BS EN 50200:2015

BSI Standards Publication

Method of test for resistance to fire of unprotected small cables for use in emergency circuits

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National foreword

This British Standard is the UK implementation of EN 50200:2015. It supersedes BS EN 50200:2006 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee GEL/20/18, Electric Cables - Fire testing.

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

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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EN 50200

December 2015

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Supersedes EN 50200:2006

English Version

Method of test for resistance to fire of unprotected small cables for use in emergency circuits

Méthode d'essai de la résistance au feu des câbles de petites dimensions sans protection pour utilisation dans les circuits de secours

Prüfung des Isolationserhaltes im Brandfall von Kabeln mit kleinen Durchmessern für die Verwendung in Notstromkreisen bei ungeschützter Verlegung

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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European foreword

This document (EN 50200:2015) has been prepared by Working Group 10 of CLC/TC 20 “Electric cables”.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2016-09-14
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2018-09-14

This document supersedes EN 50200:2006.

The main changes compared to EN 50200:2006 are as follows (minor changes are not listed):

– detailed procedures for metallic data cables and for optical fibre cables have been removed as they are now given in the relevant standards of CLC/TC 46X and CLC/TC 86A. These standards refer to EN 50200 for the basic test method;

– recasting and extension of the existing Annex D into two new Annexes, Annex B “Field of direct application and extended application of test results (Electric power and control cables with rated voltage up to and including 600 V/1 000 V) and Annex D “Information regarding classification”.

The cable is tested in a representative installed condition, under conditions of minimum bending radius, and the test is based upon a constant temperature attack at a minimum test temperature of 830 °C. This is typical of the gas temperature reached after 30 min exposure to the time/temperature conditions prescribed in EN 1363-1.

The test method in this document includes exposure to fire with mechanical shock under specified conditions and satisfies the requirements of Mandate M/117 for the PH classification. This European Standard also includes (Annex E) a means of applying a water spray to the cable during the test, which is not required under Mandate M/117.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association.

1 Scope

This European Standard specifies the test method for cables designed to have intrinsic resistance to fire and intended for use as emergency circuits for alarm, lighting and communication purposes.

This European Standard is applicable to cables for emergency circuits of rated voltage not exceeding 600 V/1 000 V, including those of rated voltage below 80 V and optical fibre cables.

This European Standard includes details for the specific point of failure, continuity checking arrangement, test sample, test procedure and test report relevant to electric power and control cables with rated voltage up to and including 600 V/1 000 V. Details for the specific point of failure, continuity checking arrangement, test sample, test procedure and test report relevant to copper data and telecom cables and optical cables are given in the relevant standards of CLC/TC 46X and CLC/TC 86A.

The test method is limited to cables with an overall diameter not exceeding 20 mm.

The test method is based on the direct impingement of flame from a propane burner giving a constant temperature attack of a notional 842 °C. It is intended to be used for cables for emergency circuits suitable for alarm, emergency lighting and communication.

NOTE When the test method is used in support of EN 13501–3, it only applies to cables of less than 20 mm diameter, and, for metallic conductor cables, to those with conductor sizes up to and including 2,5 mm^2. For optical cables, only the less than 20 mm diameter limit applies.

This European Standard includes (Annex B) the field of direct application and rules for extended application of test results (EXAP). Details regarding classification using data from this test are given in EN 13501-3 [1)]. Information regarding classification is given in Annex D.

This European Standard also includes informative guidance (Annex E) on a means of applying a water spray to the cable during the test. Such a requirement may be a feature of particular product standards.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 13501-3, *Fire classification of construction products and building elements - Part 3: Classification using data from fire resistance tests on products and elements used in building service installations: fire resisting ducts and fire dampers*

EN 60584-1, *Thermocouples - Part 1: EMF specifications and tolerances (IEC 60584-1)*

EN 60695-4, *Fire hazard testing - Part 4: Terminology concerning fire tests for electrotechnical products (IEC 60695-4)*

EN ISO 13943, *Fire safety - Vocabulary (ISO 13943)*

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1) At the time of finalizing EN 50200, an amendment to EN 13501-3:2005+A1:2009 concerning cables is under consideration in CEN/TC 127.

