

CONNECTOR FOR CONNECTING TO A STANDARDIZED LUER TAPER OR LUER-LOK CONNECTION

Description

The invention relates to a connection part for connection to a standardised luer connection or luer lock connection, with the features specified in the preamble of claim 1.

In medical technology, often, so-called luer connections are applied for the fluid-tight connection of medical apparatus and instruments, i.e. of infusion pumps. Thereby, it is the case of cone connections, whose conical surfaces have a 6 percent gradient. Typically, the connection parts of these connections are manufactured from plastic by way of injection moulding.

Basically, these connections have proven their worth in medical technology, however, leakages may occur under unfavourable circumstances. On the one hand, deviations of the dimensions and shape with regard to the luer cone may render a sealing bearing of the cone peripheral surfaces more difficult. A further cause of leakage may lie in rough or damaged, for example scratched peripheral surfaces of the luer cones. Moreover, the viscoelastic flow of the plastic may lead to a loosening of the luer connection and thus to leakages, which particularly occurs with longer storage times or with the delivery of apparatus with pre-connected luer connections.

In practice, one often attempts to increase the sealedness of a luer connection by way of joining together the connection parts with an increased joining force. Thereby, significantly increased tensile stresses occur within the connection pieces, in particular in that connection with the luer inner cone. The connection is often rendered unusable on account of the occurring tears or breakage.

It is therefore the object of the invention to create a connection part with an improved fluid-tight connection.

This object is achieved by a connection part with the features specified in claim 1. Preferred embodiments are to be deduced from the dependent claims, the subsequent description and the drawing.

The connection part according to the invention is a connection part for connection to a standardised luer connection or luer lock connection, and comprises a conical region which is designed for the bearing on the conical connection surface of the standardised luer connection or luer lock connection. Thereby, a seal is arranged on the conical region. In a connection to the

connection part according to the invention, this seal therefore acts additionally to the sealing bearing of the conical region on the conical counter-bearing surface. Dimensional and shape deviations, as well as damage to the bearing surfaces of a connected luer connection or luer lock connection may be compensated with this seal, by way of it being suitably deformed.

The seal which is designed in an elastic manner, has a good restoring behaviour. On connection of the connection part to a luer connection or luer lock connection (hereinafter indicated as counter-connection part), the seal furthermore prevents an unintended loosening of the connection. Moreover, a sealed connection of the connection part according to the invention, to a counter-connection part, is given already with a slight joining force. For this reason, also a lower force effort is required for releasing the connection, and thus the danger of the connection part or the counter connection part being damaged by too great a force effort, and of the tearing and breakage locations caused by this, is significantly reduced. Moreover, the connection part and the counter-connection part, with a small joining force, have a significantly reduced tendency to jam when connecting or releasing the connection. A good restoring behaviour of the elastic seal furthermore reduces the viscoelastic flow of the plastics. For this reason, a post-connection of the connection parts, such as by way of rotating or pressing the connection pieces at a later stage, is not necessary. Preferably, the conical region is designed as the peripheral surface of a truncated cone, which is designed for bearing on a luer cone. This peripheral surface thereby is not necessarily designed as a coherent surface, but may also consist of several surface sections which for example are separated from one another or segmented, by a seal designed as a sealing ring.

In a preferred design, with regard to the connection part according to the invention, it is the case of a female connection part, since this permits a connection to a standardised male connection. With this, in particular, one may avoid a high stress in the female connection part, since no great force effort is necessary for introducing the standardised male Luer connection.

In an alternative design, with regard to the connection part according to the invention, it is the case of a male connection part which is designed for connection to a standardised female luer connection.

The seal is further preferably designed as a sealing ring which is arranged on the conical region over the complete periphery. In particular, this sealing ring is orientated coaxially to the longitudinal axis of the conical region. In this manner, a high sealing effect may be achieved along the whole periphery of the conical regions of the connection part and counter-connection part, said regions coming to bear on one another. A rotationally symmetrical construction of the connection part in the connection region furthermore permits the simple connectability of the connection part to the counter-connection part.

In a preferred design, the seal is arranged at the free axial end of the conical region. This free axial end of the connection part comes to bear on a bearing surface of the counter-connection part, as soon as the conical regions of the connection part and the counter connection part adequately overlap. Thus one may easily ensure a releasable sealing by way of this design.

Preferably, the seal is formed of an elastomer, preferably of a silicone rubber or a thermoplastic elastomer. Such an elastic seal may be manufactured inexpensively and moreover has the advantage that this has a good restoring behaviour. If thus a connection to the connection part according to the invention is released, then the sealing contour returns almost into its original shape. In this manner, a reliably sealing connection to the connection part may be effected even with a repeated exchange of the counter-connection part.

