

Connection device for a plastic tube

1. Field of the Invention

The invention relates to a connection device for a plastic tube, having a connection nipple which receives the plastic tube, and which forms an outer cone expanding toward the free nipple end, between which and an axial stop, a spreading ring, which can be pushed onto the outer cone, having outwardly protruding retaining claws is provided, which is supported via a support ring on the axial stop of the connection nipple, and having a sleeve, which engages in a tension-resistant manner on a stop flange of the connection nipple and encloses the plastic tube pushed onto the connection nipple.

2. Description of the Prior Art

In a known connection device of this type (AT 410 706 B), the plastic tube is pushed onto a connection nipple, which carries a spreading ring having outwardly protruding retaining claws in the area of an outer cone, so that when the plastic tube is pushed on, it slides over the spreading ring located in the tapered area of the outer cone. Upon an attempt to pull the plastic tube off of the connection means, the spreading ring is carried along via its protruding retaining claws and pushed onto the outer cone. The spreading of the spreading ring connected thereto causes fixing of the plastic tube, which is enclosed by a tension-resistant sleeve connected to a stop flange of the connection nipple, so that the plastic tube cannot evade the spread spreading ring and is fixed between the spreading ring and the sleeve, which acts as a counter bearing. In order to be able to compensate for stretching of the plastic tube, a free dis-

placement path is preferably provided for the spreading ring. Since the spreading ring having its retaining claws is to be within the outer circumference of the connection nipple as much as possible for simple pushing of the plastic tube onto the connection nipple, the danger exists that when the plastic tube is pulled off of the connection nipple, the spreading ring will not be carried along and therefore also will not be pushed onto the outer cone of the connection nipple. In such a case, the plastic tube therefore cannot be fixed between spreading ring and sleeve.

In order to avoid this, supporting the spreading ring via a rubber-elastic support ring on the axial stop of the connection nipple has already been proposed (AT 504 370 A1). However, this design has several disadvantages with respect to its functionality. Thus, not only is the assembly complex, but rather also the danger exists that when the plastic tube is pushed onto the connection nipple, the rubber-elastic support ring will be forced out of its receptacle groove in the gap between connection nipple and sleeve and pushed along the connection nipple, which impairs the spring function of the support ring, whereby a defined contact pressure force for the retaining claws placed against the tube interior is no longer ensured.

SUMMARY OF THE INVENTION

The invention is therefore based on the object of designing a connection device of the type described at the beginning so that secure fixing of the plastic tube between the spreading ring and the sleeve having a secured contact pressure force for the retaining claws can be ensured using simple structural means, without having to dispense with pushing the plastic tube onto the connection nipple using comparatively little force. In addition, the assembly conditions are to be simplified.

The invention achieves the stated object in that a rubber-elastic spring ring is situated between spreading ring and support ring, spreading ring, support ring, and spring ring being connected to one another in a shear-resistant manner.

Through the springy support of the spreading ring on the stop of the connection nipple in the axial direction, the spreading ring can be pushed at least far enough off of the outer cone by the plastic tube against the spring force of the support as the plastic tube is pushed onto the connection nipple so that the spreading ring comes to rest essentially inside the nipple circumference and therefore does not represent an increased pushing resistance for the plastic tube. The spreading ring is supported via the rubber-elastic spring ring and the support ring, which presses against the stop of the connection nipple, spreading ring, spring ring, and support ring forming a shear-resistant composite body, which can be placed jointly on the outer cone or removed therefrom. Since the spreading and support rings, which are manufactured from a rigid, non-rubber-elastic material, such as a hard plastic, a metal, or a material having a similar effect in relation to the spring ring, receive the spring ring between them in a shear-resistant manner, displacement of the spring ring from its receptacle groove in the gap between connection nipple and sleeve when the plastic tube is pushed onto the connection nipple is also reliably prevented, whereby a defined contact pressure force of the retaining claws against the tube interior is always ensured. Upon an attempt is made to pull the plastic tube off of the connection nipple, the spring ring acting in the axial direction supports the pushing of the spreading ring onto the outer cone, whereby the correspondingly protruding retaining claws force reliable carrying along of the spreading ring with the plastic tube, with the consequence that the clamping forces acting on the plastic tube between the spreading ring and the sleeve become greater with increasing withdrawal. The design and assembly is less complex, since only one component is to be inserted into the receptacle groove implemented by the outer cone and the stop.

If the support ring and the spring ring are implemented as slotted like the spreading ring, particularly simple assembly of the module can be ensured. Incorrect assemblies can additionally be practically precluded by the shear-resistant composite. If the rubber-elastic spring ring additionally has a variable thickness in the axial direction, a positive influence on the deformation tendency of the spring ring as the plastic tube is pushed onto the spreading ring can additionally be taken by appropriate adaptation and selection of this geometry, in order to reduce still further the clamping tendency of the spring ring between connection nipple and tube.

For fine tuning, or to be able to avoid excess bulges of the spring ring as the plastic tube is pushed on, the possibility additionally exists of situating two or more rubber-elastic spring rings alternately between spreading ring and support ring, between which optionally a further support ring may be situated in each case, whereby an alternating arrangement of spring rings and support rings results.

In order to avoid radial yielding of spreading ring, spring ring, and support ring as the plastic tube is pushed onto the connection nipple, it is suggested that the support ring engage in an undercut groove associated with the stop flange using its front face facing toward the stop flange. The front face of the support ring facing toward the stop flange preferably has a geometry adapted to the groove shape.

