British Standard

BRITISH STANDARD

BS 5424-3: 1988

Incorporating Amendment No. 1

Specification for

Controlgear for voltages up to and including 1 000 V a.c. and 1 200 V d.c.

Part 3: Additional requirements for contactors subject to certification

(Implementation of CENELEC HD 419.3 S1)

UDC [621.316.3/.5].027.2:[621.316.53 + 006.063]

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Power Electrical Engineering Standards Committee (PEL/-) to Technical Committee PEL/10, upon which the following bodies were represented:

ASTA Certification Services

Association of Manufacturers Allied to the Electrical and Electronic Industry (BEAMA Ltd.)

British Gas plc

ERA Technology Ltd.

Electrical Contractors' Association

Electrical Installation Equipment Manufacturers' Association (BEAMA Ltd.)

Electricity Supply Industry in England and Wales

Electronic Components Industry Federation GAMBICA (BEAMA Ltd.)

Health and Safety Executive

Institution of Electrical Engineers

This British Standard, having been prepared under the direction of the Power Electrical Engineering Standards Committee, was published under the authority of the Board of BSI and comes into effect on
29 February 1988

The following BSI references relate to the work on this standard:
Committee reference PEL/10
Draft for comment 79/26979 DC

ISBN 0 580 16358 X

Amendments issued since publication

Amd. No.	Date of issue	Comments
6446	December 1990	Indicated by a sideline in the margin

Contents

National foreword

This Part of BS 5424 has been prepared under the direction of the Power Electrical Engineering Standards Policy Committee and is related to IEC 158-3:1985 "*Low voltage controlgear — Part 3: Additional requirements for contactors subject to certification*', published by the International Electrotechnical Commission (IEC). This British Standard is in agreement with Harmonization Document HD 419.3 S1, published by the European Committee for Electrotechnical Standardization (CENELEC). HD 419.3 S1 is based on IEC 158-3 but has introduced modifications to **5** d), **8.2.103.2** and **8.2.104**.

BS 5424 consists of the following Parts:

— *Part 1:1977 Contactors*;

— *Part 2:1987 Specification for semiconductor contactors (solid state contactors)*;

— *Part 3:1987 Additional requirements for contactors subject to certification*.

Terminology and conventions. The text of the international standard has been approved as suitable for publication as a British Standard without deviation. Some terminology and certain conventions are not identical with those used in British Standards; attention is drawn especially to the following.

The comma has been used in some places as a decimal marker. In British Standards it is current practice to use a full point on the baseline as the decimal marker.

References to page numbers in the text relate to IEC page numbers given in brackets at the bottom of each page.

Cross-references

International standard	Corresponding British Standard
IEC 73:1984	BS 4099 *Colours of indicator lights, push-buttons, annunciators and digital readouts* Part 1:1986 *Specification for colours of indicator lights and push-buttons* (Identical)
IEC 144:1963	BS 5420:1977 *Specification for degrees of protection of enclosures of switchgear and controlgear for voltages up to and including 1 000 V a.c. and 1 200 V d.c.* (Identical)
IEC 212:1971	BS 2844:1972 *Memorandum on conditioning of solid eletrical insulating materials prior to and during testing* (Technically equivalent)
IEC 337-1:1970	BS 4794 *Specification for control switchesl switches (switching devices including contactor relays, for control and auxiliary circuits, for voltages up to and including 1 000 V a.c. and 1 200 V d.c.)* Part 1:1979 *General requirements* (Identical)
IEC 695-2-1:1980	BS 6458 *Fire hazard testing for electrotechnical products* Part 2 : *Methods of test* Section 2.1:1984 *Glow-wire test* (Identical)

The related British Standard to IEC 158-1 is BS 5424-1:1977.

The Technical Committee has reviewed the provisions of IEC 158-1:1970 plus Amendment 1:1983, IEC 158-1A:1975, IEC 158-1B:1979 and IEC 158-1C:1982 to which reference is made in the text and has decided that they are acceptable for use in conjunction with this standard.

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 to iv, pages 1 to 12, 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.

blank

1 General

This clause of IEC Publication 158-1: Low-voltage Controlgear, Part 1: Contactors, applies except as follows:

1.1 Scope

First paragraph

Replacement:

This standard applies to electro-magnetic air-break contactors in accordance with IEC Publication 158-1 for which additional requirements are necessary in order to specify in sufficient detail certain testing parameters and procedures.

Additional notes:

NOTE 3 The need for additional requirements appears, for example, when contactors have to be tested and certified by appropriate testing authorities because of national or other laws or rules.