Preferably, with regard to the connection part according to the invention, the seal is integrally formed on the conical region with a material fit. In this manner, the seal is designed as one piece or as one part with the remaining connection part. A slippage or a loss of the seal is thus effectively avoided with this. Accordingly, with the application of the connection part according to the invention, it is not necessary to position the seal in a suitable manner or to attach the seal onto the connection part before a connection to the connection part.

In a preferred design, the connection part together with the seal is designed as a two-component injection moulded part. In this manner, on the one hand one may realise a material fit connection of the seal to the conical region of the connection part in an uncomplicated manner, and on the other hand such connection parts are manufacturable in an inexpensive manner with the plastic injection moulding method.

Further preferably, the connection part is part of a component with a check valve. In particular with infusion applications, components are often provided with check valves. An integration of such a check valve into a connection piece according to the invention here offers a significant advantage. If the check valve and the connection piece are present as an integral component, then these components may be produced more economically, and are simpler to assemble as well as to handle.

Further preferably, the connection part is part of a component which is designed as an injection moulded part. In medical technology and in particular in infusion technology, besides, a multitude of components are manufactured by way of injection moulding. Moreover, these components often comprise luer connections or luer lock connections. If these are manufactured together with the connection part according to the invention as a single-part or single-piece component by way of injection moulding, then production steps and thus also manufacturing

costs may be saved. Moreover, the handling, the assembly as well as the maintenance of such single-part or single-piece components is significantly simplified.

The invention is hereinafter described by way of embodiment examples represented in the drawing. There are shown in:

- Fig. 1 a connection part according to the invention, which is designed as a female connection part for connection to a male luer connection, in a longitudinal section,
- Fig. 2 the connection part according to Fig. 1, in a connection with a male luer connection, in a longitudinal section,
- Fig. 3 a further connection part according to the invention, which is designed as a female connection part for connection to a male luer lock connection, in a longitudinal section,
- Fig. 4 the connection part according to Fig. 3, in a connection with a male luer lock connection, in a longitudinal section,
- Fig. 5 a further connection part according to the invention, which is designed as a male connection part for connection to a female luer lock connection, in a longitudinal section, and
- Fig. 6 the connection part according to Fig. 5, in a connection with a female luer lock connection, in a longitudinal section.

A connection part 5 represented in Fig. 1 and 2 is designed as a female connection part. Thereby, the connection part 5 has an essentially cylinder symmetry with respect to its longitudinal axis 10. The connection part 5 is thereby designed for connection to a standardised luer connection 15 as a counter-connection part. For this, the connection part 5 has a conical region 20, which in the shown embodiment example forms a connection opening 20 for connection to the conical connection surface 25 of a standardised luer connection 15. The conical region 20 is designed as an inner cone 20, i.e. as a truncated-cone-like recess with an opening which widens in the direction of the free axial end 40 of the connection part 5. The conical surfaces 20 of the conical region 20 have a 6 percent gradient, so that the conical region 20 may come to bear in a surfaced manner with the conical connection surface 25 of the luer connection 15.

A seal 45 is connected with a material fit at the free axial end 40 of the connection part 5, on the conical connection surface 20 of the connection part 5. The seal 45 is designed as a sealing ring 45 orientated coaxially to the inner cone. The seal 45 consists of thermoplastic elastomer, whilst the remaining connection part 5 is manufactured of thermoplastic plastic which is rigid at room temperature. Thereby, the seal 45 and the connection part 5 together are manufactured with the two-component injection moulding method. The sealing element 45, for a suitable adaptation to the luer outer cone 25, comprises an inwardly projecting sealing contour which is designed as a sealing bead 50 and which, given a released connection, projects slightly into the conical opening region 20 of the connection piece 5. In this manner, the connection piece 5 always has a sealing contact with the outer cone 25 of the luer connection 15.

The connection part 5' according to the invention, which is represented in Fig. 3 and 4 is likewise designed as a female connection part 5' and for the connection to a luer lock connection 55'. Thereby, the connection part 5', inasmuch as it concerns the inner part, has the same features as the connection part 5 represented in Fig. 1 and 2. Moreover, this connection part however has additional features for a lockable connection to the luer lock connection.

