

ELECTRICAL CABLE GLAND WITH CAPTIVE CONE

5 FIELD OF THE INVENTION

This invention relates to electrical cable glands of the type comprising an internal armor clamp assembly typically composed of an armor clamping cone associated with an inner body part of the cable gland and an armor
10 clamping ring associated with an outer body part of the cable gland.

More particularly, but not exclusively, the invention relates to an electrical cable gland that facilitates at least partial removal of the outer body part to permit inspection of the armor clamp assembly at any required time after
15 installation of the cable gland and without disturbing the armor clamp itself. This may also enable inspection of an inner seal acting between an inner sheath of a cable and the inner body part of the cable gland.

Still more particularly, but not exclusively, the invention relates to electrical
20 cable glands of the type described in British patent no GB2368201, the contents of which are incorporated herein by reference.

It is to be noted that the term armoring is used herein in a broad sense and includes a layer in the form of longitudinally extending relatively stiff wires of
25 significant thickness between the inner and outer insulating sheaths of a cable; armoring in the form of fine, substantially more flexible, optionally braided, wires; and metal tape. The armoring may serve one or more functions including, but not limited to, physically protecting or reinforcing the cable; providing an electrically conductive earth; and providing an
30 electromagnetic shield.

BACKGROUND TO THE INVENTION

In order to provide a two-part construction of a cable gland for the purposes of ease and security of installation without either the armor clamping cone or the armor clamping ring being loose and therefore susceptible to being lost and omitted from the installed assembly, the armor clamping cone is held captive relative to one part of the cable gland, typically the inner body part of the cable gland, whilst the armor clamping ring is held captive relative to the other part of the cable gland, typically the outer body part of the cable gland.

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As described in British patent GB2368201, preventative maintenance of electrical installations is becoming commonplace.

In instances in which such maintenance involves inspection of the inner seal of a cable gland this requires that the armor clamping cone be separable from its associated part of the body of the gland for the purposes of inspection without disengaging the armor clamp.

Various constructions have been proposed and used for holding the armor clamping cone captive relative to its associated body part of the gland. In the past, spring clips encircling an extension to the cone of the armor clamp have been used in cooperation with an inwardly directed lip or flange provided on the inner surface of the tubular body part.

British patent number GB2368201 proposes an interference fit between an inwardly directed ridge provided on the tubular body part and an outwardly directed flange provided on the tubular extension to the armor clamping cone of the armor clamp.

However, neither of these expedients has proved satisfactory in practice as the spring clip does not release adequately easily, when required, and the

interference fit requires extremely close manufacturing tolerances in order to operate effectively.

OBJECT OF THE INVENTION

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It is one object of the invention to provide a cable gland in which the armor clamping cone is held captive relative to an inner body part of the cable gland in a more expeditious manner than heretofore so as to enable a cable gland to have a two sub-assembly configuration.

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It is another object of this invention to provide a cable gland of the above general type which permits inspection of the inner seal and usually also the armor clamp without necessitating the use of loose components at the time of initial installation.

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SUMMARY OF THE INVENTION

In accordance with this invention there is provided a cable gland comprising a body including a tubular inner body part and a tubular outer body part and an armor clamp assembly wherein the latter has an armor clamping cone associated with the inner body part and a cooperating armor clamping ring associated with the outer body part, the armor clamping cone being held releasably captive relative to the said inner body part to thereby permit a cable gland to be composed of two subassemblies at least for initial installation purposes, the cable gland being characterized in that the armor clamping cone is held releasably captive relative to the said inner body part by means of an elastomeric ring encircling an extension to the armor clamping cone and cooperating with both the said extension and the inner body part to hold the armor clamping cone captive relative to the inner body part but releasable therefrom.