NOTE 4 If control switches are incorporated in contactors they shall comply with IEC Publication 337-1: Control Switches (Low-voltage Switching Devices for Control and Auxiliary Circuits, Including Contactor Relays), Part 1: General Requirements.

2 Definitions

This clause of IEC Publication 158-1 applies.

3 Classification

This clause of IEC Publication 158-1 applies.

4 Characteristics of contactors

This clause of IEC Publication 158-1 applies except as follows:

4.3.2.1 *Rated conventional thermal current*

Additional note

NOTE 3 This implies that I_{th} is higher than or at least equal to the highest stated rated operational current for uninterrupted duty.

5 Nameplates

This clause of IEC Publication 158-1 applies except as follows:

Replacement of the first paragraph:

Each contactor shall be provided with a nameplate carrying the following data, marked in a durable manner, and which shall be easily legible and shall not be placed on screws, removable washers or other removable parts.

In addition when the contactor is supplied in an enclosure the IP rating according to the relevant IEC publication[1)] shall be indicated on the enclosure.

The marking of the terminals shall be in accordance with IEC Publication 158-1C.

The nameplate shall indicate that the device has been certified according to this standard and by what authority it has been thus certified.

Alternative ratings according to IEC Publication 158-1 may also be given by the manufacturer even if these have not been certified according to this standard.

Addition to Item d):

NOTE If the rated operational current is not given on the nameplate, it shall be in the catalogue of the manufacturer together with the assumed relationship between rated operational voltage and rated operational power.

Addition before the note:

For contactors whose control circuit is intended to be connected to a safety extra-low voltage supply:

n) suitability of the control circuit to be connected to a safety extra-low voltage supply, the main switching circuit being supplied with a voltage having a value greater than that of the safety extra-low voltage.

6 Standard conditions for operation in service

This clause of IEC Publication 158-1 applies.

7 Standard conditions for construction

This clause of IEC Publication 158-1 applies except as follows:

7.1.1 ***General***

Addition:

Screws or nuts which transmit contact pressure shall be in engagement with a metal thread.

Compliance of resistance to heat, to abnormal heat, to fire and to rusting is checked by the tests of Sub-clauses **8.2.103** and **8.2.104**.

7.1.2 ***Clearances and creepage distances***

Addition:

For contactors having the control circuit suitable to be connected to a safety extra-low voltage supply, the main switching circuit being supplied with a voltage having a value greater than that of the safety extra-low voltage, creepage distances and clearances between control and main switching circuits shall be greater than or equal to 6 mm.

[1)] Provisionally IEC Publication 144: Degrees of Protection of Enclosures for Low-voltage Switchgear and Controlgear.

7.1.3 ***Terminals***

Replacement:

Requirements for terminals are under consideration.

Terminals intended exclusively for the neutral conductor shall be indicated by the letter N.

Additional sub-clause:

7.1.3.101 *Operating means*

If integral manually operated control means are provided for operating the contactor, the opening position shall be indicated by the symbol "○", and the closing position by the symbol "|"

When colour symbols are used for operating means, the colours shall be according to IEC Publication 73: Colours of Indicator Lights and Push-buttons.

7.2.1 ***Degree of protection of enclosures***

Addition:

For enclosures having a rating up to and including IP4X, sufficient space shall be provided for establishing a drain hole; this operation shall meet the requirements of the relevant IEC publication[2)]

Addition sub-clause

7.2.1.101 Enclosures, screws, nuts and studs shall have adequate mechanical strength (see Sub-clause **8.2.102**).

7.2.2 ***Mechanical details***

Addition:

It shall not be possible to remove any cover of the enclosure without the use of a tool.

Suitable means shall be provided for the entry of cables or conduits into the enclosure. The use of knock-outs for this purpose is permitted.

Additional sub-clauses:

7.101 Resistance to heat, to abnormal heat and to fire

Parts of insulating material, which might be exposed to thermal stresses due to electric effects and the deterioration of which might impair the safety of the accessory, shall not be unduly affected by abnormal heat and by fire.

Compliance is checked by the test of Sub-clause **8.2.103**.

7.102 Humidity treatment and dielectric properties

Contactors shall be proof against humid conditions which may occur in normal use.

Compliance is checked by the test of Sub-clause **8.2.3**.

7.103 Resistance to rusting

Ferrous parts including covers, but excluding cores of electromagnets, shall be adequately protected against rusting.

Compliance is checked by the test of Sub-clause **8.2.104**.

