

Cable glands for electrical installations

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The European Standard EN 50262:1998, with the incorporation of amendment A1:2001 and amendment A2:2004, has the status of a British Standard

ICS 21.040; 29.080.20

National foreword

This British Standard is the official English language version of EN 50262:1998, including amendments A1:2001 and A2:2004. It supersedes BS 6121-2:1989 and BS 6121-3:1990 which are withdrawn. Also, together with BS 6121-1:2005 it supersedes BS 6121-1:1989, which is withdrawn.

The start and finish of text introduced or altered by amendment is indicated in the text by tags \square_{A1} $\langle A1 \rangle$. Tags indicating changes to CENELEC text carry the number of the CENELEC amendment. For example, text altered by CENELEC amendment A1 is indicated by \square_{A1} $\langle A1 \rangle$.

The UK participation in its preparation was entrusted by Technical Committee GEL/20, Electric cables, to Subcommittee GEL/20/11/1 (formerly GEL/20/8), Cable glands, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

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This British Standard, having been prepared under the direction of the Electrotechnical Sector Committee, was published under the authority of the Standards Committee and comes into effect on 15 October 1999

Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 23 and a back cover.

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Amendments issued since publication

Amd. No.	Date	Comments
13524	15 April 2002	See National foreword
15520	21 February 2005	See National foreword. Also, addition of National Annex NA

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ISBN 0 580 32807 4

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 50262

September 1998

+ A1

August 2001

+ A2

December 2004

ICS 21.140; 29.080.20

Descriptors: Electrical accessory, low voltage accessory, electrical installation, cable glands, requirement, definition, test, type test, classification, marking, technical document, construction characteristics, mechanical property, electrical property, electromagnetic compatibility

English version

Cable glands for electrical installations

(includes amendments A1:2001 and A2:2004)

Presse-étoupe pour installations électriques
(inclut les amendements A1:2001 et A2:2004)

Kabelverschraubungen für elektrische
Installationen
(enthält Änderungen A1:2001 und A2:2004)

This European Standard was approved by CENELEC on 1998-04-01. Amendment A1 was approved by CENELEC on 2001-03-01; amendment A2 was approved by CENELEC on 2004-10-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Ref. No. EN 50262:1998 + A1:2001 + A2:2004 E

Foreword

This European Standard was prepared by the working group WG11, Gland panels, of the Technical Committee CENELEC TC 20, Electric cables.

The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 50262 on 1998-04-01.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 1999-03-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2001-03-01

Foreword to amendment A1

This amendment to the European Standard EN 50262 was prepared by the Technical Committee CENELEC TC 20, Electric cables.

It includes requirements for testing multi-orifice seals and basic corrosion resistance tests for metric cable glands.

The text of the draft amendment was submitted to the formal vote and was approved by CENELEC as amendment A1 to EN 50262:1998 on 2001-03-01.

The following dates were fixed:

- latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2002-04-01
- latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 2003-04-01

Foreword to amendment A2

This amendment to the European Standard EN 50262:1998 was prepared by the Gland Panel of WG 11 of Technical Committee CENELEC TC 20, Electric cables.

The text of the draft was submitted to the formal vote and was approved by CENELEC as amendment A2 to EN 50262:1998 on 2004-10-01.

The following dates were fixed:

- latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2005-10-01
- latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 2007-10-01

Contents

	Page
Foreword	2
1 Scope	3
2 Normative references	3
3 Definitions	4
4 General requirements	5
5 General conditions for tests	5
6 Classification	6
7 Marking and documentation	7
8 Construction	7
9 Mechanical properties	8
10 Electrical properties	15
11 Electromagnetic compatibility	20
12 External influences	20

1 Scope

This European Standard provides requirements and tests for the construction and performance of A_2 cable glands A_1 . This standard covers complete glands as supplied by the manufacturer or supplier, but not parts of cable glands.

A_1 A_1

This standard does not cover cable glands:

- for fibre optic cables;
- for mineral insulated cables specified in HD 586;
- with a gland entry portion other than metric.

NOTE Certain cable glands may also be used in "Hazardous Areas". Regard should then be taken of other or additional requirements necessary for the A_1 enclosure A_1 to be installed in such conditions, for example, as specified in EN 50014.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications as listed hereafter. For dated references, subsequent amendments to, or revisions of, any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

All references to the standards listed in this clause are considered dated.

EN 50014:1992, + corr. October 1993, *Electrical apparatus for potentially explosive atmospheres — General requirements.*

A_1 EN 60068-2-52:1996, *Environmental testing — Part 2: Tests: Test Kb: Salt mist, cyclic (sodium chloride solution).*

(IEC 60068-2-52:1996) A_1

EN 60335 series, *Safety of household and similar electrical appliances.*

(IEC 60335 series, modified)

EN 60423:1994, *Conduits for electrical purposes — Outside diameters of conduits for electrical installations and threads for conduits and fittings.*

(IEC 60423:1993, modified)

EN 60529:1991 + corr. May 1993, *Degrees of protection provided by enclosures (IP Code).*

(IEC 60529:1989)

EN 60695-2-1/1:1996, *Fire hazard testing — Part 2: Test methods — Section 1/sheet 1: Glow-wire end-product test and guidance.*

(IEC 60695-2-1/1:1994 + corr. May 1995)

EN 61058 series, *Switches for appliances.*

(IEC 61058 series)

A_2 EN ISO 4287:1998, *Geometrical product specifications (GPS) — Surface texture: Profile method — Terms, definitions and surface texture parameters.*

(ISO 4287:1997) A_2

A_1 EN ISO 6988:1994, *Metallic and other non-organic coatings — Sulphur dioxide test with general condensation of moisture.*

(ISO 6988:1985) A_1

HD 586 series, *Mineral insulated cables with a rated voltage not exceeding 750 V.*

ISO 868:1985, *Plastics and ebonite — Determination of indentation hardness by means of a durometer (Shore hardness).*

A_2 ISO 985 series, *ISO general purpose metric screw threads — Tolerances.* A_2

3 Definitions

For the purposes of this standard, the following definitions apply.

3.1

cable gland

A1 a device designed to permit the entry of a cable, flexible cable or insulated conductor into an enclosure, and which provides sealing and retention. It may also provide other functions such as earthing, bonding, insulation, cable guarding, strain relief or a combination of these **A1**

3.2

size

the nominal diameter of the thread or nominal outside diameter of the gland entry portion which is attached to the **A1** enclosure **A1**

A1 **A1**

3.3

cable

an assembly consisting of:

- one or more cores and their individual covering(s), (if any);
- the assembly protection (if any);
- the protective covering (if any).

3.4

flexible cable

a cable which is required to be capable of being flexed while in service

3.5

armoured cable

cable with a covering consisting of a metal tape(s) or wires, generally used to protect the cable from external mechanical effects

3.6

A1 cable retention

the ability of a cable gland to limit the displacement of a fitted cable under static load **A1**

3.7

A1 cable anchorage

the ability of a cable gland to limit the displacement of a fitted cable under dynamic and torque loads **A1**

3.8

cable guard

a device which is part of a cable gland and provides additional protection when a flexible cable is subjected to excessive bending

3.9

composite cable gland

a cable gland comprising of both metallic and non-metallic materials

NOTE Sealing systems are excluded from this definition.

3.10

family (of cable glands)

cable glands of the same classification and design conception but which differ dimensionally

4 General requirements

A1 Cable glands shall be designed to ensure the protection of the inserted cables, flexible cables or insulated conductors in normal use. **A1**

Where component parts are used for cable gland assemblies which are integral with the **A1** enclosure **A1**, the resulting assembly shall meet the requirements of this standard.

5 General conditions for tests

5.1 Tests according to this standard are type tests.

5.2 Unless otherwise specified, the tests shall be carried out on cable glands assembled and mounted in accordance with the manufacturers or suppliers instructions, which shall be equal to the values required in accordance with **7.3**.

