BRITISH STANDARD

BS 6207-2: 1995

Incorporating Amendment No. 1

Mineral insulated cables with a rated voltage not exceeding 750 V —

Part 2: Terminations —

(Implementation of CENELEC HD 586.2 S1)

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee GEL/20, Electric cables, upon which the following bodies were represented:

Association of Consulting Engineers
Association of Manufacturers of Domestic Electrical Appliances
BEAMA Electrical Cable and Conductor Accessory Manufacturers' Association
British Approvals Service for Cables
British Cable Makers Confederation
British Plastics Federation
British Steel Industry
Department of Trade and Industry (Consumer Safety Unit, CA Division)
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:

Association of Manufacturers Allied to the Electrical and Electronic Industry (BEAMA Ltd.)
British Non-Ferrous Metals Federation
British Steel plc
Chartered Institution of Building Services Engineers
ERA Technology Ltd.
Electrical Installation Equipment Manufacturers' Association (BEAMA Ltd.)
Engineering Industries Association
GAMBICA (BEAMA Ltd.)
Institution of Incorporated Executive Engineers
Lighting Industry Federation Ltd.
London Underground Ltd.
National Association of Lift Makers
Portable Electric Tool Manufacturers' Association
Transmission and Distribution Association (BEAMA Limited)

This British Standard, having been prepared under the direction of the Electrotechnical Sector Board, was published under the authority of the Standards Board and comes into effect on 15 June 1995

The following BSI references relate to the work on this standard:
Committee reference GEL/20
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Amendments issued since publication

Amd. No.	Date	Comments
9273	November 1996	Indicated by a sideline in the margin

Contents

National foreword

This Part of BS 6207 has been prepared by Technical Committee GEL/20. It implements Harmonization Document HD 586.2 S1:1994, including corrigendum 1995, published by the European Committee for Electrotechnical Standardization (CENELEC).

Part 1 of BS 6207 specifies mineral insulated general wiring cables with copper sheath and copper conductors with rated voltages up to 750 V.

This Part of BS 6207 specifies terminations for use with the cables specified in Part 1.

The foreword of HD 586.2 makes reference to the "date of withdrawal" (dow) of the relevant national standard. In this case, the relevant British Standard is BS 6081:1989, which is withdrawn. For products which have conformed to BS 6081:1989, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 1 April 1996.

Cross-references

Publication referred to	Corresponding British Standard
IEC 423	BS 6053:1981 *Specification for outside diameters of conduits for electrical installations and threads for conduits and fittings* BS 5501 *Electrical apparatus for potentially explosive atmospheres*
EN 50014	Part 1:1977 *General requirements*
EN 50015	Part 2:1977 *Oil immersion "o"*
EN 50016	Part 3:1977 *Pressurized apparatus "p"*
EN 50017	Part 4:1977 *Powder filling "q"*
EN 50018	Part 5:1977 *Flameproof enclosure "d"*
EN 50019	Part 6:1977 *Increased safety "e"*
EN 50020	Part 7:1977 *Intrinsic safety "i"*
HD 586.1 S1	BS 6207 *Mineral insulated cables with a rated voltage not exceeding 750 V* Part 1:1995 *Cables*

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the HD title page, pages 2 to 6, 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.

HARMONIZATION DOCUMENT
DOCUMENT D'HARMONISATION
HARMONISIERUNGSDOKUMENT

HD 586.2 S1

September 1994

UDC 621.315.687.3:621.315.2:621.315.613

Incorporating corrigendum 1995

Descriptors: Termination, electric cable, insulated cable, solid electric insulation, specification, dimension, test

English version

Mineral insulated cables with a rated voltage not exceeding 750 V
Part 2: Terminations

Câbles à isolant minéral, de tension assignée ne dépassant pas 750 V
Partie 2: Extrémités

Mineralisolierte Leitungen mit einer Nennspannung bis 750 V
Teil 2: Endverschlüsse

CENELEC

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

Central Secretariat: rue de Stassart 35, B-1050 Brussels

Foreword

This Harmonization Document was prepared by CENELEC Technical Committeee TC 20, Electric cables.

It was submitted to the CENELEC Unique Acceptance Procedure (UAP) in May 1993 and was approved by CENELEC as HD 586.2 S1 on 1994-03-08.

The following dates were fixed:

- latest date of announcement of the HD at national level (doa) 1994-10-01
- latest date of publication of a harmonized national standard (dop) 1995-04-01
- latest date of withdrawal of conflicting national standards (dow) 1995-04-01

For products which have complied with the relevant national standard before 1995-04-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 1996-04-01.