BRIEF DESCRIPTION OF THE DRAWING

The object of the invention is shown for exemplary purposes in the drawing. In the figures:

Figure 1 shows a connection device according to the invention for a plastic tube in a simplified axial section,

- Figure 2 shows a detail from Figure 1, which shows the spreading ring, in an enlarged scale, and
- Figure 3 shows a device from Figure 2 having a design variant of a spreading ring according to the invention,
- Figure 4 shows a spreading ring according to the invention in a diagonal view, and
- Figure 5 shows a design variant of the device from Figure 1 in a simplified axial section.

DESCRIPTION OF THE PREFERRED EMBODIMENT

According to Figure 1, the connection device for a plastic tube 1, indicated by dot-dash lines, has a connection nipple 2, which receives the plastic tube 1, having a stop flange 3, on which the sleeve 4 enclosing the plastic tube 1 engages in a tension-resistant manner.

In order to clamp the plastic tube 1 between the connection nipple 2 and the sleeve 4, a spreading ring 5 is mounted on the connection nipple 2, which cooperates with an outer cone 6 of the connection nipple 2. The arrangement is made so that the spreading ring 5, which forms radially protruding retaining claws 7 on the outer side facing toward the plastic tube 1, is supported in a springy manner via a rubber-elastic spring ring 8 and a support ring 9 on a stop 11 of the connection nipple 2. Spreading ring 5, spring ring 8, and support ring 9 form a module made of individual parts assembled in a shear-resistant manner.

If the plastic tube 1 is pushed onto the connection nipple 2, the spreading ring 5 can be pushed onto the outer cone 6 against the spring force of the rubber-elastic spring ring 8 enough that the spreading ring 5 comes to rest essentially inside the circumference of the connection nipple 2, so that the plastic tube 1 can be pushed without special application of force beyond the spreading ring 5 until it stops on the stop flange 3. Upon an attempt to pull the plastic tube 1 off

of this fastening position from the connection nipple 2, the spreading ring 5, supported by the rubber-elastic spring ring 8, is pushed onto the outer cone 8 and spread open, whereby the retaining claws 9 increasingly press into the inner wall of the plastic tube 1 and thus produce a form fit, which only allows the plastic tube 1 to be pulled further off of the connection nipple 2 while carrying along the spreading ring 5. This means that the plastic tube 1 is increasingly clamped between the sleeve 4 and the spreading ring 5 and fixed against further pulling off. The seal between the plastic tube 1 and the connection nipple 2 is typically achieved via sealing rings 10, which are inserted into receptacle grooves of the connection nipple 2.

Particularly simple assembly of the module is ensured in that the support ring 9 and the spring ring 8, like the spreading ring 5, have an axial spreading slot B. The shear-resistant composite additionally has the result that incorrect assemblies are practically precluded. If the rubber-elastic spring ring 8 additionally has a varying thickness in the axial direction, for example, constrictions between thickness maxima in the illustrated exemplary embodiment, positive influence can be taken on the deformation tendency of the spring ring as the plastic tube 1 is pushed onto the spreading ring 5 by appropriate adaptation and selection of this geometry.

For fine tuning, or to avoid excess bulges of the spring ring as the plastic tube 1 is pushed on, two or more rubber-elastic spring rings 8 may be situated between spreading ring 5 and support ring 9, between each of which a further support ring 9 is preferably situated, whereby spring rings 8 and support rings 9 are alternately situated after the spreading ring 5 (Figure 3).

In order to prevent radial yielding of spreading ring 5, spring ring 8, and support ring 9 as the plastic tube 1 is pushed onto the connection nipple 2, it is recommended that the support ring 9 engage in an undercut groove 11 assigned to the stop flange 3 using its front face facing toward the stop flange 3. The front face of the support ring 9 facing toward the stop flange 3 has a geometry

adapted to the groove shape in the illustrated exemplary embodiment according to Figure 5, i.e., it forms a matching counterpart. As the plastic tube 1 is pushed onto the connection nipple 2, the support ring 9 is inserted using its terminal attachment into the undercut groove 11 and secured against radial breakout.

CLAIMS

1. A connection device for a plastic tube (1), having a connection nipple (2), which receives the plastic tube (1) and forms an outer cone (6) expanding toward the free nipple end, between which and an axial stop (11) a spreading ring (5) having outwardly protruding retaining claws (7), which can be pushed onto the outer cone (6), is provided, which is supported via a support ring (9) on the axial stop (11) of the connection nipple (2), and having a sleeve (4), which engages on a stop flange (3) of the connection nipple (2) in a tension-resistant manner and encloses the plastic tube (1) pushed onto the connection nipple (2), characterized in that a rubber-elastic spring ring (8) is situated between spreading ring (5) and support ring (9), with spreading ring (5), support ring (9), and spring ring (8) being connected to one another in a shear-resistant manner.
2. The connection device according to Claim 1, characterized in that the support ring (9) and optionally also the spring ring (8), as well as the spreading ring (5), have an axial spreading slot (B).
3. The connection device according to Claim 1 or 2, characterized in that the rubber-elastic spring ring (8) is equipped with varying thicknesses in the axial direction, for example, constrictions between thickness maxima, or is in the form of a corrugated tube.
4. The connection device according to one of Claims 1 to 3, characterized in that two or more rubber-elastic spring rings (8), between which a further support ring is preferably situated in each case, are situated between spreading ring (5) and support ring (9).

5. The connection device according to one of Claims 1 to 4, characterized in that the support ring (9) engages in an undercut groove (11) associated with the stop flange (3) using its front face facing toward the stop flange (3).
6. The connection device according to Claim 5, characterized in that the front face of the support ring (9) facing toward the stop flange (3) has a geometry adapted to the groove shape.