There shall be no adjustment between or during the tests.

A1 NOTE Re-mounting of the sample between tests is not considered to be an adjustment. **A1**

5.3 Unless otherwise specified, the tests shall be carried out at an ambient temperature of $(20 \pm 5) ^\circ\text{C}$.

5.4 Before the tests, in accordance with Clause **9**, Clause **10** and subclause **12.1**, non-metallic cable glands and composite cable glands as well as the sealing systems of metallic cable glands shall be placed in an oven, in which the temperature is maintained at $(70 \pm 2) ^\circ\text{C}$ for 168 h. If the temperature declared by the manufacturer or supplier is higher than the values specified in **8.6**, the conditioning shall be carried out at this maximum temperature plus $5 ^\circ\text{C}$.

Then they shall be kept for at least 24 h at ambient temperature.

5.5 Cable glands shall be conditioned for at least 24 h at a temperature of $(20 \pm 5) ^\circ\text{C}$ and a relative humidity between 40 % and 60 %.

5.6 Unless otherwise specified, three samples shall be subjected to the relevant tests.

In the case of a family of cable glands, three samples of the largest and smallest and one sample of all other sizes of the same family shall be subjected to the relevant tests.

In the case of a cable gland utilizing alternative sealing arrangements, each sealing arrangement as specified by the manufacturer or supplier shall be considered as a sample.

If a sample does not satisfy a test due to an assembly or manufacturing fault, that test and any preceding one which may have influenced the results of the test, shall be repeated and also the tests which follow shall be made in the required sequence on a full set of three samples of that size, all of which shall comply with the requirements.

5.7 **A2** Unless otherwise specified, test mandrels shall consist of a metallic rod with an elastomeric sleeving having a hardness of 65 Shore D ± 15 points in accordance with ISO 868, a surface roughness less than or equal to $7 \mu\text{m } R_a$ in accordance with EN ISO 4287 and a sleeve thickness as specified in Table 2A or Table 3 respectively. The complete test mandrel shall have a tolerance of $\pm 0,2$ mm for test mandrels up to and including 16 mm diameter and $\pm 0,3$ mm for test mandrels larger than 16 mm diameter. The shape shall be circular or a profile simulating the outer dimension of the cable as declared by the manufacturer or supplier. **A2**

A2 NOTE Care should be taken that the sleeve does not slip on the metallic rod during the test. **A2**

5.8 **A2** Clearance holes shall have the values as given in Table 1, unless otherwise specified by the manufacturer or supplier. **A2**

A2 Table 1 — Clearance holes for cable glands for test purposes

Size	6	8	10	12	16	20	25	32	40	50	63	75
Thread size	M6	M8	M10	M12	M16	M20	M25	M32	M40	M50	M63	M75 ^b
Clearance hole diameter mm ^a	6,5	8,5	10,5	12,5	16,5	20,5	25,5	32,5	40,5	50,5	63,5	75,5

^a Tolerance $(+0,2/-0,4)$ mm.

^b For thread sizes larger than M75, clearance holes shall be 0,5 mm larger than the nominal diameter of the entry thread.

A2

6 Classification

Cable glands shall be classified for test purposes in accordance with 6.1 and 6.2 and where appropriate with 6.3 and 6.4.

6.1 According to material

- 6.1.1 Metallic cable glands.
- 6.1.2 Non-metallic cable glands.
- 6.1.3 Composite cable glands.

6.2 According to mechanical properties

- 6.2.1 Without cable anchorage.
- 6.2.2 With cable anchorage.

This classification shall not be used for cable glands classified in accordance with 6.3.1.3.

- 6.2.2.1 Type A.
- 6.2.2.2 Type B.
- 6.2.3 Impact category.

A1 6.2.4 Cable retention for armoured cable.

- 6.2.4.1 Class A.
- 6.2.4.2 Class B. A1

6.3 According to electrical properties

- 6.3.1 With electrical continuity characteristics.
 - 6.3.1.1 A1 Equipotential bonding. A1
 - 6.3.1.2 Electrical connection to metallic layer(s) of cable.

NOTE A metallic layer may be provided for purposes such as earthing, screening, armouring or mechanical protection.

A1 6.3.1.3 Protective connection to earth. A1

- 6.3.1.3.1 Category A.
- 6.3.1.3.2 Category B.
- 6.3.1.3.3 Category C.

6.3.2 With insulating characteristics.

6.4 According to resistance to external influences

- 6.4.1 IP code in accordance with EN 60529 if different from 8.4.
- 6.4.2 Temperature range if different from 8.6.

A1 6.4.3 Resistance to salt and sulphur dioxide laden atmospheres. A1

A1 6.5 According to sealing system

6.5.1 With a single orifice seal.

NOTE A single orifice seal may consist of different sealing arrangements such as:

- a single seal;
- a multi-layer seal;
- two or more seals.

6.5.2 With a multi orifice seal.

NOTE A multi orifice seal may consist of a single seal with more than one orifice, each orifice being suitable for the passage of a separate cable, flexible cable or insulated conductor of the same or different sizes or profiles. A1

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7 Marking and documentation

7.1 An appropriate part of the cable gland shall be legibly and durably marked in a visible place with the following:

- name, logo or registered mark of the manufacturer or supplier;
- identification of the product.

The identification of the product can be given alternatively on the smallest package unit.

Compliance is checked by inspection. In addition, marking not made by pressing, moulding or engraving is tested in accordance with **7.2**.

7.2 The test is made by rubbing the marking by hand for 15 s with a piece of cotton cloth soaked with water and again for 15 s with a piece of cotton cloth soaked in petroleum spirit.

After this test, the marking shall be legible to normal or corrected vision without additional magnification.

The marking shall remain legible after all the non-destructive tests of this standard. It shall not be possible to remove labels easily and they shall not show curling.

NOTE Petroleum spirit is defined as an aliphatic solvent hexane with a content of aromatics of maximum 0,1 volume percentage, a kauri-butanol value of 29, an initial boiling point of approximately 65 °C, a dry point of approximately 69 °C and specific gravity of approximately 0,68 kg/l.

7.3 The manufacturer or supplier shall provide in his literature all information necessary for the proper use and safe installation, such as:

- sealing range (maximum and minimum cable dimensions);
- installation torques, if any;
- entry thread length, if any;
- A_2 — clearance hole diameter; A_2
- type of cable anchorage and anchorage range, if any;
- impact category;
- correct assembly of the cable gland for use as part of the PE conductor or electrical connection;
- IP code in accordance with EN 60529 if different from subclause **8.4**;
- temperature range if different from subclause **8.6**;
- A_1 resistance to salt and sulphur dioxide laden atmospheres (if applicable);
- multi orifice seals. A_1

Compliance is checked by inspection.

8 Construction

8.1 Those parts of a cable gland that are used for tightening or for holding during installations should be of hexagon form.

Alternatives to the hexagon form are acceptable providing the cable gland meets the test requirements of this standard.

A_2 For sizes up to and including M75, the entry thread, if any, shall be constructed in accordance with EN 60423, Table 1. For sizes greater than M75, the entry thread, if any, shall be constructed in accordance with ISO 965 and with a thread pitch of 1,5 mm, 2 mm or 3 mm.

NOTE Preferred sizes above M75 are M80, M85, M90, M100 and M110. A_2

Compliance is checked by inspection and in case of doubt, by measurement.

8.2 All external projecting edges, and corners of cable gland components shall be smooth, to prevent danger from injury in handling the cable gland.

Compliance is checked by inspection and manual test.

8.3 Cable glands shall be constructed to avoid cable damage when installed in accordance with the manufacturers or suppliers instructions.

Compliance is checked by inspection and in conjunction with the tests in **9.1** or **9.3**.

8.4 Cable glands shall provide a minimum degree of IP54 in accordance with EN 60529.

Compliance is checked in accordance with **9.4** and **9.5**.

