

TIE WRAP CONNECTOR

CROSS-REFERENCE RELATED APPLICATIONS

This application claims the benefit of U.S. Provisional Patent Application
5 No. 61/066,760, filed on February 22, 2008 the entire contents of which are
incorporated by reference herein.

BACKGROUND OF THE INVENTION

10 FIELD OF THE INVENTION

This invention relates to a tie wrap connector for connecting a flexible
conduit to a fitting such as a barbed fitting.

DESCRIPTION OF PRIOR ART

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Flexible tubing is widely utilized to deliver fluid from a fluid source to a
storage site or fluid treatment site. The flexible tubing is connected to the storage
volume or fluid treatment site in order to provide the desired fluid delivery. It is
common practice to secure the flexible tubing to a barbed conduit in order to
20 transfer fluid from a first location to a second location. It is necessary to provide a
secure and leak proof connection at the end of the flexible tubing in order to avoid
fluid contamination and/or leakage. Such a secure connection is particularly
required in medical and pharmaceutical applications such as blood pumps, oxygen
concentration cartridges, filtration cartridges, intravenous bags or the like.

25 At the present time, cable ties are utilized to provide a secure connection at
the end of the flexible tubing. Cable ties comprise a strap and a locking head
shaped to be locked to each other during their use. Presently available cable ties
have the disadvantage of not being capable of providing a compressive force
about the entire circumference of the flexible tubing. This disadvantage results
30 from the locking head not being sufficiently flexible to follow the contour of the
outside surface of the flexible tubing. Accordingly, the risk of leakage is
increased at the portion of the outside surface of the flexible tubing subject to
decreased compressive force.

Accordingly, it would be desirable to provide a connector for connecting a
35 flexible tubing to a barbed fitting which prevents leakage and/or contamination of

fluid located within the flexible tubing. In addition, it would be desirable to provide such a connector which remains intact even at elevated fluid pressure within the flexible tubing. Such a connector would provide ease of installation as well as security against fluid leakage or fluid contamination.

5 WO90/02284 discloses a one-piece tie wrap connector according to the preamble of claim 1, made from plastic material comprising integral lateral extensions formed at the locking head, which incline outwardly and are curved for fitting in complementary manner against an article around which the strap is looped in use.

10 US5966781 teaches a spacing clamp tie wrap connector to secure two elongated items in spaced, parallel relationship with each other.

US2007/0023586 teaches a harness clamp tie for fastening onto a mounting structure such as an aperture in a panel.

15 SUMMARY OF THE INVENTION

According to the present invention there is provided a tie wrap connector as defined in claim 1. Preferred embodiments are defined in the dependent claims.

The present invention provides a tie wrap connector which includes a solid insert having an arc shaped surface which conforms to an outside surface of a
20 flexible conduit. The insert is a separate piece from the tie wrap connector. The tie wrap connector includes a strap having a free end and a second end joined to a strap locking head. The strap includes a stepped surface which permits locking the strap within the locking head. The locking head has an opening to receive the free end of the strap. The locking head includes a ratcheting panel that receives the
25 steps of the strap thereby to lock the strap within the locking head. The insert is positioned adjacent the locking head. When the strap is locked within the locking head and positioned about the surface of the flexible conduit, the arc surface of the insert exerts a compressive force on the outside surface of the flexible conduit.

30 BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a side, partially cross sectional view of the tie wrap connector of this invention.

Figure 2 is a cross sectional view of the tie wrap connector of Figure 1
35 taken along line 2-2 of Figure 1.

Figure 3 is a front view of the tie wrap connector of Figure 1.

Figure 4 is a side view of a tie wrap connector of the prior art in use.

Figure 5 is a side view of a tie wrap connector of this invention in use.

Figure 6 is a top, partial cross sectional view of the tie wrap connector of
5 Figure 5 in use.

Figure 7 is a side view of an alternative embodiment of a tie wrap
connector of this invention in use.

Figure 8 is a side view of an alternative embodiment of a tie wrap
connector of this invention in use.