8 Tests

This clause of IEC Publication 158-1 applies except as follows:

8.1.1 ***Type tests***

Replacement:

*f) verification of mechanical and electrical endurance (see Sub-clause **8.4.1**);*

Additions:

*h) durability of markings stated in Clause **5** (see Sub-clause **8.2.101**);*

*i) mechanical strength (see Sub-clause **8.2.102**);*

*j) resistance to heat, to abnormal heat and to fire (see Sub-clause **8.2.103**);*

*k) resistance to rusting (see Sub-clause **8.2.104**).*

8.2.1 ***General***

Addition:

Unless otherwise specified, the contactors are tested at an ambient air temperature of 25 ± 10 °C.

The number of test samples required for certification is given in Appendix BB.

8.2.3.1 *Condition of the contactor for tests*

First paragraph

Replacement:

The dielectric tests are made on contactors submitted previously to a humidity treatment as follows:

— Contactors, new and in clean condition, mounted as in normal conditions of use (including wiring) are placed in a humidity cabinet containing air with a relative humidity maintained between 91 % and 95 %. The temperature of the air, at all places where samples are to be located, is maintained within 1 °C of any convenient value T between 20 °C and 30 °C.

A relative humidity between 91 % and 95 % can be obtained by placing in the humidity cabinet a saturated solution of sodium sulphate (Na_2SO_4) or potassium nitrate (KNO_3) in water, having a sufficiently large contact surface with the air.

[2)] Provisionally IEC Publication 144

In order to achieve the specified conditions within the cabinet, it is necessary to ensure constant circulation of the air in it and, in general, to use a cabinet which is thermally insulated.

Before being placed in the humidity cabinet, the samples are brought to a temperature differing from T by not more than 2 °C.

In most cases, the samples may be brought to the specified temperature of T ± 2 °C by keeping them at this temperature for at least 4 h before the humidity treatment.

The samples are kept in the cabinet for:

— 2 days (48 h)for contactors with a degree of protection up to and including IPX1;

— 7 days (168 h) for contactors with a degree of protection higher than IPX1.

For this humidity treatment, cable entries, if any, are left open; if knock-outs are provided, one of them is opened.

The dielectric tests are made as soon as practicable after the above humidity treatment.

8.2.3.3 *Value of the test voltage*

Replacement of the second paragraph:

The value of the one-minute test voltage shall be as follows:

Addition:

The high-voltage transformer used for the test shall be so designed that, when the output terminals are short-circuited after the output voltage has been adjusted to the appropriate test voltage, the output current is at least 200 mA.

The overcurrent relay shall not trip when the output current is less than 100 mA.

Additional sub-clause:

8.2.3.101 *Results to be obtained*

No flashover or breakdown shall occur during the test.

Glow discharges without drop in the voltage are neglected.

8.2.7 ***Verification of mechanical endurance***

Replacement of the complete sub-clause, including the title:

8.2.7 ***Verification of mechanical and electrical endurance***

The test is made according to the requirements for utilisation category AC-3.

If the contactor has no AC-3 utilization category, the test is made according to the requirements for the utilization category given (or, if more than one, for the most severe utilization category given).

NOTE Where a contactor has more than one utilization category and where information about the behaviour of the contactor at the utilization category (or categories) not tested is requested, additional tests may be required.

The test circuit shall comprise inductors and resistors so arranged as to give the appropriate values of current, voltage, power-factor and time-constant. For category AC-4, the test circuit shall be arranged in accordance with Appendix D of IEC Publication 158-1. In all cases, the speed of operation shall be chosen by the manufacturer.

The contactor is subjected to the number of operations per hour corresponding to the applicable class of intermittent duty; see Sub-clause ***4.3.4.3.1*** *of IEC Publication 158-1.*

The on-load period shall be sufficiently long to allow the contactor to come to a complete rest.

The number of operations to be performed (see Sub-clause ***2.2.10*** *of IEC Publication 158-1) is 30 000.*

Tests shall be carried out under the appropriate conditions of Sub-clauses ***8.2.7.1*** *and* ***8.2.7.2*** *of IEC Publication 158-1, using the test procedure, where applicable, of Sub-clause* ***8.2.7.3*** *of IEC Publication 158-1.*

There shall be no loosening of the parts used for connecting the conductors or of other parts essential for the operation of the contactor.

After the test, the contactor shall fulfil the operating conditions specified in Sub-clause ***8.2.6*** *of IEC Publication 158-1 and withstand the dielectric test voltages of Sub-clause* ***8.2.3.3*** *of IEC Publication 158-1 applied only as in Sub-clause* ***8.2.3.2.1*** *a) 1) and 2) of IEC Publication 158-1.*

Additional sub-clauses:

8.2.101 ***Verification of the durability of markings***

Compliance with the requirements of Clause ***5*** *is checked by inspection, also by lightly rubbing the marking 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.*

8.2.102 ***Verification of mechanical strength***

See Sub-clause ***7.2.1.101)***

8.2.102.1 *Mechanical strength of enclosures*

Compliance is checked by the following test, carried out by means of the impact test apparatus as described in Appendix AA (see Figure AA.1, Figure AA.2 and Figure AA.3).