8.5 Care shall be taken in the construction of cable glands to ensure that no detrimental effects occur between dissimilar materials which may impair the performance of the cable glands.

NOTE No restriction will be placed on the type of materials used in the construction of cable glands, providing the relevant requirements of this standard are met.

8.6 Cable glands shall be suitable for use within a minimum temperature range of $-20\text{ }^{\circ}\text{C}$ to $65\text{ }^{\circ}\text{C}$. For test purposes the temperature tolerance is $\pm 5\text{ }^{\circ}\text{C}$.

When a manufacturer or supplier declares a temperature range exceeding this temperature range, the relevant tests shall be carried out at the limits of the declared temperature range.

Compliance is checked in accordance with **9.4**.

9 Mechanical properties

9.1 Cable retention for cable glands without protective bonding to earth

Cable glands declared without cable anchorage in accordance with **6.2.1** shall provide cable retention.

Except for armoured cables, which are tested in accordance with **10.4.1**, compliance is checked by the following test.

Cable glands declared to have cable anchorage in accordance with **6.2.2** are tested in accordance with **9.3**, if the sealing range and the anchorage range are the same.

A₁) For cable glands with a sealing system in accordance with **6.5.1**, a test mandrel equivalent to the minimum value of the sealing range of the cable gland as declared by the manufacturer or supplier with a sleeve thickness as specified in Table 2A, is fixed to the sample.

For cable glands with a sealing system in accordance with **6.5.2**, a test mandrel equivalent to the minimum value of the sealing range of the smallest orifice of the cable gland with a sleeve thickness as specified in Table 2A, is fixed into the smallest orifice of the sample, and each remaining orifice is plugged with a plug equivalent to the minimum value of its sealing range.

The circular test mandrel is loaded until the **A₂)** pull force **A₂)** is in accordance with the values given in Table 2A. **A₁)**

For test mandrels which are not circular in shape i.e. where non-circular cables are being simulated, their cross-sectional area shall be determined, and the diameter of a circular cable of the same cross-sectional area shall be calculated. The test values shall be appropriate to the nearest circular test mandrel size.

NOTE For cable glands with sealing systems comprising two or more seals, the mandrel may be stepped appropriately.

The test mandrel is marked when unloaded so that any displacement relative to the cable gland can be easily detected.

The load is maintained for 5 min and at the end of this period the displacement shall not exceed 3 mm when unloaded.

A₁) The test is repeated using a test mandrel equivalent to the maximum value of the sealing range of the cable gland as declared by the manufacturer or supplier, with the test value of the relevant maximum cable diameter specified in Table 2A. **A₁)**

A typical arrangement for the cable retention test is shown in Figure 1.

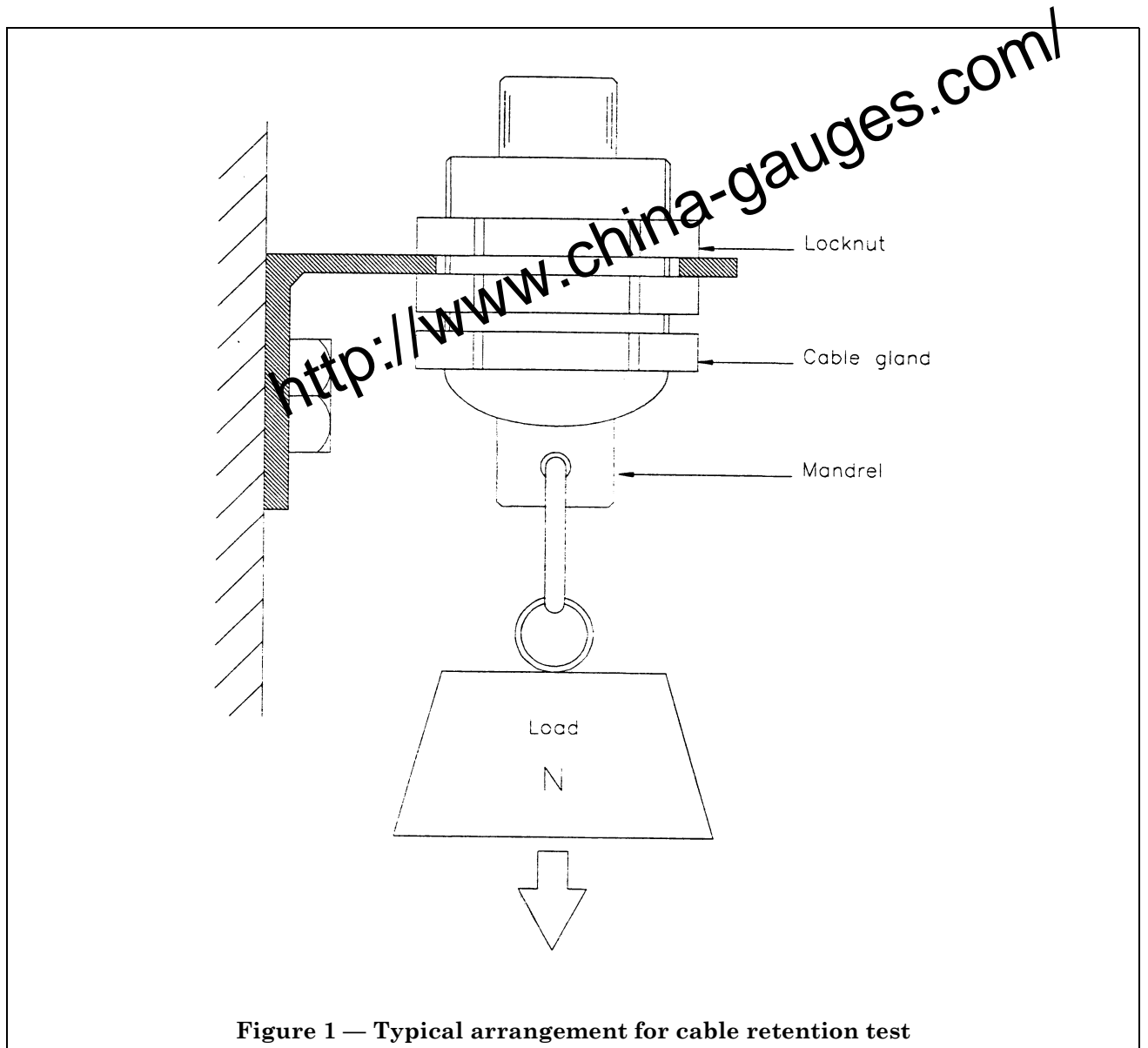


Table 2A — Pull forces for cable retention and cable anchorage (A1)

Cable diameter mm	Cable retention N	Cable anchorage Type A N	Cable anchorage Type B N	Minimum test mandrel sleeve thickness mm
up to 4	5	—	—	1 ^a
>4 to 8	10	30	75	1
>8 to 11	15	42	110	2
>11 to 16	20	55	150	2
>16 to 23	25	70	140	2
>23 to 31	30	80	250	2
>31 to 43	45	90	350	2
>43 to 55	55	100	400	2
>55	70	115	450	2

^a For cable diameters up to 4 mm, a suitable non-metallic mandrel may be used.

Table 2B — Pull forces for cable retention for armoured cable

Cable diameter mm	Cable retention Class A N	Cable retention Class B N
>4 to 8	75	640
>8 to 11	120	880
>11 to 16	130	1 280
>16 to 23	140	1 840
>23 to 31	250	2 480
>31 to 43	350	3 440
>43 to 55	400	4 400
>55	450	5 600

(A1)

9.2 Cable retention for cable glands with protective bonding to earth

Cable glands declared in accordance with 6.3.1.3 shall provide cable retention.

Compliance is checked in accordance with 10.4.

9.3 Cable anchorage

Cable glands declared with cable anchorage in accordance with 6.2.2 shall relieve the conductors from strain, including twisting.

NOTE For special applications, regard should be taken for possible extra requirements necessary, as for example in accordance with EN 60335.

Compliance is checked by the following tests.

