of the support surface at the widest end of the evasion groove is at least about half the groove's width, guarantees that the escaping part of the tube's cross section is immediately supported by the support surface of the evasion groove's bottom in case of crushing and that no increase of the cross section of the opening can occur afterwards.

The invention enhances the deformation behaviour of the tube and avoids creeping changes in cross section after the squeezing of the tube.

The following is a detailed description of an embodiment of the invention with reference to the drawings.

The Figures show:

Fig. 1 a longitudinal section of the tube clip along the line I-I of Fig. 2, the tube and the roller being represented by broken lines,

Fig. 2 a cross section of the tube clip along the line II-II of Fig. 1,

Fig. 3 a perspective view on the channel, according to a section along the line III-III of Fig. 1, and

Fig. 4 another embodiment of the channel, illustrated as in Fig. 3.

The tube clip has an elongated housing of U-shaped cross section that is open at the top. The side walls 11, 12 are connected at their lower ends by the bottom wall 13. The inside surfaces of the side walls 11, 12 are provided with parallel guiding grooves 14 for guiding the roller 15. The roller 15 is provided with oppositely protruding axle stubs 16 which extend into the guiding grooves 14. The axle stubs 16 protrude from the central disc 17 defined on its outside by a broadened peripheral ring 18. The peripheral surface of the peripheral ring 18 is provided with a corrugation 19. The side walls 11 and 12 together with the bottom wall 13 form a longitudinally extending channel 20 in which the roller 15 can be moved in the longitudinal direction and from the open top of which the

roller protrudes. The plastic tube 21 runs longitudinally through the channel 20. The channel bottom 22 extends parallel to the guiding grooves 14.

An evasion groove 25 provided in the channel bottom extends in the center of the channel's width, which groove has its greatest depth and width at the release end 23 and its smallest depth and width at the crush end 24. The width and depth of the evasion groove 25 are constant in the area 25a near the release end 23, whereas width and depth of the evasion groove are linearly reduced toward the squeeze end 24 in the area 25b which forms the regulation area.

In the embodiment of Fig. 3, the evasion groove 25 is of a rectangular cross section. At the widest end, the width of the evasion groove 25 is only half the width of the channel and, toward the squeeze end 24, it is reduced to about a quarter of the channel width. At the widest end, the depth of the evasion groove 25 is about half the width of the evasion groove 25 and, toward the squeeze end 24, it constantly decreases towards zero. The bottom of the evasion groove 25 provides a plane support surface, the distance of which to the channel bottom 22 decreases toward the squeeze end 24. As can be seen from Fig. 2, the width of the squeezed tube 21 is greater than the width of the channel 22, so that a part of the tube cross section is displaced into the evasion groove 25. This displaced part of the tube cross section is supported by the bottom of the groove. The peripheric portions of the tube in contact with the bottom of the channel 22 are completely squeezed by the roller 15, while the part of the tube that has penetrated into the evasion groove 25 forms an opening free for fluid flow.

The embodiment of Fig. 4 has an evasion groove 25 of trapezoidal cross section. At its widest end, the width B of the evasion groove is about twice the width b of the support surface 26. The decrease in width of the support surface 26 toward the squeeze end 24 is negligibly small, whereas the width of the evasion groove decreases to the width of the support surface 26. At the widest end, the depth T of the evasion groove 25 is about half the groove width B and it constantly decreases to zero toward the squeeze end. The inclined side walls of the evasion groove 25 also offer a lateral support for the evading portion of the tube cross section.

The passages 27 between channel bottom 22 and evasion groove 25 of all embodiments described are provided with sharp edges so that the squeezed lateral portions of the tube are distinctly separated from the evading central portion constituting the cross section of the opening.

Claims

1. Tube clip for a plastics tube, having a longitudinally extending channel (20) for accomodating said tube (21), said channel being provided in a housing (10), and a roller (15), the axle of which is guided in guiding grooves (14) provided in the side walls (11, 12) of said channel (20), the channel bottom (22) being provided with a central evasion groove (25), the depth and width of which decrease in the longitudinal direction of the housing toward the squeeze end (24), and which form a support surface (26) for the evading portion of the tube cross section,

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said evasion groove (25) has a plane bottom that provides a support surface (26), and that, at the widest end of said evasion groove, the width (b) of said support surface (26) is at least about half the groove width (B) and the depth (T) of said evasion groove is about half the groove width (B).

2. Tube clip according to claim 1, characterised in that said evasion groove (25) has a rectangular cross section.

3. Tube clip according to claim 1, characterised in that the evasion groove (25) has a trapezoidal cross section.

4. Tube clip according to one of claims 1-3, characterised in that the width (b) of said support surface (26) at the squeeze end (24) is at least one fifth of the width of said channel (20).



5. Tube clip according to one of claims 1-4, characterised in that the transition (27) between said channel bottom (22) and said evasion groove (25) has sharp edges.



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