EN 50200:2015

IEC 60269-3:2010 and IEC 60269–3:2010/A1:2013, *Low-voltage fuses – Part 3: Supplementary requirements for fuses for use by unskilled persons (fuses mainly for household and similar applications) - Examples of standardized systems of fuses A to F*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 13943 and EN 60695-4 and the following apply.

3.1
draught-free environment
space in which the results of tests are not significantly affected by the local air speed

4 Test environment

The test shall be carried out in a draught-free environment within a suitable chamber, of minimum volume 20 m^3, with facilities for disposing of any noxious gases resulting from the burning. Sufficient ventilation shall be available to sustain the flame for the duration of the test. Air inlets and the exhaust chimney should be located in such a way that the burner flame remains stable during the verification procedure and test. If necessary, the burner shall be shielded from any draughts by the use of draught shields. Windows may be installed in the walls of the chamber in order to observe the behaviour of the cable during the test. Fume exhaust should be achieved by means of natural draught through a chimney located at least 1 m from the burner. A damper may be used for adjustment of ventilation conditions.

The same ventilation and shielding conditions shall be used in the chamber during both the verification and cable test procedures.

The chamber and test apparatus shall be at (25 ± 15) °C at the start of each test.

NOTE The test given in this European Standard may involve the use of dangerous voltages and temperatures. Suitable precautions should be taken against shock, burning, fire and explosion risks that may be involved and against any noxious fumes that may be produced.

5 Test apparatus

5.1 Test equipment

The test equipment shall consist of the following:

a) a test wall, on to which the cable is mounted, comprising a board manufactured from heat resisting non-combustible material suitable for the temperatures involved fastened to steel supports and mounted on a rigid support as described in 5.2;

b) a continuity checking arrangement as described in 5.3;

c) a source of heat comprising a horizontally mounted ribbon burner as described in 5.4;

d) a shock producing device as described in 5.5;

e) a test wall equipped with thermocouples for verification of the source of heat as described in 6.1;

f) fuses as described in 5.7.

A general arrangement of the test equipment is shown in Figure 1, Figure 2 and Figure 3.

5.2 Test wall and mounting

The test wall shall consist of a board of heat resisting, non-combustible and non-metallic material fastened rigidly to two horizontal steel supports, one at the top of the board and the other at the bottom. Vertical supports may also be used. The board shall be (900 ± 100) mm long, (300 ± 50) mm high and (10 ± 2) mm thick, and the total mass of the wall (i.e. board and steel supports) shall be (10 ± 0,5) kg. Ballast, if required, shall be placed inside the steel supports.

Guidance on the choice of suitable material for the wall is given in Annex A.

Boards should not be re-used if they show significant damage. In case of dispute, a new board shall be used for each test.

NOTE 1 Supports made from square section steel tube approximately 25 mm x 25 mm and approximately 1 m long have been found to be suitable.

NOTE 2 The top support should be fastened to the board so that its upper face is slightly above the upper edge of the board, so that the shock producing device impacts on the support and not the board.

Each horizontal support shall have a mounting hole at each end, not more than 100 mm from the edge of the board, the exact position and diameter being determined by the particular supporting bush and supporting framework used. The test wall shall be fastened to a rigid support by four bonded rubber bushes of hardness 50-60 Shore A fitted between the horizontal steel supports of the wall and the support framework, as shown in Figure 1 and Figure 2, so as to allow movement under impact.

NOTE 3 A typical rubber bush which has been found to be suitable is shown in Figure 4.

In order to check the mounting of the wall, the static deflection following application of a load to the centre of the upper support of the wall shall periodically be measured.

The values of load and deflection shall comply with the following:

– load: (25 ± 0,2) kg;

– deflection: (1,5 ± 0,3) mm.