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Further features of the invention provide for the elastomeric ring to be an O-ring that is preferably partially accommodated in a groove in the outer surface of the extension to the armor clamping cone; for the inner body part of the cable gland to have at the entry end thereof, an inwardly directed lip for retaining the elastomeric ring within the tubular body in a releasable manner; for the cable gland to have a two-sub-assembly construction with the armor clamping cone being held captive relative to the inner body part and the armor clamping ring being held at least temporarily captive relative to the outer body part with the two body parts being movable axially by virtue of cooperating screw threads thereon; and for the cable gland to embody both inner and outer compression seals for sealing onto the inner and outer sheaths of a cable.

The armor clamping ring may be held releasably or temporarily captive relative to the outer body part by any suitable means such as those described in said published British patent number GB2368201.

In the case of an inner seal, the seal will generally be accommodated in a bore of the inner body part and will, in use, be compressed axially by the free end of the extension to the armor clamping cone.

In order that the invention may be more fully understood, one preferred embodiment thereof will now be described with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:-

Figure 1 is an elevation of a cable gland according to the invention with the upper half thereof shown in section; and,

Figure 2 is an enlarged view of the central region of the cable gland illustrated in Figure 1.

DETAILED DESCRIPTION WITH REFERENCE TO THE DRAWINGS

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In the embodiment of the invention illustrated in the drawings, the invention is applied to a cable gland that is also provided with a so-called deluge seal for preventing the ingress of moisture into the interior of the gland where the armor clamp assembly is located. Of course, the invention can also be
10 applied to many other cable glands.

In this particular embodiment of the invention the cable gland comprises an outer tubular body part [1] having a free end [2] forming an entry end for a cable [3] and an inner tubular body part [4] having an externally screw
15 threaded portion [5] in cooperating engagement with an internally screw threaded portion [6] of the outer tubular body.

In the installed condition, the two bodies form an internal cavity housing an armor clamp assembly that includes an armor clamping cone [7] and a
20 cooperating clamping ring [8] that are operatively urged into cooperating relationship by screwing the inner tubular body into the outer tubular body.

The cone has a rearwardly directed tubular extension [9] which, in the installed position, compresses an elastomeric inner compression seal [10] in
25 well established manner. The entry end of the gland has an elastomeric outer compression seal [11] which is independently brought into service by means of a union nut [12] screwed onto the entry end of the body.

The armor clamping cone [7] and cooperating clamping ring [8] have
30 cooperating conical clamping surfaces. The cone angle of these surfaces is substantially conventional [for example, a cone angle of 20 degrees or, in other words, 10 degrees to the axis of the gland] and of self locking type.

These surfaces are adapted to clamp the armor wires [13] of a cable between them.

Turning now to the releasable attachment of the armor clamping cone [7] to the inner tubular body part in terms of this invention, this is achieved using an endless elastomeric ring that is, in this instance, an O-ring [14] of a suitable diameter and cross-sectional dimension. The O-ring is seated in a groove [15] in the outer surface of the extension [9] towards the end thereof remote from the armor clamping cone itself and the O-ring cooperates with the inner surface of the inner tubular body part [4]. The armor clamping cone and its extension may be held captive relative to the inner tubular body part simply by virtue of frictional engagement of the O-ring with the inner surface of the inner tubular body part. It is, however, preferred that the inner tubular body part have an inwardly directed lip [16] for retaining the elastomeric ring within the tubular body in a releasable manner.

It will be understood that with the armor clamp assembly operatively engaging the armor wires of a cable, the outer and inner tubular body parts of the cable gland can be disengaged from each other without disturbing the lock between the two conical surfaces and the armor wires and, in the instance of the armor clamping cone, the inner seal can be inspected as may be required by disengaging the extension to the armor clamping cone from the inner body part.

It is to be mentioned that the cooperating clamping ring [8] of the armor clamp assembly is also held releasably captive relative to the outer body part of the gland so that the outer body part can be moved away from the armor clamp to enable it to be inspected for corrosion or for any other purpose. The cooperating clamping ring [8] is also held captive utilizing an elastomeric O-ring [17] partially accommodated within a groove in the outer surface of the clamping ring.