The enclosures for contactors are mounted on a sheet of plywood as in normal use.

Cable entries which are not provided with knock-outs, are left open; if they are provided with knock-outs, one of them is opened.

For flush-type mounting boxes of contactors, the sample is mounted in a recess provided in a block of hornbeam or similar material, which is cemented to a sheet of plywood as described in Appendix AA (see Figure AA.4).

If wood is used for the block, the direction of the wood fibres shall be perpendicular to the direction of the impact.

The samples are mounted so that the point of impact lies in the vertical plane through the axis of the pivot.

The striking element is allowed to fall from a height of:

— 10 cm for flat surface cover plates of flush-type mounting boxes;

— 20 cm for parts projecting from the mounting surface of cover plates of flush-type mounting boxes and for enclosures of surface-types;

— 25 cm for enclosures of types other than ordinary types.

The samples are subjected to ten blows, which are evenly distributed over the sample. The blows are not applied to knock-outs.

In general, five of the blows are applied as follows:

— for flush-type contactors, one blow in the centre, one at each extremity of the area over the recess in the block, and the other two approximately midway between the previous blows, preferably on the ridge, if any, the sample being moved horizontally:

— for other contactors and for mounting boxes, one blow in the centre, one at each side of the sample after it has been turned as far as possible, but not through more than 60°, about a vertical axis, and the other two approximately midway between the previous blows, preferably on the ridge, if any.

The remaining blows are then applied in the same way, after the sample has been turned through 90° about its axis perpendicular to the plywood.

If cable inlets are provided, the sample is so mounted that the two lines of blows are as nearly as possible equidistant from these inlets.

After the test, the samples shall show no damage within the meaning of this standard. In particular live parts shall not become accessible.

In case of doubt, it is verified that it is possible to remove and to replace external parts, such as mounting boxes, enclosures, covers and cover plates, without these parts or their insulating lining breaking.

Damage to the finish, small dents which do not reduce creepage distances and clearances below the values specified and small chips which do not adversely affect the protection against electric shock are neglected.

Cracks not visible to the naked eye and surface cracks in fibre reinforced mouldings and the like, are ignored. Cracks or holes in the outer surface of any part of the contactor are ignored if the contactor complies with this standard when the part is omitted. If a decorative cover is backed up by an inner cover, fracture of the decorative cover is neglected, if the inner cover withstands the test after removal of the decorative cover.

Contactors without enclosure intended to be fitted as components inside other equipment need not be subjected to this test.

A revision of this test is under consideration.

8.2.102.2 *Mechanical strength of screws, nuts and studs*

These requirements are for copper conductors only.

The mechanical strength of screws, nuts and studs transmitting contact pressure or which are operated when mounting or connecting the contactor, is further tested by tightening and loosening them:

— 10 times for screws in engagement with a thread of insulating material;

— 5 times in all other cases.

Screws in engagement with a thread of insulating material are completely removed and reinserted each time.

The test is made applying a torque according to the following table:

Table 101 — Relation between diameters of thread and torques

Nominal diameter of thread (mm)	Torque (Nm)				
	I	II	III	IV	V
Up to and including 2.8	0.2	0.4	—	—	0.4
over 2.8 up to and including 3.0	0.25	0.5	—	—	0.5
over 3.0 up to and including 3.2	0.3	0.6	—	—	0.6
over 3.2 up to and including 3.6	0.4	0.8	—	—	0.8
over 3.6 up to and including 4.1	0.7	1.2	1.2	1.2	1.2
over 4.1 up to and including 4.7	0.8	1.8	1.2	1.8	1.8
over 4.7 up to and including 5.3	0.8	2.0	1.4	2.0	2.0
over 5.3 up to and including 6.0	—	2.5	1.8	3.0	3.0
over 6.0	—	—	—	—	—
NOTE The above values are provisional					

Column I applies to screws without heads if the screws when tightened, do not protrude from the hole, and to other screws which cannot be tightened by means of a screwdriver with a blade wider than the diameter of the screw.

Column II applies to other screws which are tightened by means of a screwdriver.

Column III applies to nuts of mantle terminals which are tightened by means of a screwdriver.

Column IV applies to nuts of mantle terminals in which the nut is tightened by means other than a screwdriver.

Column V applies to screws or nuts, other than nuts of mantle terminals, which are tightened by means other than a screwdriver.