5.3 Continuity checking arrangement for electric power and control cables with rated voltage up to and including 600 V/1 000 V

During the test a current for continuity checking shall be passed through all conductors of the test sample. This shall be provided by a three phase star connected or single phase transformer(s) of sufficient capacity to maintain the test voltage up to the maximum leakage current allowable.

NOTE 1 Due note should be taken of the fuse characteristics when determining the power rating of the transformer.

This current is achieved by connecting, at the other end of the sample, a suitable load and indicating device (e.g. lamp) to each conductor, or group of conductors.

NOTE 2 A current of 0,25 A at the test voltage, through each conductor or group of conductors, has been found to be suitable.

5.4 Source of heat

5.4.1 Burner

The source of heat shall be a ribbon type propane gas burner with a nominal burner face length of 500 mm with a Venturi mixer. The nominal burner face width shall be 10 mm. The face of the burner shall have three staggered rows of drilled holes, nominally 1,32 mm in diameter and drilled at centres 3,2 mm from one another, as shown in Figure 5.

Guidance on the choice of recommended burner systems is given in Annex A.

NOTE 1 A centre-feed burner is recommended.

NOTE 2 A row of small holes milled on each side of the burner plate, to serve as pilot holes for keeping the flame burning, is permitted.

5.4.2 Flow meters and flow rates

Mass flow meters / controllers shall be used as the means of controlling accurately the input flow rates of fuel and air to the burner.

For the purposes of this test, the air shall have a dew point not higher than 0 °C.

The mass flow rates used for the test shall be as follows:

– propane: (160 ± 6) mg/s;

NOTE 1 This is approximately equivalent to a volume flow rate of (5,0 ± 0,2) l/min at reference conditions (1 bar and 20 °C).

– air: (1 600 ± 80) mg/s.

NOTE 2 This is approximately equivalent to a volume flow rate of (80 ± 4) l/min at reference conditions (1 bar and 20 °C).

5.4.3 Verification

The burner and control system shall be subject to verification following the procedure given in Clause 6.

5.5 Shock producing device

The shock producing device shall be a mild steel round bar (25 ± 0,1) mm in diameter and (600 ± 5) mm long. The bar shall be freely pivoted about an axis parallel to the test wall, which shall be in the same horizontal plane as, and (200 ± 5) mm away from, the upper edge of the wall. The axis shall divide the bar into two unequal lengths, the longer length being (400 ± 5) mm which shall impact the wall. The bar shall drop under its own weight from an angle of $(60\ ^{+5}_{0})°$ to the horizontal to strike the upper steel support of the wall at its midpoint as shown in Figure 1 and Figure 3.

5.6 Positioning of source of heat

The burner face shall be positioned in the test chamber such that it is at least 200 mm above the floor of the chamber or any solid mounting block, and at least 500 mm from any chamber wall.

By reference to the wall the burner shall be positioned centrally at a horizontal distance of (40 ± 2) mm from the burner face to the test wall as shown in Figure 2 and Figure 3.

NOTE The burner should be rigidly fixed to the framework during testing so as to prevent movement relative to the test sample.

5.7 Fuses

Fuses used in the test procedures in Clause 8 shall comply with IEC 60269-3 Fuse System A-D Type DII, 2A. Alternatively, a circuit breaker with equivalent characteristics may be used.

Where a circuit breaker is used, its equivalent characteristics shall be demonstrated by reference to the characteristic curve shown in Annex C.

The fuse shall be the reference method in the case of dispute.

6 Verification procedure for source of heat

6.1 Measuring equipment

The flame temperature shall be measured using two 1,5 mm mineral insulated, stainless steel sheathed thermocouples Type K to EN 60584-1, mounted on the test wall as shown in Figure 7. The thermocouple tips shall be (10 ± 0,5) mm in front of the test wall. The horizontal line of the thermocouples shall be (100 ± 10) mm above the bottom of the wall. The wall shall consist of a board of heat-resistant, non-combustible and non-metallic material (900 ± 100) mm long, (300 ± 50) mm high and (10 ± 2) mm thick.