(A1) For cable glands with a sealing system in accordance with 6.5.1, a test mandrel equivalent to the minimum value of the anchorage range of the cable gland as declared by the manufacturer or supplier with a sleeve thickness as specified in Table 2A, is fixed to the sample.

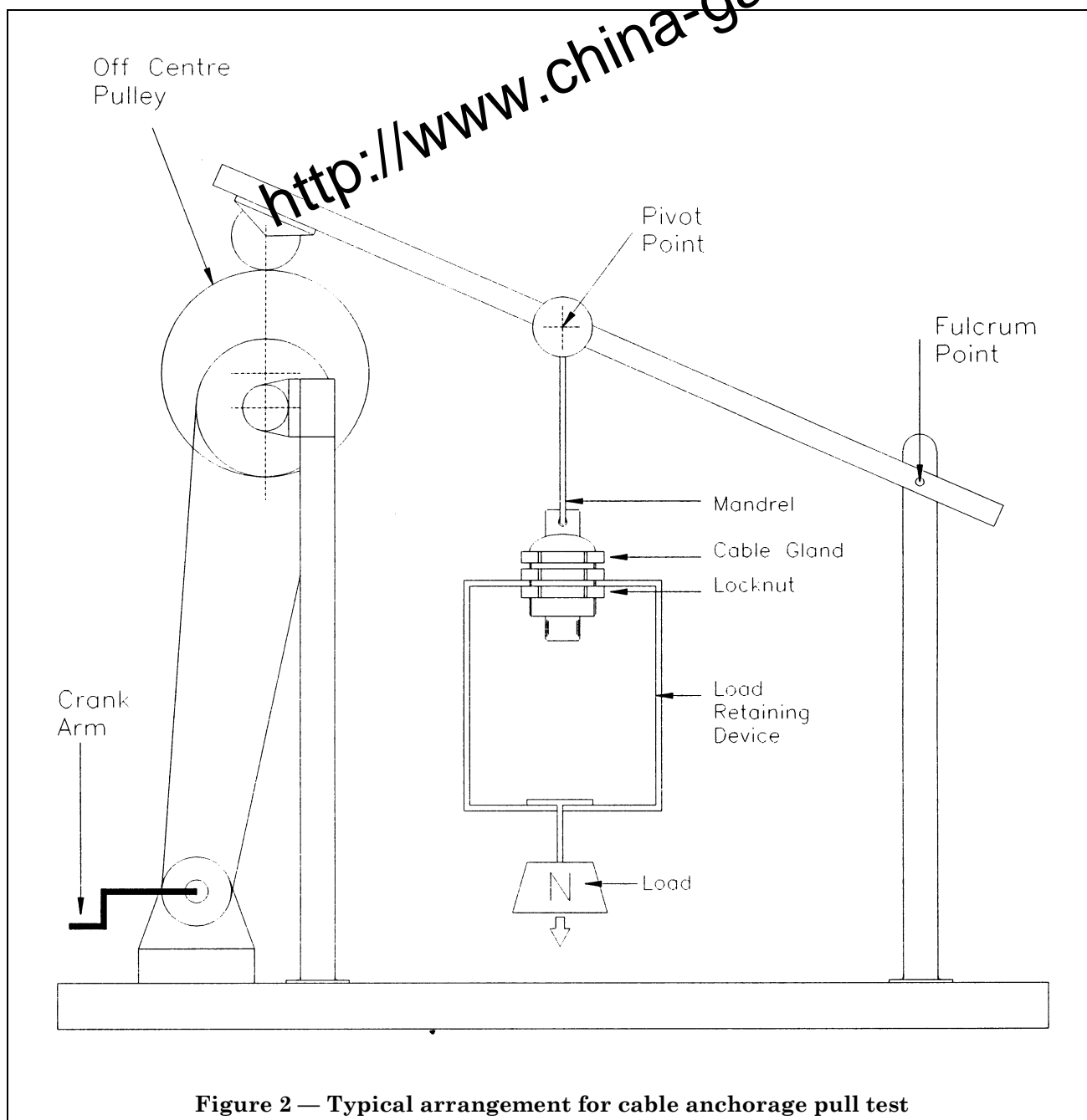
For cable glands with a sealing system in accordance with 6.5.2, a test mandrel equivalent to the minimum value of the anchorage range of the smallest orifice of the cable gland with a sleeve thickness as specified in Table 2A, is fixed into the smallest orifice of the sample, and each remaining orifice is plugged with a plug equivalent to the minimum value of its sealing range. (A1)

The test mandrel is marked when unloaded so that any displacement relative to the gland can be easily detected.

A₁) The test mandrel is pulled for a duration of 1 s, 50 times, without jerks in the direction of the axis with the **A₂**) relevant pull force **A₂**) specified in Table 2A. **A₁**)

At the end of this period the displacement shall not exceed 2 mm. This measurement is to be carried out after unloading the force from the test mandrel.

A typical arrangement for the cable anchorage pull test is shown in Figure 2.



The sample with the test mandrel is then mounted onto the test arrangement for the cable anchorage twist test.

The test mandrel is marked when unloaded so that any displacement can be easily detected and is then subjected for 1 min to the torque as shown in Table 3.

During this test the test mandrel shall not turn by more than an angle of 45°.

The tests shall be repeated using a test mandrel equivalent to the maximum value of the anchorage range of the cable gland as declared by the manufacturer or supplier with the test value of the relevant maximum cable diameter specified in Table 3.

A typical test arrangement for the cable anchorage twist test is shown in Figure 3.

Table 3 — Torque values for cable anchorage twist test

Cable diameter mm	Torque Types A and B Nm	Minimum test mandrel sleeve thickness mm
>4 to 8	0,10	1
>8 to 11	0,15	2
>11 to 16	0,35	2
>16 to 23	0,6	2
>23 to 31	0,80	2
>31 to 43	0,90	2
>43 to 55	1,00	2
>55	1,20	2

9.4 Resistance to impact

Cable glands shall be resistant to impact.

A1) Compliance is checked with new samples by the following test.

For cable glands with a sealing system in accordance with 6.5.1, a test mandrel equivalent to the minimum value of the sealing range of the cable gland as declared by the manufacturer or supplier with a sleeve thickness as specified in Table 3, is fixed to the sample and then the test is carried out at the minimum temperature in accordance with 8.6.

For cable glands with a sealing system in accordance with 6.5.2, a test mandrel equivalent to the minimum value of the sealing range of the smallest orifice of the cable gland with a sleeve thickness as specified in Table 3, is fixed into the smallest orifice of the sample, and each remaining orifice is plugged with a plug equivalent to the minimum value of its sealing range. The test is carried out at the minimum temperature in accordance with 8.6. **A1)**

The weight shall be fitted with an impact head of hardened steel in the form of a hemisphere of 25 mm diameter.

The point of impact shall be the place considered to be the weakest.

A1) The sample shall be mounted **A2)** on a steel base **A2)** so that:

- the direction of impact is perpendicular to the surface being tested if it is flat, or perpendicular to the tangent of the surface at the point of impact if it is not flat;
- there is no movement of the cable gland support which could influence the test results. **A1)**

The base shall have a mass of at least 20 kg or be rigidly fixed or inserted in the floor.

A typical arrangement for the impact test is shown in Figure 4.

The sample is subjected to the weight as given in Table 4 according to the category declared by the manufacturer or supplier.