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BRIEF DESCRIPTION OF SPECIFIC EMBODIMENTS

Referring to Figures 1, 2 and 3, the tie wrap connector of this invention 10
includes a strap 12, a locking head 14 and an insert 16 having an arc shaped
surface 18. The locking head 14 includes an opening 20 that extends through the
15 thickness of the locking head 14 and a locking device 22 such as the ratcheting
panel shown in the Figure. The strap 12 includes steps 24 that cooperate with the
device 22 so that the strap 12 is locked within the locking head 14 and, usually
through the locking head 14 so that the steps 24 contact the
locking device 22 thereby to lock the strap 12 in place within the locking head 14.

20 Referring to Figure 4, a tie wrap connector 30 of the prior art is shown.
The tie wrap connector 30 includes a strap 32 having steps 34 and a locking head
36. The locking head 36 includes any conventional means for passing the free end
38 through the locking head 36 and for locking the strap 34 within the locking
head 36. Since the locking head 36 is not sufficiently flexible, a gap 38 is formed
25 between the strap 32 and a portion 40 of the outside surface of flexible conduit 42.
The flexible conduit 42 is positioned over hollow barbed conduit 44. Thus there
is no compression force on the portion 40 of the flexible conduit 42 thereby
increasing the possibility of leakage between the flexible conduit 42 and barbed
conduit 44.

30 Referring to Figures 5 and 6, the tie wrap connector of this invention is
shown. The tie wrap connection includes the strap 12, the locking head 14 and the
insert 16 having the arc shaped surface 18. As the end 24 of the strap 12 is pulled
through the locking head 14, a compressive force is exerted on the insert 16 by the
strap 12. This, in turn, causes a compressive force to be exerted on the flexible
35 conduit 42 by the insert 16. The remaining portion of the strap 12 in contact with

the flexible conduit 42 also exerts a compressive force on the flexible conduit 42 so that the entire outside surface of the flexible conduit 42 is subject to direct compressive force. The strap 12 is kept in place against the flexible conduit 42 by the interaction of the locking device 22 and the steps 24 of the strap 12 thus
5 securing the flexible conduit 42 to the barbed conduit 44. This results in an improved seal between the flexible conduit 42 and the barbed conduit 44.

According to the invention, the insert comprises a separate piece that can be inserted in the desired area when it is desired to use the tie wrap connector. In such a free-standing design the insert 16 contains a device (not shown) for removably
10 securing it to the strap 12 if desired such as a slot on the side of the insert 16 facing the strap 12 through which the strap 12 may be placed.

Additionally, the height of the insert 16 and the length of the arc 18 can be varied to accommodate a greater or lesser amount of the surface of the flexible tubing 42 as is required by the desired application, as is shown in Figures 5, 7 and
15 8. In Figure 5, the height of the insert 16 relative to the opening 20 of the locking head 14 is substantially the same as that of the locking device 22 so that the arc 18 is spread over as much surface of the flexible conduit 42 as possible. In Figure 7, the height of the insert 16 is less than that of the embodiment of Figure 5 and is substantially the same as that of the base 50 of the locking device 22 in the
20 locking head 14. In Figure 8, the height of the insert 16 is substantially the same as the lower base 52 of the opening 20 of the locking head 14.

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CLAIMS

What is claimed:

- 5 1. A tie wrap connector (10) comprising:
 a strap (12) having a free end (25) and an opposite end joined to a strap
locking head (14),
 said locking head (14) having a strap receiving opening (20) therein, the
opening (20) having a device (22) for securing a portion of the strap (12) within the
10 opening (20), and
 an insert (16) positioned adjacent said locking head (14), said insert (16)
having an arc shaped surface (18) positioned remote from said locking head (14),
characterised in that
 said insert (16) is formed separately from said locking head (14) and said
15 strap (12), and
 said insert (16) contains a device for removably securing the insert (16) to
the strap (12).
2. The connector of claim 1 wherein the device (22) for securing a portion
20 of the strap (12) is a ratchet and the strap (12) has a series of steps (24) that mate
with the ratchet of the locking head (14).
3. The connector of claim 1 or 2 wherein the insert (16) is of a height that is
substantially equal and planar with the opening (20) of the locking head (14).
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4. The connector of any one of claims 1 to 3 wherein the insert (16) is of a
height that is substantially equal and planar with the device (22) for securing a
portion of the strap (12) within the opening (20) of the locking head (14).
- 30 5. The connector of any one of claims 1 to 4 wherein said device is a slot
on the side of the insert (16) facing the strap (12) through which the strap (12) may
be placed.