Where a screw has a hexagonal head with means for tightening with a screwdriver and the values in Columns II and V are different, the test is made twice, first by applying to the hexagonal head the torque specified in Column V and then by applying the torque specified in Column II by means of a screwdriver. If the values in Columns II and V are the same, only the test with the screwdriver is made.

During the test no damage impairing the further use of the screwed connections shall occur, such as breakage of screws or damage to the head slots, threads, washers or stirrups.

Screws or nuts which are operated when installing the contactor include screws for fixing cover or cover plates, etc., but not connecting means for screwed conduits and screws for fixing the base of a contactor.

The shape of the blade of the test screwdriver shall suit the head of the screw to be tested. The screws and nuts shall not be tightened in jerks. Damage to covers is neglected.

8.2.103 ***Verification of resistance to heat, to abnormal heat and to fire***

Compliance with the requirements of Sub-clause **7.101** *shall be checked by the following test:*

8.2.103.1 *Ball-pressure test*

Parts necessary to retain live parts in position are subjected to a ball-pressure test by means of the apparatus shown in Figure 101, page 7.

The surface of the part under test is placed in the horizontal position and a steel ball of 5 mm diameter is pressed against this surface by a force of 20 N.

The test is made in a heating cabinet at a temperature of 125 ± 5 °C.

After 1 h the ball is removed from the sample, which is then cooled down within 10 s to approximately room temperature by immersion in cold water, and the diameter of the impression is measured. The diameter shall not exceed 2 mm.

The test is not made on parts of ceramic material.

8.2.103.2 *Glow-wire test*

The glow-wire test is applied to ensure that an electrically heated test wire under defined test conditions does not cause ignition of insulating parts or to ensure that a part of insulating material, which might be ignited by the heated test wire under defined conditions, has a limited time to burn without spreading fire by flame or burning parts or droplets falling down from the tested part.

*The test is performed in accordance with Clauses **4** to **10** of IEC Publication 695-2-1: Fire Hazard Testing, Part 2: Test Methods. Glow-wire Test and Guidance, under the following conditions:*

— for parts of insulating material which are not necessary to retain in position current-carrying parts and parts of the protective circuit, even though they are in contact with them by the test made at a temperature of 650 °C;

— for parts of insulating material which are necessary to retain in position current-carrying parts and parts of the protective circuit, by the test made at the test temperature of 960 °C

Mounting boxes and small parts, such as washers, are not subjected to the test of this sub-clause.

The tests are not made on parts of ceramic material.

If possible, the sample should be a complete contactor. If the test cannot be made on a complete contactor, a suitable part may be cut out from it for the purpose of the test.

The test is made on one sample. In case of doubt, the test shall be repeated on two further samples. The sample shall be stored for 24 h under standard ambient atmosphere conditions before the test, in accordance with IEC Publication 212: Standard Conditions for Use Prior to and During the Testing of Solid Electrical Insulating Materials.

The test is made by applying the glow-wire once. The sample shall be positioned during the test in the most unfavourable position of its intended use (with the surface tested in a vertical position).

The tip of the glow-wire shall be applied to the specified surface of the test sample taking into account the conditions of the intended use under which a heated or glowing element may come into contact with the sample.

The sample is regarded as having passed the glow-wire test if, without the part burning away completely:

— the length of the flame does not exceed 30 mm while the tip is being pressed against the surface;

— there is no visible flame and no sustained glowing, or if flames or glowing at the sample extinguish within 30 s after removal of the glow-wire;

— the tip does not penetrate into the sample over a distance exceeding 15 mm with respect to the surface;

— no burning drops or glowing particles fall from the sample.'

There shall be no ignition of the tissue paper or scorching of the pinewood board.

8.2.104 *Verification of resistance to rusting*

*Compliance with the requirements of Sub-clause **7.103** is checked by the following test:*

All grease is removed from parts to be tested, by using a suitable degreasing agent for 10 min.

The parts are then immersed for 10 min in a 10 % solution of ammonium chloride in water at a temperature of 20 ± 5 °C.

Without drying, but after shaking off any drops, the parts are placed for 10 min in a box containing air saturated with moisture at a temperature of 20 ± 5 °C.

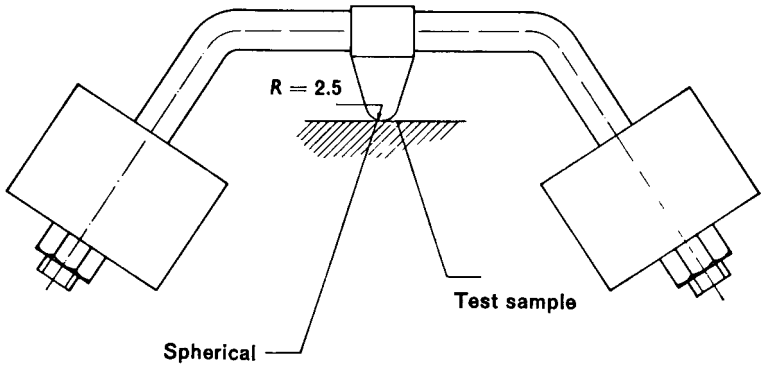
After the parts have been dried for 10 min in a heating cabinet at a temperature of 100 ± 5 °C, their surface shall show no signs of rust.