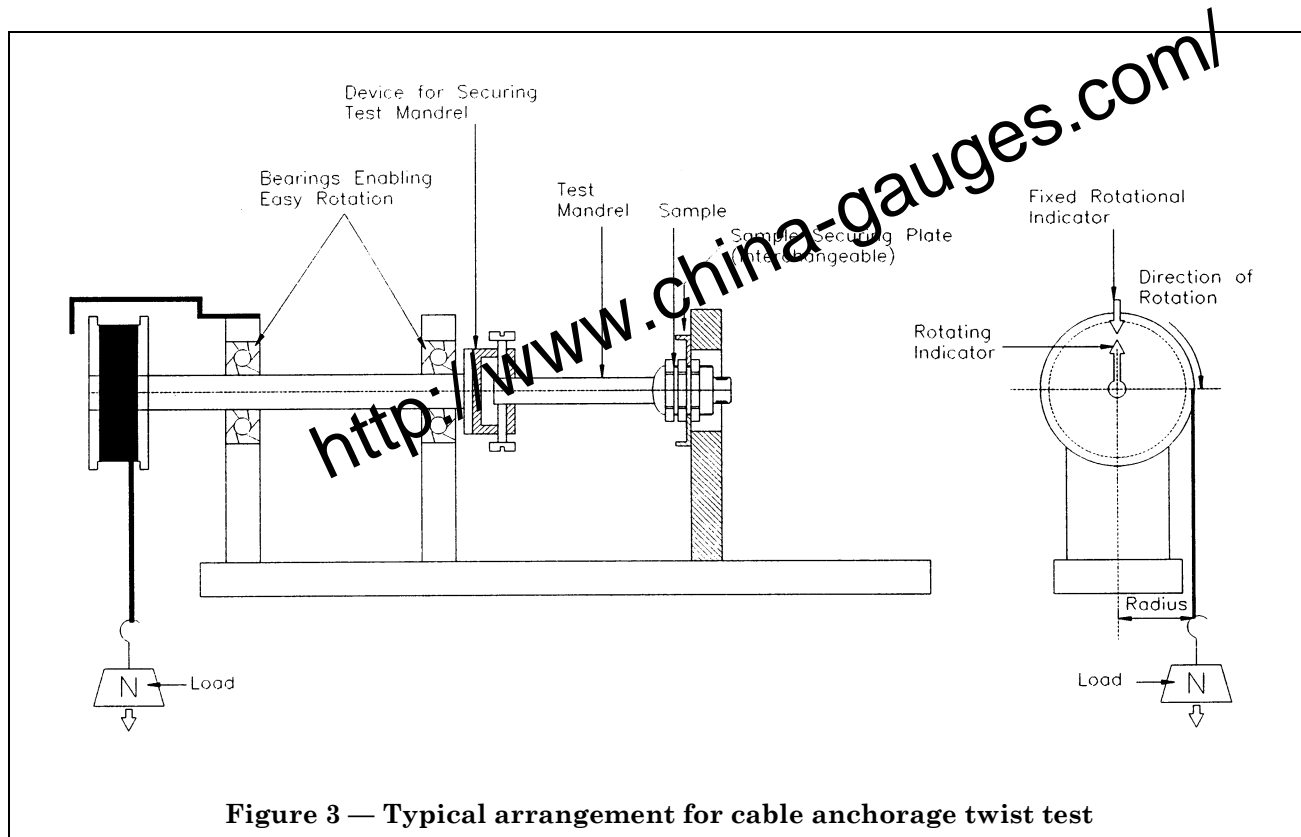


Table 4 — Impact values

Category	1	2	3	4	5	6	7	8
Newtons (N)	2	2	2	2	10	10	10	20
Weight (kg)	0,2	0,2	0,2	0,2	1,0	1,0	1,0	2,0
Energy (J)	0,2	0,5	1,0	2,0	4,0	7,0	10,0	20,0
Height (m)	0,10	0,25	0,5	1,0	0,4	0,7	1,0	1,0

After the test the sample shall show no signs of damage likely to impair safety.

The sample shall then be subjected to the appropriate tests in accordance with 12.1 but considering the classification according to 6.4.1 if so declared by the manufacturer or supplier.

9.5 Excess tightening and seal performance

Cable glands shall be capable of withstanding excess tightening which is likely to occur during installation.

A1) Compliance is checked with new samples by the following tests.

For cable glands with a sealing system in accordance with 6.5.1, a test mandrel equivalent to the maximum value of the sealing range of the cable gland as specified by the manufacturer or supplier with a sleeve thickness as specified in Table 3, is fixed to the sample with the torque(s) equal to 1,5 times that (those) declared by the manufacturer or supplier.

For cable glands with a sealing system in accordance with 6.5.2, a test mandrel equivalent to the maximum value of the sealing range of the smallest orifice of the cable gland with a sleeve thickness as specified in Table 3, is fixed into the smallest orifice of the sample with the torque(s) equal to 1,5 times that (those) declared by the manufacturer or supplier, and each remaining orifice is plugged with a plug equivalent to the maximum value of its sealing range. **A1)**

After the test, the sample shall show no signs of damage likely to impair safety.

The sample shall then be subjected to the appropriate tests in accordance with 12.1, but considering the classification according to 6.4.1 if so declared by the manufacturer or supplier.

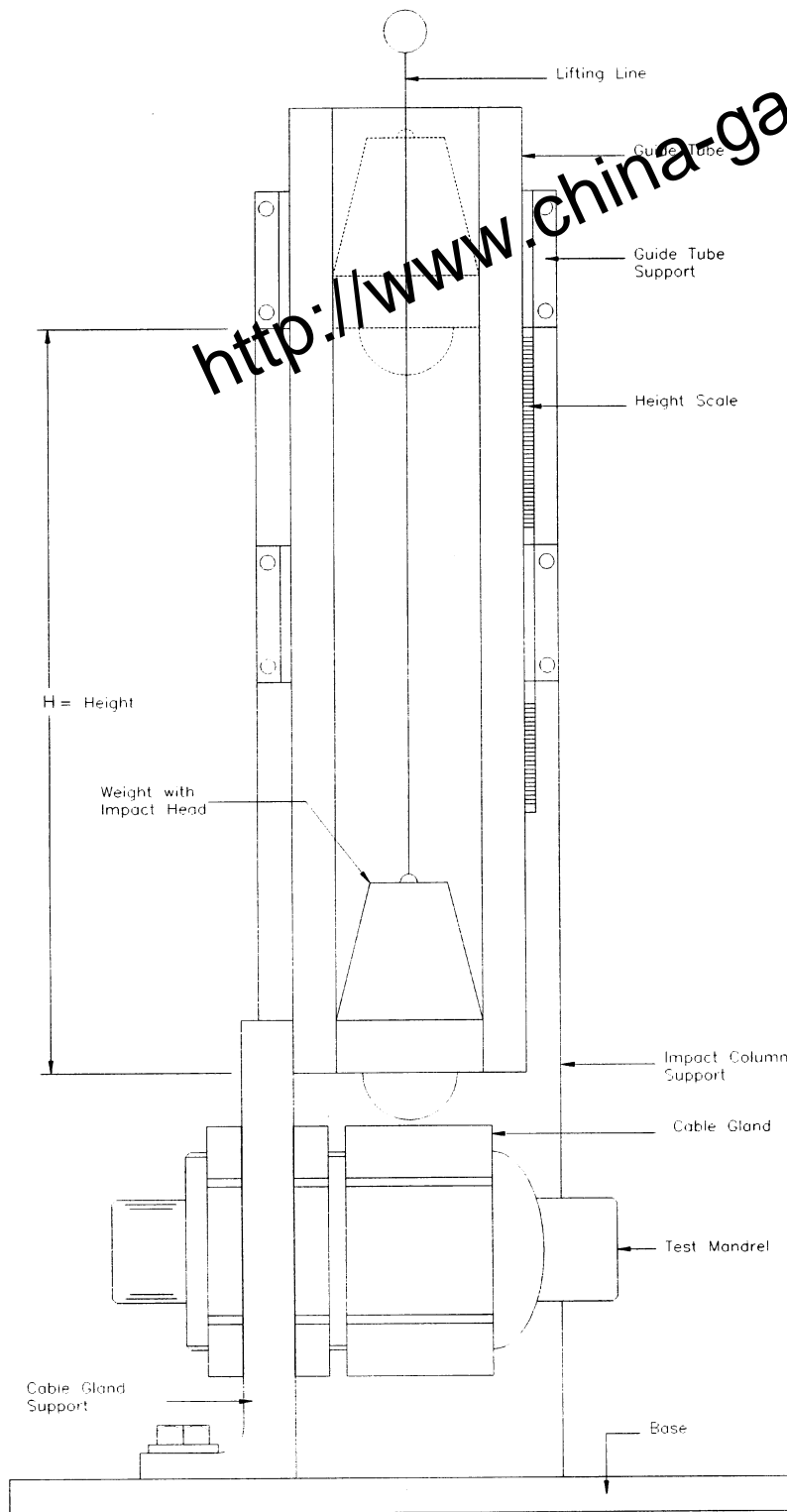


Figure 4 — Typical arrangement for impact test

9.6 Cable guard

A cable guard which is part of a cable gland shall be constructed so that the flexible cable is adequately protected against excessive flexing.