This Part 2 of HD 586 is to be used in conjunction with HD 586.1 S1:1994.

Contents

1 Scope

This standard specifies requirements for terminations for use with mineral insulated cables complying with the requirements of CENELEC harmonised publication HD 586.1.

2 Definitions

The following definitions apply for the purpose of this standard.

2.1
termination

a complete end fitting for a mineral insulated cable, normally comprising a seal and a gland or a composite seal/gland device, but excluding the locknut and any associated junction box or accessory

2.2
seal

the part of a termination designed to seal the end of the cable against entry of moisture. The design must be such as to provide insulation between conductors and between conductors and sheath and provide conductor insulation external to the seal. It may also have a means of providing a protective conductor

2.3
gland

the part of a termination designed to secure the cable in a cable entry. It may or may not be used to ensure earth continuity depending upon the type of construction and material used

3 Marking

3.1 Marking of packages

Packages in which terminations or parts of terminations are supplied shall be marked with the following particulars if applicable.

The manufacturer or supplier.

The maximum and minimum operating temperature of the seals.

A mark or means of identifying the cables or cables for which it is intended.

Whether a protective conductor is provided.

Gland thread form and size.

3.2 Marking of seals and glands

Seals and glands shall be marked with a mark or means of identifying the cable or cables for which they are intended. In addition, glands certified for use in hazardous areas shall be marked in accordance with EN50 014, EN50 015, EN50 016, EN50 017, EN50 018, EN50 019, EN50 020.

4 Construction

4.1 Seals

4.1.1 A seal shall consist of a moisture resistant material contained if necessary within a suitable enclosure, and shall provide electrical insulation for the cable conductors.

4.1.2 A protective conductor may be connected to a metallic sealing enclosure by any suitable method (e.g. welding, brazing, crimping or soldering) or it may be connected directly to the metal sheath by any suitable attachment (e.g. clip or clamp). The size of the protective conductor shall be in accordance with publication HD 384 and the attachment shall meet the electrical continuity test requirement specified in sub-clause **5.4**.

4.1.3 A seal for use in potentially explosive atmospheres shall comply with the requirements of this standard and the appropriate requirements specified in EN50 014, EN50 015, EN50 016, EN50 017, EN50 018, EN50 019, EN50 020.

4.1.4 A seal or enclosure shall be made from material which will ensure freedom from corrosion arising from electrolytic action.

4.1.5 The sealing material used in the termination shall be such that the completed seal is capable of meeting the test requirements specified in clause **5**.

4.1.6 Sleeving for conductor insulation shall be suitable for the range of operating temperatures stated for the seal by the manufacturer.

4.2 Glands

4.2.1 A gland may be of any suitable material providing that it ensures freedom from corrosion arising from electrolytic action and meets the test requirements specified in clause **5**.

4.2.2 The gland entry threads shall have a preferred thread form in accordance with those specified for conduit in IEC publication 423: Outside Diameters of Conduits for Electrical Installations and Threads for Conduits and Fittings. Other threads are permitted provided that the gland complies with all the other requirements of this standard.

4.2.3 The length of gland entry threads shall be not less than 8 mm.

4.2.4 Glands for use in potentially explosive atmospheres shall comply with the requirements of this standard and also the appropriate requirements specified in EN50 014, EN50 015, EN50 016, EN50 017, EN50 018, EN50 019, EN50 020.

5 Type tests

5.1 General

The tests in this standard are type tests intended to establish termination design characteristics. Unless otherwise specified all tests shall be carried out at an ambient temperature of 20 ± 10 °C.

The test voltage shall be either a.c. of approximately sinusoidal waveform at a frequency in the range 49 Hz to 61 Hz, or d.c. equal to the peak value of the alternating voltage, and shall be applied gradually.

The seals and glands to be tested shall be fitted in accordance with the manufacturer's recommendations to both ends of 300 ± 50 mm lengths of MI cable complying with Harmonised CENELEC publication HD 586.1 of a size and rated voltage appropriate to the seals/glands under test. Each seal shall be fitted as soon as possible after the end of the cable has been prepared to minimise the ingress of moisture.

New seals/glands shall be taken for each electrical and mechanical test.

5.2 Seals

5.2.1 *Voltage test*

The sample shall withstand the following test voltage applied between each conductor and every other conductor, and between each conductor and sheath, for five minutes.

Seals for 500 V rated cable – 2 000 V rms

Seals for 750 V rated cable – 2 500 V rms

5.2.2 *Insulation resistance test*

The insulation resistance measured with a d.c. voltage between 80 V and 500 V applied between the conductor, or conductors bunched together, and the sheath shall be not less than 100 Mohms.