As indicated above, the invention is embodied in a cable gland having a deluge seal for preventing the ingress of moisture between the inner and outer body parts of the cable gland and this is further described below for completeness of disclosure.

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The external screw threaded portion [5] on the inner tubular body part is of short length and is confined to an inner end region of the inner tubular body part. A smooth outer cylindrical surface [20] having a diameter slightly less than the minimum diameter of the screw threaded end region extends from
10 said screw threaded end region to a nut formation [21] that is axially external of the outer tubular body part.

The inner surface of the outer tubular body part has an endless O-ring seal [22] accommodated in a circumferential groove [23] adjacent its end that
15 receives the inner tubular body. The O-ring seal engages the outer cylindrical surface of the inner tubular body to totally seal against any ingress of moisture from the outside to the cavity housing the armor clamp assembly, and thus to the armor wires.

20 In order to facilitate assembly of the cable gland, the end of the outer tubular body receiving the inner tubular body has a lead-in taper [24] arranged such that an O-ring fitting snugly on the outer cylindrical surface of the inner tubular body immediately adjacent the screw threaded end region will automatically be squeezed and rolled into the outer tubular member and
25 thereby caused to snap into its operative position in the circumferential groove.

In order to assist in this, the inner tubular body is provided with a shallow groove [25] immediately adjacent the externally screw threaded portion [5] so
30 that the O-ring seats itself partially in that groove. Such a groove typically has a width less than that of the cross-sectional diameter of the O-ring, and preferably about one half of the cross-sectional diameter of the O-ring. The

internal screw thread in the outer tubular body may extend past the circumferential groove for convenience of manufacture.

5 It will be appreciated that the cable gland, in this embodiment of the invention, has a two sub-assembly construction with the clamping cone being held captive relative to the inner tubular body and the clamping ring being held captive in the outer tubular body.

10 It will also be understood that numerous variations may be made to the embodiment of the invention described above without departing from the scope hereof. In particular, the nature of the gland may vary widely and the purpose of holding the armor clamping cone captive relative to the inner body part of the cable gland may be simply to provide a two sub-assembly construction for installation purposes. In such an instance the feature of
15 enabling inspection of an inner seal becomes irrelevant.

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CLAIMS:

1. A cable gland comprising a body including a tubular inner body part and a tubular outer body part and an armor clamp assembly wherein
5 the latter has an armor clamping cone associated with the inner body part and a cooperating armor clamping ring associated with the outer body part, the armor clamping cone being held releasably captive relative to the said inner body part to thereby permit a cable gland to be composed of two subassemblies at least for initial installation
10 purposes, the cable gland being characterized in that the armor clamping cone is held releasably captive relative to the said inner body part by means of an elastomeric ring encircling an extension to the armor clamping cone and cooperating with both the said extension and the inner body part to hold the armor clamping cone captive
15 relative to the inner body part but releasable therefrom.
2. A cable gland as claimed in claim 1 in which the elastomeric ring is an O-ring.
- 20 3. A cable gland as claimed in claim 2 in which the O-ring is partially accommodated in a groove in the outer surface of the extension to the armor clamping cone.
4. A cable gland as claimed in any one of the preceding claims in which
25 the inner body part of the cable gland has at the entry end thereof, an inwardly directed lip for retaining the elastomeric ring within the tubular body in a releasable manner.
5. A cable gland as claimed in any one of the preceding claims in which
30 the cable gland has a two-sub-assembly construction with the armor clamping cone being held captive relative to the inner body part and the armor clamping ring being held at least temporarily captive relative

to the outer body part with the two body parts being movable axially by virtue of cooperating screw threads thereon.

- 5 6. A cable gland as claimed in any one of the preceding claims in which the cable gland embodies both inner and outer compression seals for sealing onto inner and outer sheaths of a cable.
- 10 7. A cable gland as claimed in claim 6 in which the inner seal is accommodated in a bore of the inner body part and is located to be compressed axially by the free end of the extension to the armor clamping cone.
- 15 8. A cable gland substantially as herein described and exemplified with reference to the accompanying drawings.

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