6.2 Procedure

Position the burner (40 ± 2) mm horizontally from the wall and (65 ± 10) mm vertically below the centre line of the thermocouple as shown in Figure 3.

Ignite the burner and adjust the gas and air supplies to those given in 5.4.2.

Monitor the temperature as recorded by the thermocouples over a period of 10 min to ensure conditions are stable.

6.3 Evaluation

The verification procedure shall be considered satisfied if

a) the arithmetic mean of the averaged readings for each of the two thermocouples over the 10 min period falls within the requirement of $(830\ ^{+40}_{0})$ °C and

b) the difference of the averaged readings for each of the two thermocouples over the 10 min period does not exceed 40 °C.

At least one measurement shall be made on each thermocouple every 30 s in order to obtain the average.

NOTE The actual method of obtaining the average thermocouple reading over the period is not specified but it is recommended that a recorder with averaging facilities be used in order to damp the variability caused by point measurement.

6.4 Further verification

If the verification is not successful, the flow rates shall be altered within the tolerances given in 5.4.2 and/or distances altered within the tolerances given in 6.2 and a further verification carried out.

If no successful verification can be achieved within the tolerances given, then the burner system shall be considered as incapable of providing the source of heat required by this European Standard.

6.5 Verification report

The position established for successful verification and flow rates used shall be recorded (see 8.1).

7 Test sample (Electric power and control cables with rated voltage up to and including 600 V/1 000 V)

7.1 Sample preparation

The sample to be tested shall be a piece of cable not less than 1 200 mm long with approximately 100 mm of sheath and outer coverings removed at each end. At each end of the test sample, each conductor shall be suitably prepared for electrical connections, and, if there is more than one conductor, the exposed conductors shall be spread apart to avoid contact with each other.

7.2 Sample mounting

The test sample shall be bent to form an approximate 'U' shape. The internal radius of each bend shall be the manufacturer's declared minimum bending radius in normal use and the overall distance between the vertical portions of the cable shall be (475 ± 10) mm as shown in Figure 8.

The test sample shall be mounted centrally on the wall using copper P clips. The clips, which shall be earthed, shall support the cable at either end of the radiused section and in the centre as shown in Figure 8. The type of clips used shall be detailed in the Test Report.

By agreement between the user and manufacturer of the cable alternative clips may be used for the testing of multicore cable, but in this case the test shall only be considered valid for cable installed with such clips.

8 Cable test procedure (Electric power and control cables with rated voltage up to and including 600 V/1 000 V)

8.1 General

The test procedure shall be carried out using the apparatus detailed in Clause 5.

Position the burner (40 ± 2) mm horizontally from the wall, and at the same vertical distance below the bottom line of the cable as determined in the verification procedure for the distance between burner and thermocouple centre lines.

8.2 Electrical connections

At the transformer end of the sample, earth the neutral conductor, if present, and any protective conductor. Any metal screens, drain wire or metallic layer shall be interconnected and earthed. Connect the transformer(s) to the conductors, excluding any conductor which is specifically identified as intended for use as a neutral or a protective conductor, as shown in the circuit diagram (Figure 9).

Where a metallic sheath, armour or screen acts as a neutral or protective conductor, it shall be connected as shown in the circuit diagram (Figure 9) as for a neutral or protective conductor.

For single-, twin- or three-phase conductor cables, connect each phase conductor to a separate phase of the transformer(s) output with a 2 A fuse or circuit breaker with equivalent characteristics in each phase.

For multicore cables having four or more conductors (excluding any neutral or protective conductors), the conductors shall be divided into three roughly equal groups, ensuring that adjacent conductors are, as far as possible, in different groups.

For multipair cables the conductors shall be divided into two equal groups, ensuring that the a-core of each pair is connected to one phase and the b-core of each pair is connected to another phase (L1 and L2 of Figure 9). Quads shall be treated as 2 pairs.

