

TIE WRAP CONNECTOR

CROSS-REFERENCE RELATED APPLICATIONS

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

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

10 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

Flexible tubing is widely utilized to deliver fluid from a fluid source to a
15 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 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
20 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.

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
25 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 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
30 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 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.

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SUMMARY OF THE INVENTION

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 flexible conduit. The insert can be a separate piece or can be formed integrally with 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 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.

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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 taken along line 2-2 of Figure 1.

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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 Figure 5 in use.

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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.

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 insert 16 is formed integrally with the strap 12, such as by any
5 conventional molding process. The locking head 14 includes an opening 20 that extends through the 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
10 locking device 22 thereby to lock the strap 12 in place within the locking head 14.

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
15 head 36. Since the locking head 36 is not sufficiently flexible, a gap 38 is formed 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
20 conduit 44.

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
25 strap 12. This, in turn, causes a compressive force to be exerted on the flexible 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
30 the interaction of the locking device 22 and the steps 24 of the strap 12 thus 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.

It is to be understood that the insert 16 need not be formed integrally with the strap. It can comprise a separate piece that can be inserted in the desired area

when it is desired to use the tie wrap connector. Optionally, in such a free-standing design the insert 16 may contain a device (not shown) for removably 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.

5 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 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
10 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 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.

CLAIMS

What is claimed:

1. A tie wrap connector comprising:
a cable tie, including a strap having a free end and an opposite end joinable
5 to a strap locking head,
said locking head having a strap receiving opening therein, the opening
having a device for securing a portion of the strap within the opening and
an insert positioned adjacent said locking head, said insert having an arc
shaped surface positioned remote from said locking head.
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2. The connector of claim 1 wherein said locking head, insert and strap are
formed integrally.
3. The connector of claim 1 wherein said insert is formed separately from
15 said locking head and said strap.
4. The connector of claim 1 wherein the device for securing a portion of
the strap is a ratchet and the strap has a series of steps that mate with the ratchet of
the locking head.
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5. The connector of claim 1 wherein the insert is of a height that is
substantially equal and planar with the opening of the locking head.
6. The connector of claim 1 wherein the insert is of a height that is
25 substantially equal and planar with the device for securing a portion of the strap
within the opening of the locking head.
7. A method of securing a flexible conduit to a hose barb comprising
providing a flexible conduit having an inner and outer surface, providing a hose
30 barb having an inner and outer surface wherein the barb is formed on the outer
surface and has a substantially planar surface on the outer surface beyond the
barb, mounting the flexible conduit to the hose barb such that the inner surface of
the conduit is adjacent the outer surface of the barb and a portion of the flexible
conduit extends to the substantially planar surface beyond the barb, providing a

connector formed of a cable tie, including a strap having a free end and an opposite end joinable to a strap locking head, said locking head having a strap receiving opening therein, the opening having a device for securing a portion of the strap within opening and an insert positioned adjacent said locking head, said
5 insert having an arc shaped surface positioned remote from said locking head and placing the strap around the portion of the flexible conduit at the substantially planar surface of the hose barb beyond the barb, placing the free end of the strap into the opening of the locking head and securing the strap portion within the opening of the locking head in the device for securing a portion of the strap.

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8. The method of claim 7 wherein a portion of the free end of the strap extends through and beyond the opening.

9. The method of claim 7 wherein the device for securing a portion of the
15 strap is a ratchet and the strap has a series of steps that mate with the ratchet of the locking head in order to secure the strap within the opening of the locking head.

10. The connector of claim 1 wherein said insert is formed separately from said locking head and said strap and contains a device for removably securing the
20 insert to the strap.