Traces of rust on sharp edges and any yellowish film removable by rubbing are ignored.

For small springs and for inaccessible parts exposed to abrasion, a layer of grease may provide sufficient protection against rusting. Such parts are only subjected to the test if there is doubt, about the effectiveness of the grease film, and the test is then made without previous removal of the grease.

8.4 Special tests

This clause of IEC Publication 158-1 does not apply.



Dimensions in millimetres

Figure 101 — Ball-pressure apparatus

Appendix A Information to be given by the user when conditions for operation in service differ from the standard

This appendix of IEC Publication 158-1 applies except as follows:

Addition:

The manufacturer shall specify the tests to be made when the conditions for operation in service, as indicated by the user or as specified in the standard of the appliance in which the contactor is to be incorporated, differ from this standard.

Appendix B Clearances and creepage distances for low-voltage contactors

This appendix of IEC Publication 158-1 applies.

Appendix C Protection of a contactor by a short-circuit protective device

This appendix of IEC Publication 158-1 applies except as follows: C4. — Type "a".

Addition

NOTE A revision of this requirement is under consideration.

Appendix D Conventional test circuit for verification of making and breaking capacities for categories AC-1 To AC-4 and DC-1 To DC-5

This appendix of IEC Publication 158-1 applies.

Additional appendices

Appendix AA Impact test apparatus

The striking element has a mass of 150 ± 1 g and has a hemispherical face of 10 mm radius, made of polyamide having a Rockwell hardness of HR 100. (Figure AA.1, Figure AA.2, Figure AA.3 and Figure AA.4.)

It is rigidly fixed to the lower end of a steel tube with an external diameter of 9 mm and a wall thickness of 0.5 mm, which is pivoted at its upper end in such a way that it swings only in a vertical plane.

The axis of the pivot is 1 000 ± 1 mm above the axis of the striking element. The Rockwell hardness of the striking element is determined by using a ball having a diameter of 12.700 ± 0.0025 mm, the initial load being 100 ± 2 N and the extra load 500 ± 2.5 N.

Additional information concerning the determination of the Rockwell hardness of plastics is given in ASTM[3)] Method D 785-65(76).

The design of apparatus is such that a force between 1.9 N and 2.0 N shall be applied to the face of the striking element to maintain the tube in a horizontal position.

The samples are mounted on a sheet of plywood, 8 mm thick and 175 mm square, secured at its top and bottom edges to a rigid bracket, which is part of the mounting support.

The mounting support shall have a mass of 10 ± 1 kg and shall be mounted on a rigid frame by means of pivots. The frame is fixed to a solid wall.

The design of the mounting is such that:

— the sample can be so placed that the point of impact lies in the vertical plane through the axis of the pivot;

— the sample can be removed horizontally and turned about an axis perpendicular to the surface of the plywood;

— the plywood can be turned about a vertical axis.

The height of fall is the vertical distance between the position of a checking point, when the pendulum is released, and the position of that point at the moment of impact. The checking point is marked on the surface of the striking element where the line through the point of intersection of the axis of the steel tube of the pendulum and the axis of the striking element, and perpendicular to the plane through both axes, meets the surface.

Theoretically the centre of gravity of the striking element should be the checking point. As the centre of gravity in practice is difficult to determine, the checking point is chosen as described above.

NOTE Test apparatus for large contactors which cannot be mounted on the test apparatus according to Figure AA.3 is under consideration.

[3)] ASTM: American Society for Testing and Materials.

