

Mechanical cable glands —

Part 3: Specification for special corrosion resistant glands

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Cables and Insulation Standards Policy Committee (CIL/-) to Technical Committee CIL/20, upon which the following bodies were represented:

- Aluminium Federation
- Association of Consulting Engineers
- Association of Manufacturers of Domestic Electrical Appliances
- British Approvals Service for Electric Cables
- British Cable Makers' Confederation
- British Plastics Federation
- British Railways Board
- British Shipbuilders
- British Steel Industry
- British Telecommunications plc
- Department of the Environment (Property Services Agency)
- Department of Trade and Industry (Consumer Safety Unit, CA Division)
- ERA Technology Ltd.
- Electricity Association
- Engineering Equipment and Materials Users' Association
- Institution of Electrical Engineers
- London Regional Transport

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

- Electrical Insulation Equipment Manufacturers Association (BEAMA Ltd.)
- Electrical, Electronic, Telecommunications and Plumbing Union
- Engineering Industries Association
- Gland Manufacturers Technical Committee
- Lighting Industry Federation Ltd.

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Foreword

This Part of BS 6121 has been prepared under the direction of the Cables and Insulation Standards Policy Committee.

Other Parts of the standard are as follows.

- *Part 1: gives requirements and tests for metallic cable glands;*
- *Part 2: gives requirements and tests for polymeric cable glands;*
- *Part 4: will give requirements for insulated cable glands;*
- *Part 5: will be a code of practice for selection, installation and inspection of cable glands used in electrical installation.*

This Part of BS 6121 gives requirements and tests for special corrosion resistant glands manufactured from all metal components or a combination of both metallic and polymeric components. It also specifies a range of glands dimensionally standardized to a sufficient extent to ensure that glands of similar type and size made by different manufacturers are interchangeable. The standard describes mechanical glands with ISO metric thread as specified in BS 3643 on the threaded fixing component, such as are used with elastomer-insulated and PVC-insulated cables. Thread forms based on other international standards are accepted. To avoid restricting development, only dimensions essential to the interchangeability of the gland as a whole are specified and no attempt has been made to secure interchangeability of components between different makes.

Glands suitable for use with flameproof and/or explosion proof enclosures are not included in this standard. Reference should be made to BS 5501.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 20, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This Part of BS 6121 specifies limiting dimensions, marking, materials, construction and type tests for special corrosion resistant mechanical cable glands. The glands may be assembled from corrosion resistant metallic components, or a combination of both metallic and polymeric components. This standard provides for interchangeability between complete glands of different makes, but not between component parts.

The glands are particularly suitable for use with cables complying with the following British Standards but the range of glands specified does not completely cover all the cables included in these standards.

BS 5467, *Specification for cables with thermosetting insulation for electricity supply for rated voltages of up to and including 600/1 000 V and up to and including 1 900/3 300 V.*

BS 6004, *Specification for PVC-insulated cables (non-armoured) for electric power and lighting.*

BS 6007, *Specification for rubber-insulated cables for electric power and lighting.*

BS 6116, *Specification for elastomer-insulated flexible trailing cables for quarries and miscellaneous mines.*

BS 6346, *Specification for PVC-insulated cables for electricity supply.*

BS 6480, *Specification for impregnated paper-insulated lead or lead alloy sheathed electric cables of rated voltages up to and including 33 000 V.*

BS 6500, *Specification for insulated flexible cords and cables.*

BS 6622, *Specification for cables with extruded cross-linked polyethylene or ethylene propylene rubber insulation for rated voltages from 3 800/6 600 V up to 19 000/33 000 V.*

BS 6724, *Specification for armoured cables for electricity supply having thermosetting insulation with low emission of smoke and corrosive gases when affected by fire.*

BS 6883, *Specification for elastomer-insulated cables for fixed wiring in ships¹⁾.*

The glands are also suitable for use with certain cables of generally similar types not included in these British Standards.

A locknut is not regarded as part of a cable gland. Locknuts are therefore outside the scope of this standard.

NOTE 1 The information to be supplied by the purchaser when ordering is given in Appendix A.

NOTE 2 The titles of the publications referred to in this standard are listed on the inside back cover.

2 Definitions

For the purposes of this British Standard, the definitions given in BS 4727-2:Group 08 apply, together with the following.

2.1 cable gland

a device designed to attach and secure the end of the cable to the equipment by means suitable for the type and description of cable for which it is designed, including provision for making electrical connection to the armour or braid and lead or aluminium sheath of the cable, if any

NOTE Type AK2 and/or AK4 glands may also be used to seal cables passing through bulkheads or gland plates.