For locking, the luer lock connection 55', as is known, comprises an inner thread 60' which is arranged coaxially to the luer cone 25' and surrounds this over the whole periphery. For locking with this inner thread 60' of the luer lock connection 55', the connection part 5' is provided with two radial tongues for the threaded engagement 65', which are envisaged for meshing with the thread 60' of the luer lock connection 55'. These tongues 65' are designed equally to those which serve for connection to a luer lock connection 55' with a standardised luer connection. Thus the tongues 65' are arranged in an essentially diametrical manner. Thereby, the tongues 65' are located at the free axial end 40' of the connection part 5', thus at that end on which the seal 45' is fastened. The tongues 65' thereby project outwards in the radial direction. Thus the connection part 5' may be screwed into the luer lock connection 55', until an adequately tight bearing of the conical region 20' or of the seal 45' with the luer outer cone 25' of the luer lock connection 55' is achieved.

A further connection part 5'' according to the invention is represented in the Fig 5 and 6. This is designed as a male connection part 5'' and for connection to a female luer lock connection 55''. The connection part 5'', for connection to the luer lock connection 55'', comprises a conical region 20''. The conical region 20'' is designed as an outer cone 20'', i.e. it has a truncated-cone-like profile with a diameter tapering in the direction of the free axial end 40'' of the connection part 5''. This outer cone is thus designed fitting with an inner cone of a standardised female luer lock connection 55', on which it may come to bear in a surfaced manner. A peripherally arranged ring seal 45'' is formed on the free axial end 40'' of the connection part 5''. For this reason, a slight axial overlap of the connection part 5'' with a female luer lock connection part 55'' is sufficient

for a sealing bearing. The ring seal 45" is attached on the axial end 40" of the connection part 5" in a manner such that the peripheral surface of the outer cone 20" merges into the outer surface of the seal 45" at the axial end 40". For this, the outer cone 20" at the axial end 40" has a peripheral recess 70", which extends up to the axial end 40" and into which the material of the seal 45" is deposited. The seal 45" extends past the cross-sectional surface at the axial end 40" of the cone-shaped region 20", and projects slightly into the end region of the inner shank 75" of the connection part 5".

For locking with a female luer lock connection 55", the connection piece 5" comprises a coaxially orientated inner thread 60" which peripherally surrounds the conical region 20", with which inner thread 60" corresponding tongues 65" of the female luer lock connection 55' may engage (see Fig. 6). This connection part 5" too is manufactured as a single-part or single-piece component together with the seal 45" as a two-component injection moulded part.

List of reference numerals

5, 5', 5"	-	connection part
10, 10', 10"	-	longitudinal axis of the connection part
15	-	connection part of the standardised luer connection
20, 20', 20"	-	conical region of the connection part
25, 25'	-	conical connection surface of the standardised luer connection
25"	-	conical connection surface of a standardised luer lock connection
40, 40', 40"	-	free axial end of the connection part
45, 45', 45"	-	seal
50, 50'	-	sealing bead
55', 55"	-	connection part of a standardised luer lock connection
60', 60"	-	inner thread
65', 65"	-	tongues for thread meshing
70"	-	recess
75', 75"	-	inner shank of the connection part

Claims

1. A connection part (5, 5', 5'') for connection to a standardised luer connection (15) or luer lock connection (55, 55''), which comprises a conical region (20, 20', 20'') designed for bearing on the conical connection surface (25, 25', 25'') of the standardised luer connection (15) or luer lock connection (55', 55''), characterised in that a seal (45, 45', 45'') is arranged on the conical region (20, 20', 20'').
2. A connection part (5, 5') according to claim 1, characterised in that it is designed as a female connection part (5, 5').
3. A connection part (5'') according to claim 1, characterised in that it is designed as a male connection part (5'').
4. A connection part (5, 5', 5'') according to one of the claims 1 to 3, characterised in that the seal (45, 45', 45'') is designed as a sealing ring (45, 45', 45'') which is arranged over the whole periphery on the conical region (20, 20', 20'')
5. A connection part (5, 5', 5'') according to one of the preceding claims, characterised in that the seal (45, 45', 45'') is arranged at the free axial end (40, 40', 40'') of the conical region (20, 20', 20'').
6. A connection part (5, 5', 5'') according to one of the preceding claims, characterised in that the seal (45, 45', 45'') is formed of an elastomer, in particular silicone rubber or of a thermoplastic elastomer.
7. A connection part (5, 5', 5'') according to one of the preceding claims, characterised in that the seal (45, 45', 45'') is arranged with a material fit on the conical region (20, 20', 20'').
8. A connection part (5, 5', 5'') according to one of the preceding claims, characterised in that together with the seal (45, 45', 45''), it is designed as a two-component injection moulded part.
9. A connection part (5, 5', 5'') according to one of the preceding claims, characterised in that it is part of a component with a check valve.
10. A connection part (5, 5', 5'') according to one of the preceding claims, characterised in that it is part of a component designed as an injection moulded part.