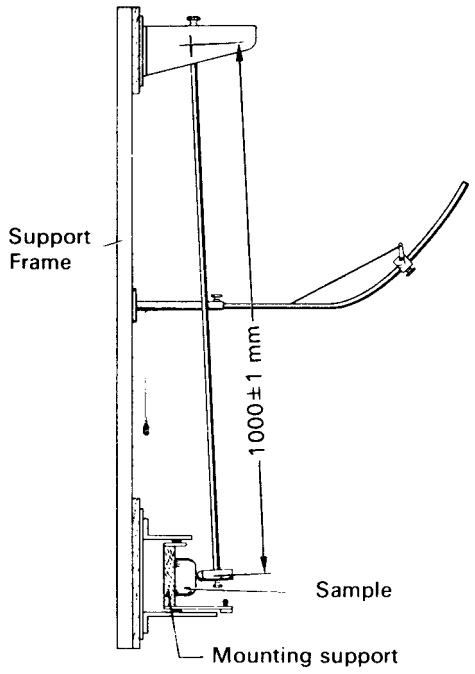


Figure AA.1 — Impact test apparatus

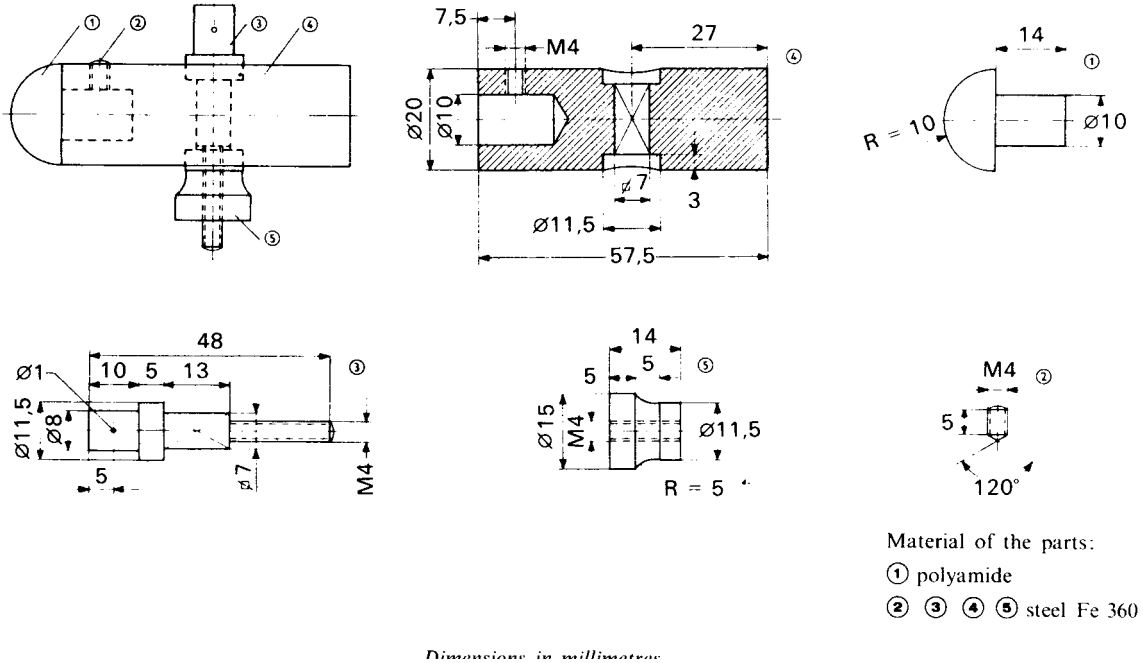
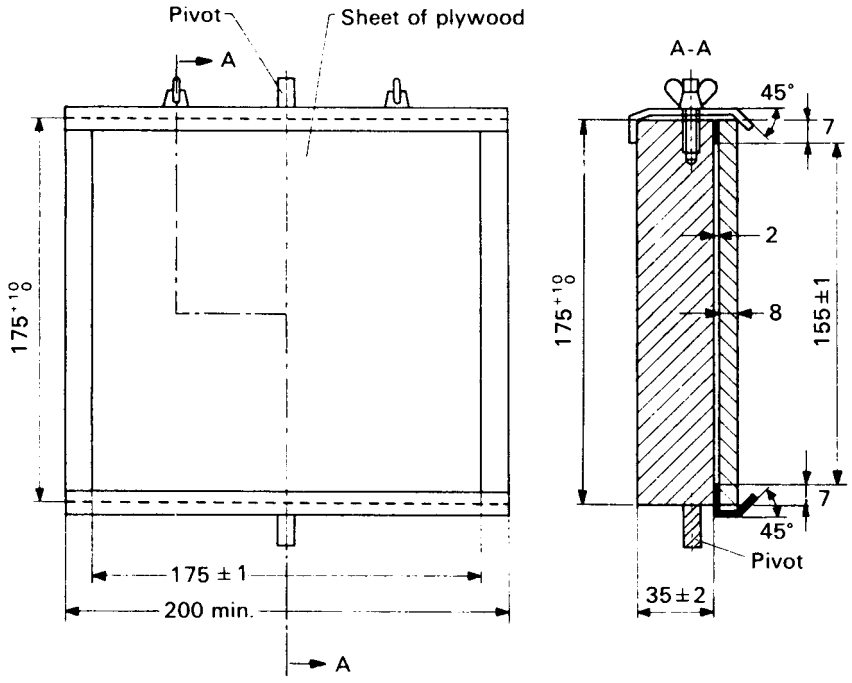
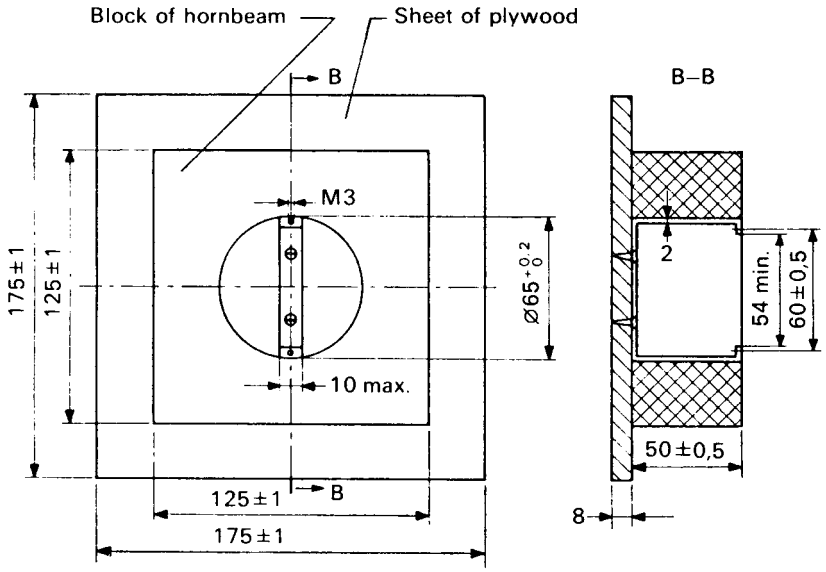