2.2 mechanical cable gland

a cable gland in which the cable is secured and any necessary electrical continuity is provided by mechanical means, without recourse to a plumber's wiped joint

2.3 corrosion resistant cable gland

a mechanical cable gland designed from metallic and/or non-metallic materials to meet the criteria of a cable gland resistant to corrosion from the corrosive agents specified in this standard

2.4 sealed gland

a gland having a seal so constructed as to exclude dust and water under the conditions prescribed

2.5 threaded fixing component

the part of the cable gland designed for attaching it to the casing of the equipment to which the cable is to be connected. It is provided with an external thread which either engages in a similarly threaded hole in the casing of the apparatus, or is secured in a plain hole by means of a locknut or threaded earth-tag inside the casing

2.6 inner sheath of a cable

that sheath to which it may be required to establish an inner seal or bond with the gland

NOTE In some British Standards this component is referred to as the bedding or inner covering.

¹⁾ The glands covered by this standard will not necessarily meet the tests for watertightness required for installation in ships.

2.7
outer sheath

a polymeric envelope applied to the outside of an electric cable

2.8
protrusion

the distance which the gland protrudes outside the equipment casing when the gland is assembled with the largest cable for which it is designed, and with the seal compression nut tightened to the specified proof torque

2.9
compound seal

a seal produced by filling the cable interstices with a suitable compound

3 Types of gland

The basic designations of the glands shall be as follows.

Type AK2. For unarmoured cables with an elastomer or plastics outer sheath where the function of the gland is to secure the outer sheath of the cable. The gland incorporates an IP66 seal or seals between the outer sheath and the gland.

Type AK4. As type AK2, but with an electrical bond for a metallic inner sheath.

Type CK. For armoured or wire braided cable with an elastomeric or plastics outer sheath, where the function of the gland is to secure the armour or metallic braid and to provide electrical continuity between such armour or braid and the threaded fixing component of the gland. The gland is also fitted with an IP66 seal between the outer sheath and gland.

Type EK1. For armoured or wire braided cable with an extruded elastomeric or plastics inner sheath and elastomeric or plastics outer sheath, where the function of the gland is to secure the armour or metallic braid, and to provide electrical continuity between such armour or braid and the threaded fixing component of the gland. The gland is also fitted with an IP66 seal between the outer sheath and gland and between the inner sheath and threaded fixing component.

Type EK2. As type EK1, but with an electrical bond for a metallic inner sheath.

Glands of types CK, EK1 and EK2 shall also be identified by a suffix indicating the type of cable for which the gland is suitable. The suffix for each type of armour or braid shall be as follows.

Single wire armoured	W
Pliable wire armoured flexible	T
Wire braided	X
Aluminium strip armoured	Y
Double steel tape armoured	Z

If a gland is suitable for more than one type of armour or braid, all of the relevant suffixes shall be used.

NOTE 1 The following are examples of type designations.
Type AK2. A gland for unarmoured cable, with an IP66 seal between the outer sheath and gland.
Type CKT. A gland for pliable wire armoured flexible cable, with an IP66 seal between the outer sheath and gland.
Type EK2X. A gland for wire braided cable with an electrical bond for the metallic inner sheath.

NOTE 2 Glands containing inner seals are only intended for use on extruded inner sheaths.

4 Sizes of gland

The size designations and the range of sizes for each type shall be as given in Table 1 to Table 6, the suffix “S” denoting the smaller bore.

5 Marking

An appropriate part of the gland shall be legibly and permanently marked with the following particulars:

- a) the number of this British Standard, i.e. BS 6121-3²⁾;
- b) the size designation of the gland (see clause 4);
- c) Whenever possible, the type of the gland and the appropriate suffix (see clause 3).

Where printing is used for marking the gland, the permanency of identification shall be checked by inspection and by rubbing the mark by hand for 15 s with a piece of cloth soaked with water and again for 15 s with a piece of cloth soaked with petroleum spirit after which the marking shall remain legible.

Where appropriate the outer packaging of the gland shall be marked with an “R” to indicate the inclusion of a compound seal.

²⁾ Marking BS 6121-3 on or in relation to a product represents a manufacturer’s declaration of conformity, i.e. a claim by or on behalf of the manufacturer that the product meets the requirements of the standard. The accuracy of the claim is therefore solely the responsibility of the person making the claim. Such a declaration is not to be confused with third party certification of conformity, which may also be desirable.

6 Materials and construction

(see Figure 1)

6.1 Materials

No restriction shall be placed on the type of materials used in the construction of the corrosion resistant cable gland, provided the gland is capable of meeting the test requirements of the standard.