For multitriple cables the conductors shall be divided into three equal groups, ensuring that the a-core of each triple is connected to one phase, the b-core of each triple to another phase and the c-core of each triple to the third phase of the transformer. (L1, L2 and L3 of Figure 9)

Connect the conductors of each group in series and connect each group to a separate phase of the transformer output with a 2 A fuse or circuit breaker with equivalent characteristics in each phase.

NOTE 1 The test procedure given in 8.2 connects the neutral core to earth. This may not be appropriate if the cable is designed for use on systems where the neutral is not earthed. If required by the cable standard, it is permissible for the neutral conductor to be tested as if a phase conductor. Where a metallic sheath, armour or screen acts as a neutral conductor, it shall always be connected to earth. Any such variations in methodology should be included in the test report.

NOTE 2 For cable constructions not specifically identified above, the test voltage should be applied, as far as is practicable, to ensure that adjacent conductors are connected to different phases.

At the end of the sample remote from the transformer:

– connect each phase conductor, or group of conductors, to one terminal of the load and indicating device (as described in 5.3), the other terminal being earthed,

– connect the neutral conductor and any protective conductor to one terminal of the load and indicating device (as described in 5.3), the other terminal being connected to L1 (or L2 or L3) at the transformer end (see Figure 9).

8.3 Flame and shock application

Ignite the burner and adjust the propane and air flow rates to those obtained during the verification procedure (see Clause 6).

Immediately after igniting the burner, activate the shock producing device and start the test duration timer. The shock producing device shall impact the wall after 5 min ± 10 s from activation and subsequently at 5 min ± 10 s intervals. After each impact, the impacting bar shall be raised from the test wall no more than 20 s after the impact.

8.4 Electrification

Immediately after starting the test duration timer, switch on the electricity supply and adjust the voltage to the rated voltage of the cable (subject to a minimum voltage of 100 V a.c.), i.e. the test voltage between conductors shall equal the rated voltage between conductors and the test voltage from conductor to earth shall equal the rated voltage from conductor to earth.

8.5 Duration of survival

The duration of survival, measured in minutes, to the point of failure shall be recorded for each cable tested up to a maximum survival time of 120 min.

8.6 Point of failure

The criteria for determining the point of failure shall be as follows:

1) the voltage is not maintained during the test duration, as indicated by fuse failure or by interruption of the circuit breaker;

2) a conductor ruptures during the test duration, as indicated by the lamp extinguishing.

Failure by either one of the criteria listed shall be sufficient to show a failure for that cable.

NOTE A particular cable standard may require an alternative survival time and/or measure of the point of failure. In such cases, no classification in accordance with the requirements of EN 13501–3 can be claimed.

9 Test report (Electric power and control cables with rated voltage up to and including 600 V/1 000 V)

The test report shall include the following information:

a) the number of this EN;

b) a full description of cable tested;

c) the manufacturer of cable tested;

d) the test voltage;

e) any options used in the test procedure (i.e. type of test wall, failure detection method);

f) the type and disposition of clips supporting cable sample;