Compliance is checked in accordance with the tests described in the relevant standard for equipment for which the cable glands with guards are intended.

NOTE Relevant standards are for example EN 60335 and EN 61058.

10 Electrical properties

10.1 $\overline{A_1}$ Equipotential bonding $\overline{A_1}$

$\overline{A_1}$ Cable glands declared in accordance with 6.3.1.1 shall have adequate conductivity to the enclosure. $\overline{A_1}$

Compliance is checked on $\overline{A_1}$ new samples $\overline{A_1}$ measuring the resistance between the earthing/bonding terminal or earthing/bonding contact of the cable gland and each of the accessible metal parts of the cable gland in turn.

In no case shall the resistance exceed 0,1 Ω .

10.2 Electrical connection to metallic layer(s) of cable

Cable glands declared in accordance with 6.3.1.2 shall ensure adequate electrical connection with the metallic layer(s) of the cable.

Compliance is checked on $\overline{A_1}$ new samples $\overline{A_1}$ by measuring the resistance between the metallic layer(s) of the cable fixed to the cable gland and the cable gland as close as possible to the connection or as specified by the manufacturer or supplier.

Before the test, the sample is mechanically pre-stressed with the relevant pull value given in 9.1, 9.2 or 9.3 as declared by the manufacturer or supplier in accordance with 6.2.

The resistance shall not exceed 0,1 Ω .

10.3 Insulation resistance

Cable glands declared in accordance with 6.3.2 shall have adequate insulation resistance.

Compliance is checked on $\overline{A_1}$ new samples $\overline{A_1}$ by the test of 10.3.2 immediately after the humidity treatment according to 10.3.1.

10.3.1 Humidity treatment

The humidity treatment shall be carried out in a humidity cabinet with a relative humidity between 91 % and 95 % at a temperature t maintained within ± 1 °C of any convenient value between 20 °C and 30 °C.

Before being placed in the humidity cabinet, the sample is brought to a temperature between t and $t + 4$ °C. This may be achieved by keeping it at this temperature for at least 4 h before the humidity treatment.

The sample is then kept in the humidity cabinet for 120 h.

10.3.2 Insulation resistance test

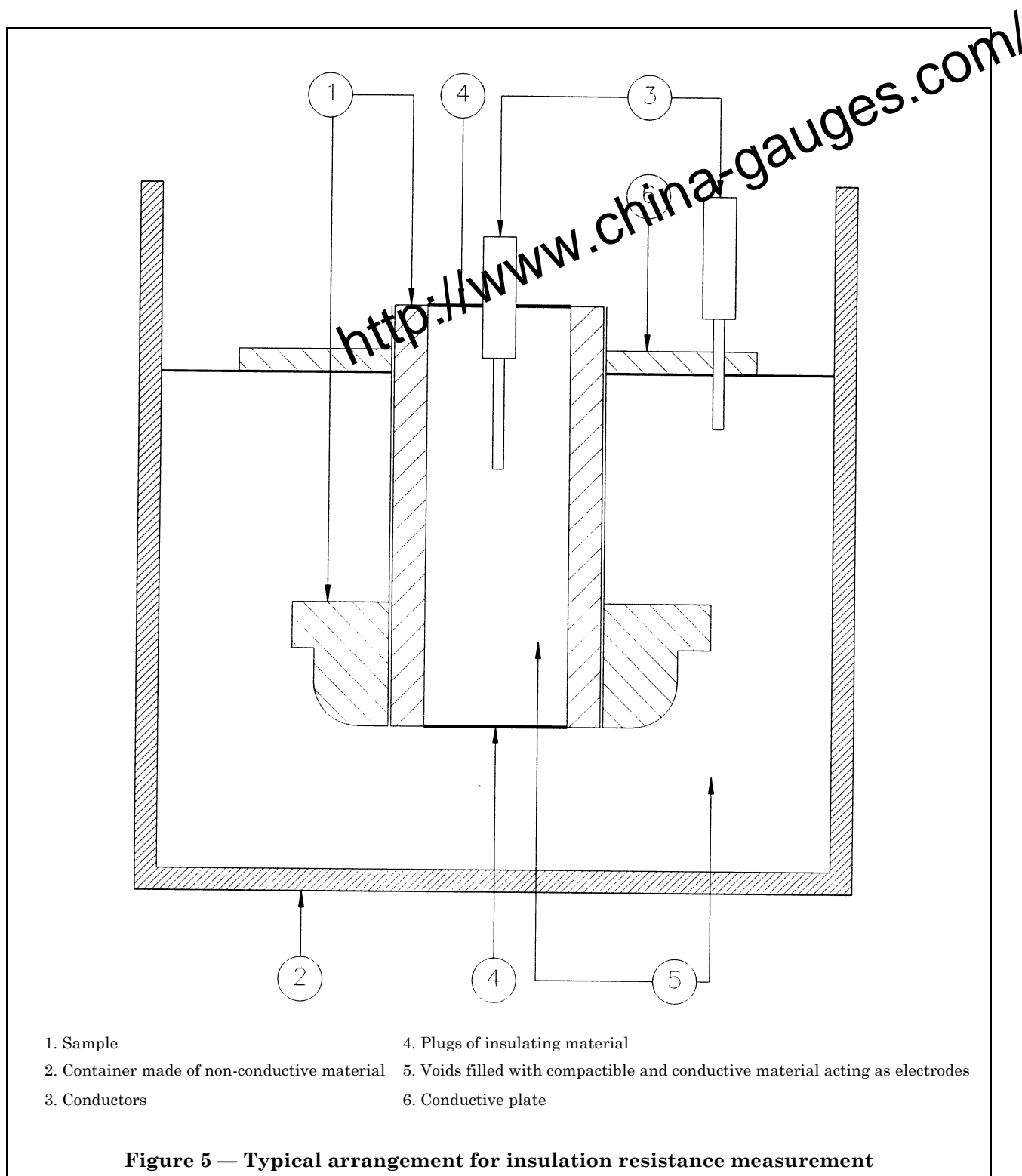
One end of the sample is closed with insulating material, and the sample is filled with fine, compactible and conductive material, i.e. brass, copper or the like, used as an internal electrode. The other end of the sample may then also be closed with an insulating cover. A conductor is inserted with its non-insulated end into the conductive material, for at least 10 mm. Then the prepared sample is placed in fine, compactible and conductive material used as an external electrode so that the threaded entry or the equivalent part of the sample protrudes out of the conductive material, such that the test result is not negatively influenced.

A further conductor is inserted through the conductive plate into the external conductive material for at least 10 mm.

The insulation resistance of the sample is measured by applying a d.c. voltage of approximately 500 V between the conductors.

The insulation resistance shall not be less than 5 M Ω .

A typical arrangement for insulation resistance measurement is shown in Figure 5.



10.4 \square Protective connection to earth \square

Cable glands declared in accordance with 6.3.1.3 shall be resistant to earth fault current.

Compliance is checked by the test of 10.4.2 after the sample has been mechanically pre-stressed according to 10.4.1.