Glands to be used with aluminium sheathed or aluminium armoured cables shall be manufactured from a material which will ensure freedom from corrosion arising from electrolytic action.

NOTE 1 It is important to select a basic material and a finish which are suitable for the situation in which the gland is to be installed. Gland materials should be compatible with the sheathing and armour material.

NOTE 2 Attention is drawn to the fact that no polymeric material is completely resistant to solvents, oils and gases.

6.2 Construction

6.2.1 General

Those parts of the gland that have to be tightened or held during installation shall be hexagonal or have hexagons formed on them.

All externally projecting edges and corners of gland components shall be rounded or chamfered to reduce the danger of injury in handling or after installation, but chamfering of hexagonal parts shall be such that 7.5 is complied with. Internal edges shall be chamfered to prevent damage of the cable.

Each gland shall be capable of being attached to the equipment through a single circular hole of a size to suit the gland type. The clamping of cable armour shall be achieved by means of parts concentric with the cable, without the use of auxiliary bolts, clamps or clips.

Where rotating parts of the gland are metallic, skid washers or other means shall be provided to prevent rotation of seals during compression.

The face of the gland which is to be clamped against the equipment casing shall be made so that the face is normal to the axis of the gland.

These glands shall be suitable for use within the safe temperature range of -20°C to 90°C .

6.2.2 Earth bond attachment

If an earth bond attachment is fitted, the gland shall be provided with a means of connecting to it a flexible stranded or strip earth bond.

Adequate electrical continuity shall be ensured between the earth bond attachment, the body of the gland, the threaded fixing component and the armour of the cable, compliance being checked in accordance with 8.6.

NOTE Provision of an earth bond attachment is not applicable to type AK2 glands. The earth bond size needs to be stated when ordering (see Appendix A).

6.2.3 Sealing devices

Sealing devices, except where a bond has to be made onto a metallic sheath, shall consist of an oil resistant elastomeric compound or compound seal complying with 8.7. If a metal-to-metal seal of any design is used with a metallic sheath, it shall comply with 8.7. When used with a gland and cable of the appropriate size, the sealing device shall not damage the insulation or sheath of the cable. Compliance shall be checked by visual examination.

7 Dimensions

7.1 Threaded fixing component

7.1.1 Thread

The thread on the threaded fixing component shall be the ISO metric thread in accordance with BS 3643 for all sizes of gland, but other forms complying with national or international standards (e.g. DIN 40 430, federal standard H.28) are permissible provided the glands meet all other requirements of this standard.

The nominal size of the thread shall be one of the values given in Table 1 to Table 6.

7.1.2 Length

The length of thread on the threaded fixing component shall be not less than the appropriate value given in Table 1 to Table 6. The thread shall have no undercut.

7.2 Bore

The bore diameter of the threaded fixing component shall be in accordance with Table 1 to Table 6, as appropriate, subject to a tolerance of $+0.3\text{ mm}$ for glands of conduit size 25 mm and below and a tolerance of $+0.5\text{ mm}$ for glands of conduit size 32 mm and above.