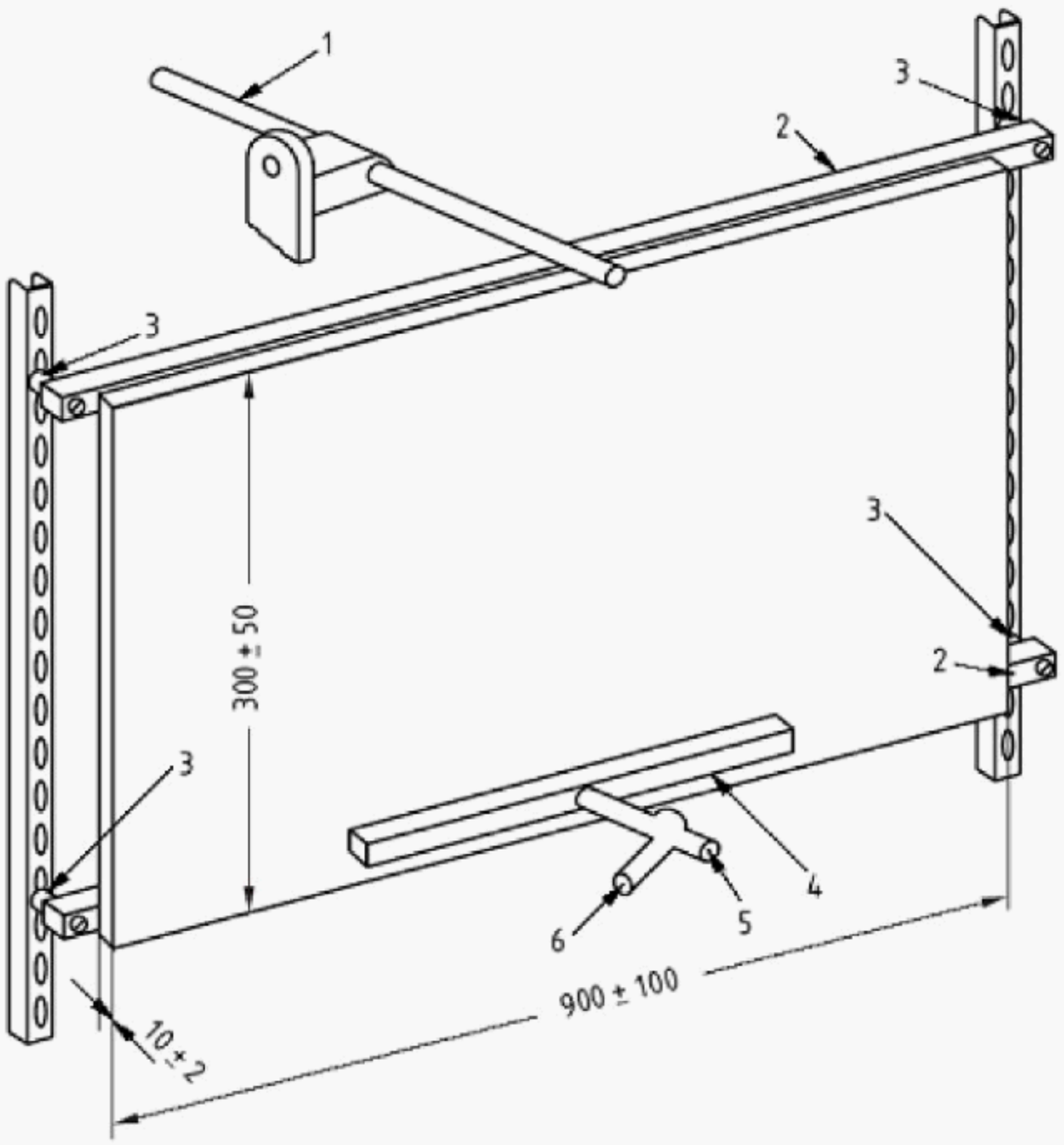
g) the actual cable bending radius used for the test;

h) the method used for temperature monitoring during the verification procedure;

i) the point of failure mechanism (i.e. voltage not maintained or conductor rupture);

j) the survival time achieved.

Dimensions in millimetres



Key

1	shock producing device	4	ribbon gas burner
2	steel support	5	air inlet pipe
3	rubber bush	6	propane inlet pipe

Figure 1 — Schematic of test configuration

Dimensions in millimetres
(Dimensions are approximate except where toleranced)