10.4.1 Mechanical pre-stressing

Two samples, each consisting of 2 new cable glands, are assembled. In the first sample, the cable glands are fitted, one at each end, to a cable 300 mm long, having the maximum metallic armour thickness as declared by the manufacturer or supplier. In the second sample the cable glands are fitted, one at each end, to a cable 300 mm long having the minimum metallic armour thickness as declared by the manufacturer or supplier.

A1) For each sample, one cable gland is fixed and the other cable gland is loaded in accordance with the values given in Table 2B. **A1)**

The cables are marked so that any displacement relative to each cable gland can be easily detected.

The load is maintained for 5 min and at the end of this period the displacement shall not exceed 3 mm at either cable gland.

A typical arrangement for mechanical pre-stressing is shown in Figure 6.

10.4.2 Electrical current test

The assembled samples shall be connected with the high current source as shown in Figure 7 and subjected to the values given in Table 5 according to the category declared by the manufacturer or supplier for a period of 1 s.

A1) The samples shall be deemed to have passed the tests if:

- they withstand the current for the specified period;
- the contact resistance between the armour close to the samples and the earthing connections, measured with a source of at least 10 A, is equal to or less than 0,1 Ω ;
- they do not exhibit any cracks to normal or corrected vision without magnification nor have any loose parts or deformations impairing normal use. **A1)**

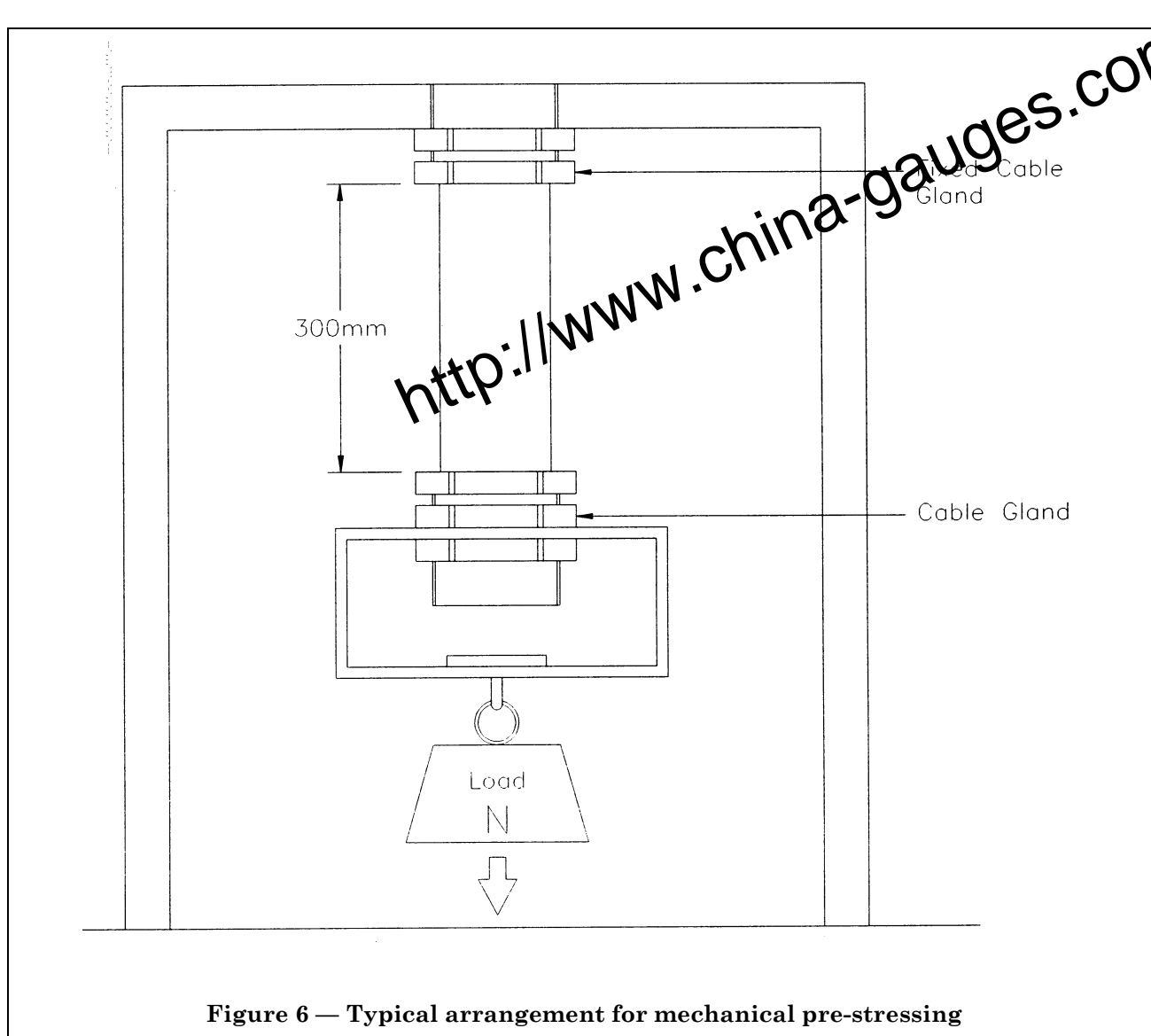
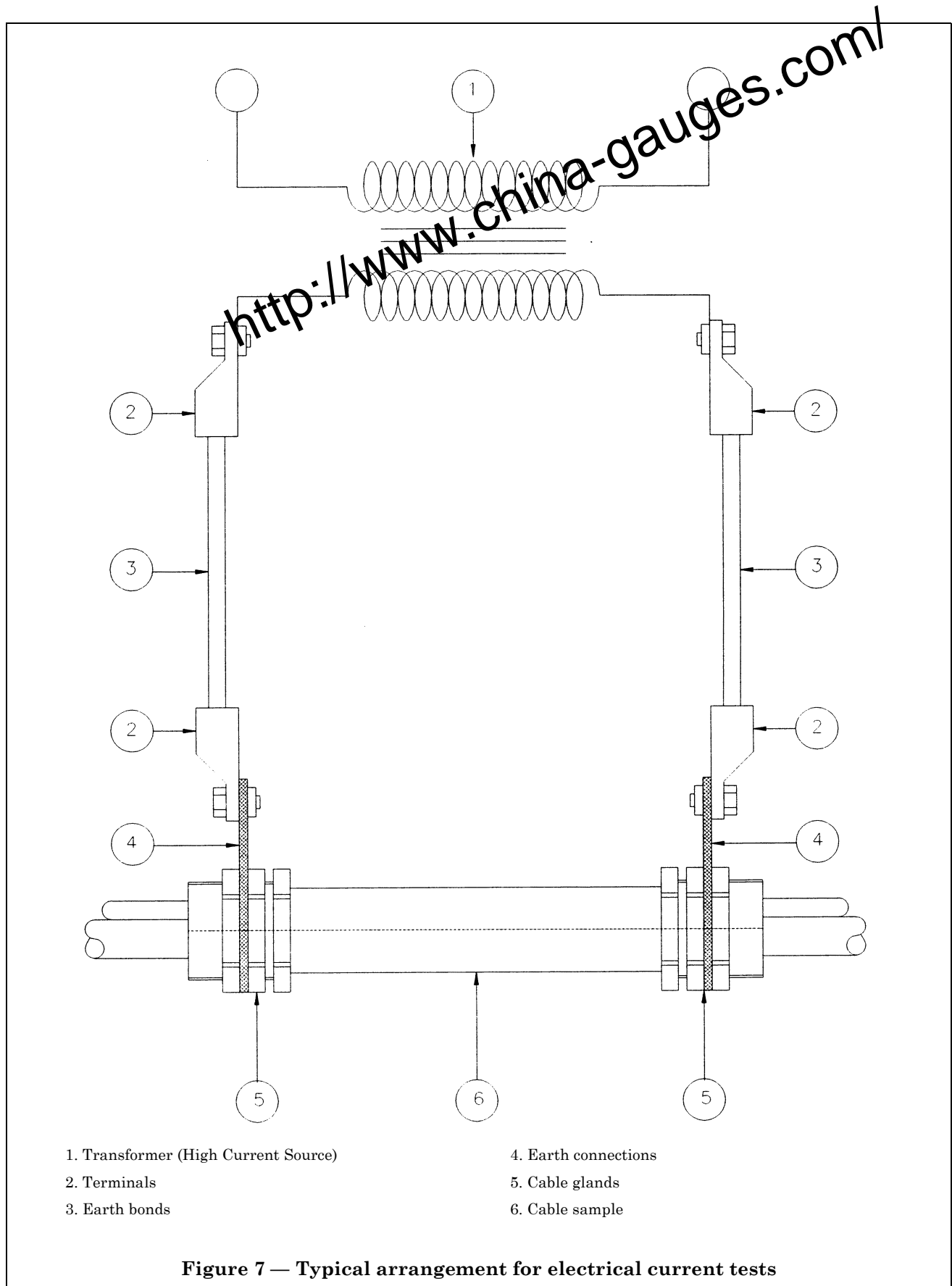