5.2.3 *Insulation integrity test*

This test shall be carried out in addition to the insulation resistance test after environmental tests specified in sub-clauses **5.2.4** and **5.2.5** as an indirect check that the insulation has not deteriorated.

The insulation integrity test is a voltage test applied between each conductor and every other conductor and between each conductor and sheath. The voltage equal to the rated voltage of the cable shall be applied for five minutes. No insulation breakdown shall occur.

5.2.4 *Maximum operating temperature test*

The sample shall be heated to a temperature at least 5 K and not more than 10 K higher than the maximum operating temperature specified by the manufacturer.

At this temperature it shall pass the insulation integrity test specified in **5.2.3**, and the insulation resistance measured with a d.c. voltage between 80 V and 500 V applied between a conductor, or conductors bunched together, and the sheath shall be not less than 1 Mohm.

5.2.5 *Temperature cycle test*

The sample shall be heated to at least 5 K and not more than 10 K higher than the maximum operating temperature specified by the manufacturer and maintained at this temperature for 16 ± 1h. Then it shall be transferred to a refrigerated compartment and maintained at the minimum operating temperature specified by the manufacturer (± 5 k), for 8 ± 1h. This cycle shall be repeated 20 times.

On completion of 20 cycles the sample shall be allowed to return to room temperature and then it shall be placed in a humidity cabinet at (25 ± 5) °C and (95 ± 5) % relative humidity for (16 ± 1) h.

After removal from the humidity cabinet, the surface moisture shall be dried and the sample shall pass the insulation resistance test as specified in subclause **5.2.2**. and the insulation integrity test as specified in **5.2.3**.

5.2.6 *Tensile test*

This test is applicable only to those seals which are intended to be used as a means of attachment of cables to supporting structures or enclosures. For the purpose of this test one seal may be fitted to the cable sample.

The assembly shall be tested in a suitable tensile testing machine in such a way that the load is applied without imparting any crushing force. The load shall be increased gradually to the proof value specified in Table 1, and maintained at that value for 5s.

After testing the seal shall show no splits or cracks or movement relative to the cable when examined with normal or corrected vision without magnification.

Table 1 — Proof Loads for Sealing Pots or Glands

Nominal diameter of cable (mm)		Proof Load (N)
Above	Up to and including	
—	6	35
6	9	70
9	—	100

5.3 Glands

5.3.1 *Tensile test*

The gland shall be fitted to one end of a cable sample in accordance with the manufacturer's recommendations.

The entry thread on the body of the gland shall be screwed into an appropriate thread cut in a block of metal attached to one of the members of a suitable tensile testing machine. The load shall be increased gradually to the proof value in Table 1 and maintained at that value for 5s.

After testing, the gland shall show no splits or cracks or movement relative to the cable when examined with normal or corrected vision without magnification.

5.4 Electrical earth continuity test

The samples, prepared as described in **5.4.1** or **5.4.2**, shall be heated in an oven to a temperature at least 50 K and not more than 10 K higher than the maximum temperature specified by the manufacture, and then allowed to return to room temperature. The electrical potential difference shall be measured as specified in **5.4.1** or **5.4.2** and recorded. The initial potential difference shall not exceed 10 mV.

The temperature cycle and potential measurement shall be repeated until the variation in three successive voltage measurements is less than 2 % or for 10 cycles whichever is the greater.

The final reading shall not be greater than the original reading by more than 10 %.

5.4.1 Glands and seals with integral protective conductors or other protective conductor attachments

The test shall be carried out on an assembly incorporating two protective conductors and a sample of cable assembled in accordance with the manufacturer's recommendations. Only those components concerned with electrical continuity need be incorporated, and all parts shall be in a clean new condition and shall not be adjusted during the test.

A current of 25 A d.c. or a.c. r.m.s. at a frequency of 49 Hz to 61 Hz shall be passed between the free ends of the protective conductors. The potential difference shall be measured at each end of the assembly between a point on the protective conductor not more than 1.5 mm distant from the attachment and a point on the cable sheath not more than 1.5 mm distant from the attachment.

5.4.2 Glands intended to provide earth continuity without integral protective conductors

The test shall be carried out on an assembly incorporating two glands screwed into appropriate threads cut in two blocks of metal. A current of 25 A d.c. or a.c. r.m.s. at a frequency of 49 Hz to 61 Hz shall be passed between the two blocks. The potential difference shall be measured at each end of the assembly between a point on the gland body and a point on the cable sheath no more than 1.5 mm distant from the gland.

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List of references

See national foreword.

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