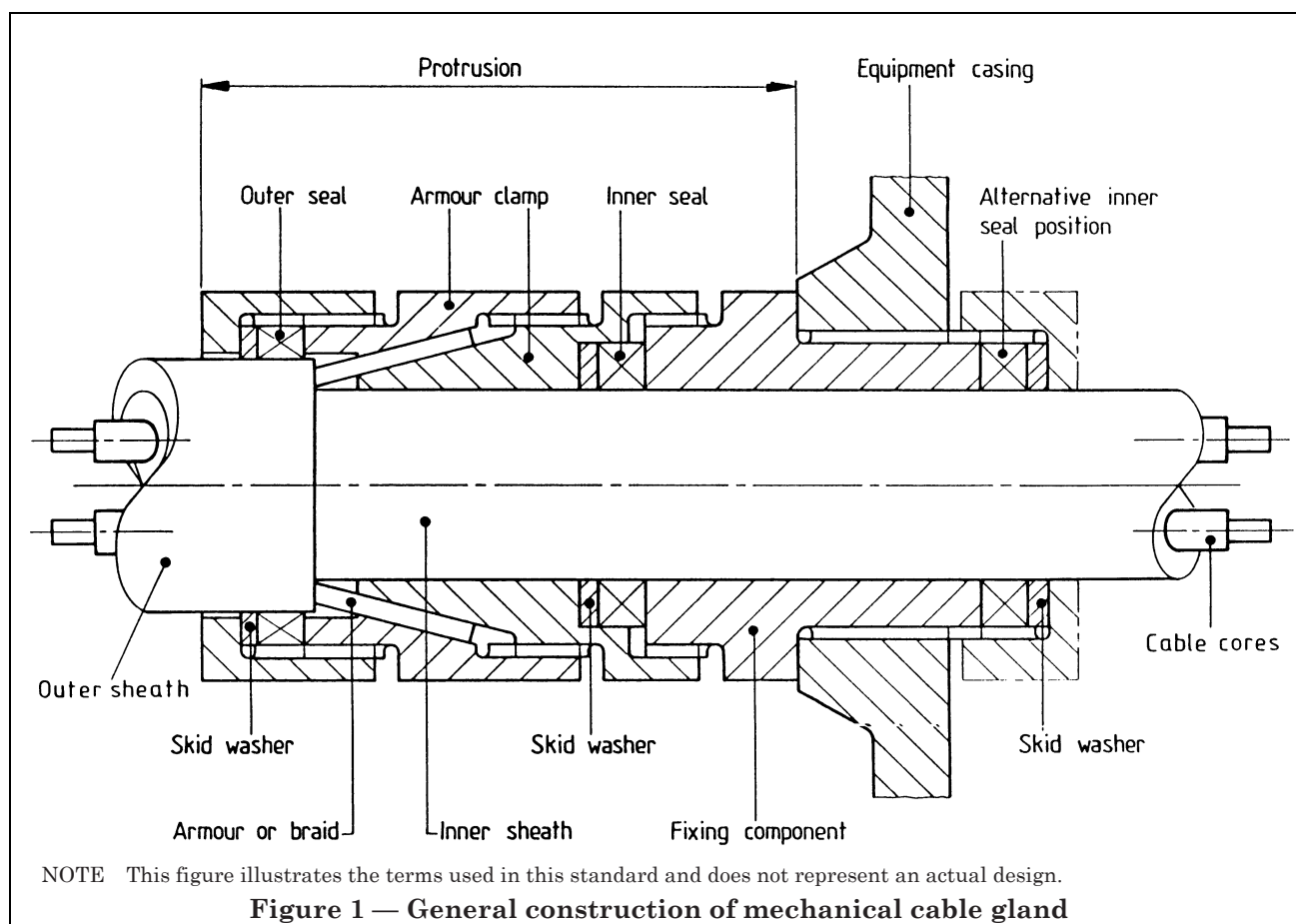
7.3 Protrusion

NOTE This clause does not apply to glands for pliable wire armoured flexible cables (type suffix T).

The protrusion of a gland from the mounting face shall not exceed the appropriate value for the gland given in Table 1 to Table 6, when the cable gland is assembled on the plug-gauge or a mandrel of the same diameter as the maximum cable size and the threaded fixing component is tightened to the proof torque.

7.4 Gland maximum diameter across corners

The diameter of an imaginary cylinder, coaxial with the gland and enclosing it, shall not exceed the appropriate maximum value given in Table 1 to Table 6.



7.5 Dimensions across flats of hexagons

All hexagonal parts shall fit one of the spanners listed in BS 192.

7.6 Armour

Glands for use with armoured cables shall be suitable for the appropriate sizes of armour, as given in Table 2, Table 3, Table 4 or Table 6.

7.7 Wire braiding

Glands for use with wire braided cables shall be suitable for the appropriate size of braiding wire, as given in Table 5.

7.8 Cable overall diameter

The gland shall be capable of accommodating cable of the appropriate maximum overall diameter, as given in Table 1 to Table 6.

8 Type tests

8.1 General

No gland shall be adjusted during the test.

NOTE The type tests are for proving the design.

Tests shall be made at an ambient temperature of $20 \pm 15^\circ\text{C}$ unless otherwise specified in the details for the particular test.

8.2 Temperature conditioning

Prior to proceeding with the tests detailed in 8.3 to 8.6 the composite cable glands for tests shall be subjected to a temperature conditioning cycle as described in Appendix B.

NOTE The procedure in Appendix B is designed to condition the polymeric cable glands for test, considerably reduce the water absorption characteristics and produce a proof condition for the tests specified in this standard resulting from material strength reduction, temperature effects and also the removal of the water absorption characteristics.

The tests specified in 8.3 to 8.6 shall be carried out within 48 h of this temperature conditioning.

8.3 Proof torque test

8.3.1 At ambient temperature

All types of gland shall undergo this test. There shall be no damage to the threads and no detrimental effect to the hexagon on dismantling with a spanner after the test when the gland is assembled and tested as described in Appendix C.

NOTE 1 Any distortion of the seals can be ignored for the purpose of this test.