Figure 6 — Typical arrangement for mechanical pre-stressing



A)

Table 5 — Electrical current values

Cable diameter mm	Category A Minimum symmetrical r.m.s current (kA)	Category B Minimum symmetrical r.m.s current (kA)	Category C Minimum symmetrical r.m.s current (kA)
>4 to 8	—	—	—
>8 to 11	0,5	3,06	10,0
>11 to 16	0,5	3,06	13,1
>16 to 23	0,5	3,06	13,1
>23 to 31	0,5	4,0	13,1
>31 to 43	0,5	5,4	13,1
>43 to 55	1,8	7,2	43,0
>55 to 65	2,3	10,4	43,0
>65	2,8	10,4	43,0

NOTE Category A is the minimum requirement, which may apply in cases where cable armour (other than steel wire) is the limiting factor.

Category B is a medium requirement, which may apply in cases where steel wire armoured cable is used and the system includes a high sensitivity method of secondary protection against fault currents.

Category C is the highest requirement, which may apply in cases where steel wire armoured cable is used and the system relies on low sensitivity method of secondary protection against fault currents. A)

11 Electromagnetic compatibility

Products covered by this standard are, in normal use, considered to be passive in respect of electromagnetic influences, (emission and immunity).

NOTE Products covered by this standard are installed as part of a wiring installation, which may emit or be influenced by electromagnetic signals. The degree of influence will depend upon the nature of the installation within its operating environment and the apparatus connected to the wiring.

12 External influences

12.1 IP Code in accordance with EN 60529

The degree of protection provided by cable glands is checked in accordance with 12.1.1 immediately followed by 12.1.2.

12.1.1 Degree of protection against foreign solid objects indicated by the first characteristic numeral

12.1.1.1 The sample is mounted onto an appropriate test enclosure where the mating surface which comes into contact with any part of the sample shall be flat and smooth.

12.1.1.2 The sample shall be tested in accordance with the appropriate test of EN 60529. For characteristic numeral 5, category 2 applies.

12.1.1.3 The sample is deemed to have passed the test if there is no ingress of dust.

12.1.2 Degree of protection against ingress of water indicated by the second characteristic numeral

12.1.2.1 The sample shall be tested in accordance with the appropriate test of EN 60529. For characteristic numeral 4, the test device as shown in Figure 4 (oscillating tube) of EN 60529 shall be used.

12.1.2.2 The sample is deemed to have passed the test if there is no ingress of water visible to normal or corrected vision without magnification.

12.2 Resistance to abnormal heat

Exposed non-metallic parts of cable glands shall be resistant to abnormal heat from an external source.

A1 **A1**

Sealing systems are exempt from this test.

For the purpose of this test external exposed parts are those parts which can be touched by a glow wire.

Compliance is checked by the glow wire test in accordance with EN 60695-2-1/1 under the following conditions.

The temperature of the glow wire is 650 °C.

The test is made by applying the glow wire once.

The tip of the glow wire shall be applied to the exposed external parts of the cable gland taking into account the conditions of intended use under which a heated or glowing element may come into contact with the cable gland.

The cable gland is regarded as having passed the glow wire test if:

- there is no flame or glowing; or
- flames or glowing at the cable gland, extinguish within 30 s after removing the glow wire;
- and there shall be no ignition of the tissue paper or scorching of the board.

A1 12.3 Resistance to salt and sulphur dioxide laden atmospheres

Cable glands if declared in accordance with 6.4.3 shall have adequate resistance to salt and sulphur dioxide laden atmospheres.

Compliance is checked by the following test in accordance with EN 60068-2-52 followed by the test in accordance with EN ISO 6988.

Details of the tests:

EN 60068-2-52 Clauses 7 and 10 are not applicable. The test is carried out to severity 2 in accordance with 6.2.

ISO 6988: 7 cycles with a concentration of sulphur dioxide of 667 ppm (by volume). Each cycle has a duration of 24 h, is composed of a heating period of 8 h at a temperature of 40 °C ± 3 °C in the humid saturated atmosphere which is followed by a rest period of 16 h. After that the humid sulphurous atmosphere is replaced.

After each test, the samples are to be carefully rinsed and dried and shall show no sign of corrosion.

Discolorations and effects on sealing systems are neglected.

This test is not carried out on cable glands constructed from the following materials in their unplated condition:

- stainless steel;
- brass;
- aluminium. **A1**

National Annex NA (informative)**Guidance on application of EN 50262 to cable glands with non-metric entry threads****NA.1 Clearance holes for testing cable glands**

EN 50262, Table 1 specifies the diameters of clearance holes for testing metric cable glands. The clearance hole diameters given in the table were calculated from the following formula:

$$d = t + 0.5^{+0.2}_{-0.4}$$

where

d is the clearance hole diameter, in millimetres (mm);

t is the maximum diameter of the entry thread, in millimetres (mm).

This formula can be used to calculate the clearance hole diameters needed for testing cable glands with non-metric entry threads.

NA.2 Marking and documentation**NA.2.1 Marking**

EN 50262, 7.1, specifies marking the cable gland with the identification of the product. In the case of cable glands with non-metric entry threads this identification is considered to include the entry thread size and type.

NA.2.2 Documentation

EN 50262, 8.1, specifies that the entry thread, if any, shall be constructed in accordance with EN 60423, Table 1, or ISO 965, depending on the size. These standards specify metric threads. For cable glands with non-metric entry threads the information to be supplied by the manufacturer to enable proper use and safe installation, as specified in EN 50262, 7.3, needs to include the details of the specification to which the entry thread was made.

Standards specifying non-metric entry threads are listed in Table NA.1.

Table NA.1 — Standards specifying non-metric entry threads

Thread type	Standard
—	BS 31:1940
—	BS EN ISO 228-1:2003
—	BS 21:1985
NPSM	ANSI/ASME B1.20.1:1983
NPT	ANSI/ASME B1.20.1:1983

NA.3 Non-metric equivalents of metric entry threads

Non-metric equivalents of metric entry threads are given in Table NA.2.

Table NA.2 — Non-metric equivalents of metric entry threads

Metric entry thread designation	Non-metric entry thread standards		
	BS 31	ANSI/ASME B1.70 (Thread types NPT and NPSM)	BS EN ISO 228-1 BS 21
M16	5/8"	3/4"	3/8"
M20	3/4"	1/2"	1/2"
M25	1"	3/4"	3/4"
M32	1 1/4"	1"	1"
M40	1 1/2"	1 1/4"	1 1/4"
M50	2"	1 1/2"	1 1/2"
M63	2 1/2"	2"	2"
M75	3"	2 1/2"	2 1/2"
—	—	3"a	3"a
—	—	3 1/2"a	3 1/2"a
—	—	4"a	4"a

^a Given for additional information only. There are no equivalent metric entry threads for these sizes.

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