Figure AA.2 — Pendulum impact test apparatus (striking element)



Dimensions in millimetres

Figure AA.3 — Mounting support for sample



Dimensions in millimetres

The dimensions of the recess in the hornbeam block are given as an example. More general dimensions are under consideration.

Figure AA.4 — Mounting block for sample

Appendix BB Test series to be carried out and number of samples to be submitted for certification purposes

If one type of contactor only is submitted for certification purposes, the number of samples to be submitted to the different tests series is that indicated in Table BB.I.

This table gives also the number of failures permitted and the number of supplementary samples to be tested in case of failure.

The test will be carried out in the order of the sub-clauses.

Table BB.I — Test series for certification

Test series	Tests according to sub-clauses	Number of samples[a]	Number of failures permitted[a]	Number of samples for repeated tests[c]
A	**8.2.2** – **8.2.3** **8.2.4** – **8.2.101** **8.2.102**[d] – **8.2.103**	3	1[b]	3
B	**8.2.6** – **8.2.7** **8.2.104**	3	1	3

[a] For contactors having a rated current above 63 A, the tests of each test series are only carried out on one test sample and no failure shall occur during the tests.
[b] No failure is permitted for the test of Sub-clause **8.2.4**.
[c] In the case of repeated tests no further failure is permitted.
[d] Where applicable.

blank

Publications referred to

See national foreword.

BSI — British Standards Institution

BSI is the independent national body responsible for preparing British Standards. It presents the UK view on standards in Europe and at the international level. It is incorporated by Royal Charter.

Revisions

British Standards are updated by amendment or revision. Users of British Standards should make sure that they possess the latest amendments or editions.

It is the constant aim of BSI to improve the quality of our products and services. We would be grateful if anyone finding an inaccuracy or ambiguity while using this British Standard would inform the Secretary of the technical committee responsible, the identity of which can be found on the inside front cover. Tel: 020 8996 9000. Fax: 020 8996 7400.

BSI offers members an individual updating service called PLUS which ensures that subscribers automatically receive the latest editions of standards.

Buying standards

Orders for all BSI, international and foreign standards publications should be addressed to Customer Services. Tel: 020 8996 9001. Fax: 020 8996 7001.

In response to orders for international standards, it is BSI policy to supply the BSI implementation of those that have been published as British Standards, unless otherwise requested.

Information on standards

BSI provides a wide range of information on national, European and international standards through its Library and its Technical Help to Exporters Service. Various BSI electronic information services are also available which give details on all its products and services. Contact the Information Centre. Tel: 020 8996 7111. Fax: 020 8996 7048.

Subscribing members of BSI are kept up to date with standards developments and receive substantial discounts on the purchase price of standards. For details of these and other benefits contact Membership Administration. Tel: 020 8996 7002. Fax: 020 8996 7001.

Copyright

BSI
389 Chiswick High Road
London
W4 4AL