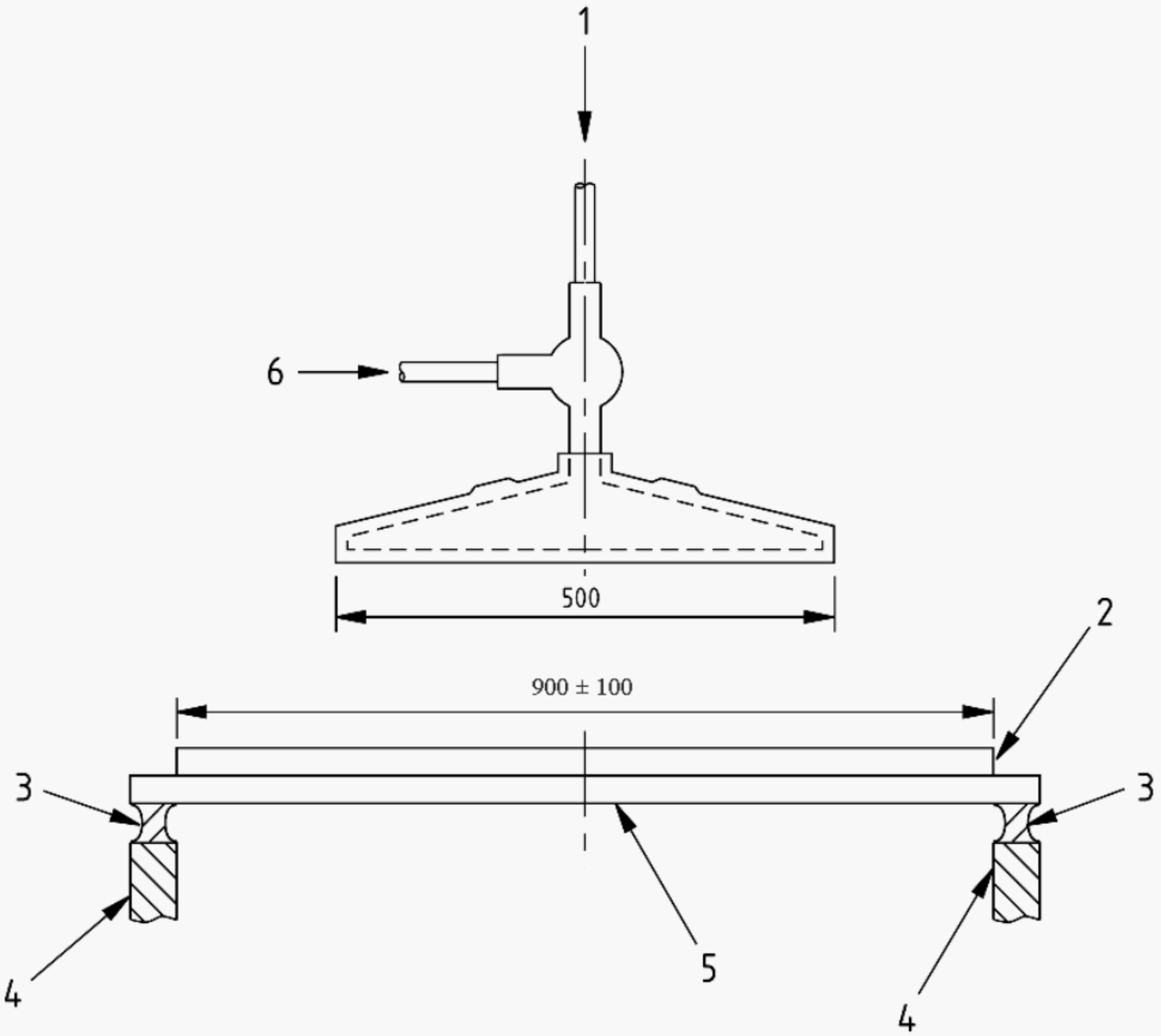


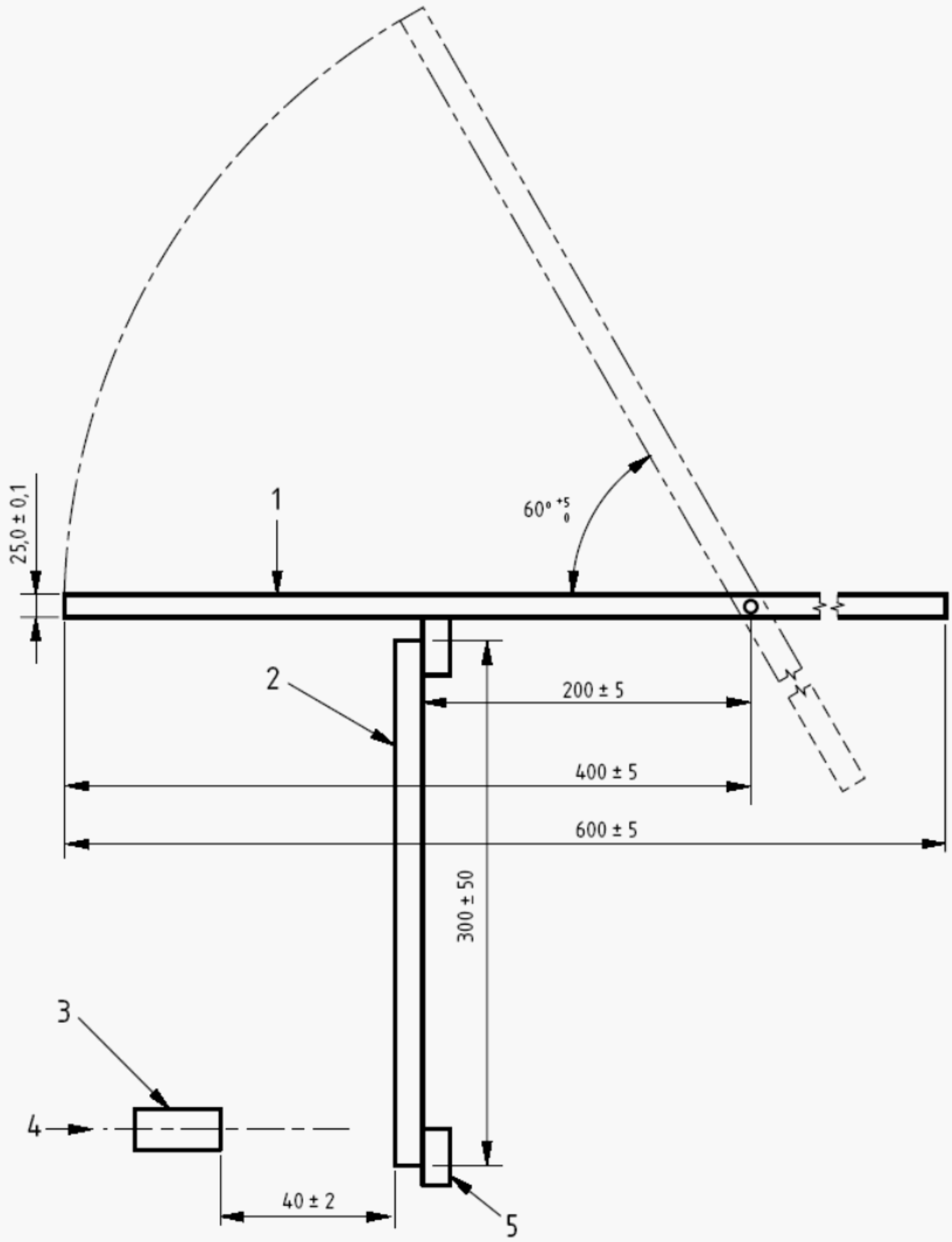
Figure 2 is purely representational and does not indicate nor imply relative sizes or dispositions of components of the test.

Key

1	entry for air	4	support framework
2	board	5	horizontal steel support for board
3	rubber bush	6	entry for propane gas

Figure 2 — Plan view of test equipment

Dimensions in millimetres



Key

1	shock producing device	4	centre line of burner face
2	test wall	5	support framework
3	gas burner		

Figure 3 — End elevation of test equipment (not to scale)

Dimensions in millimetres

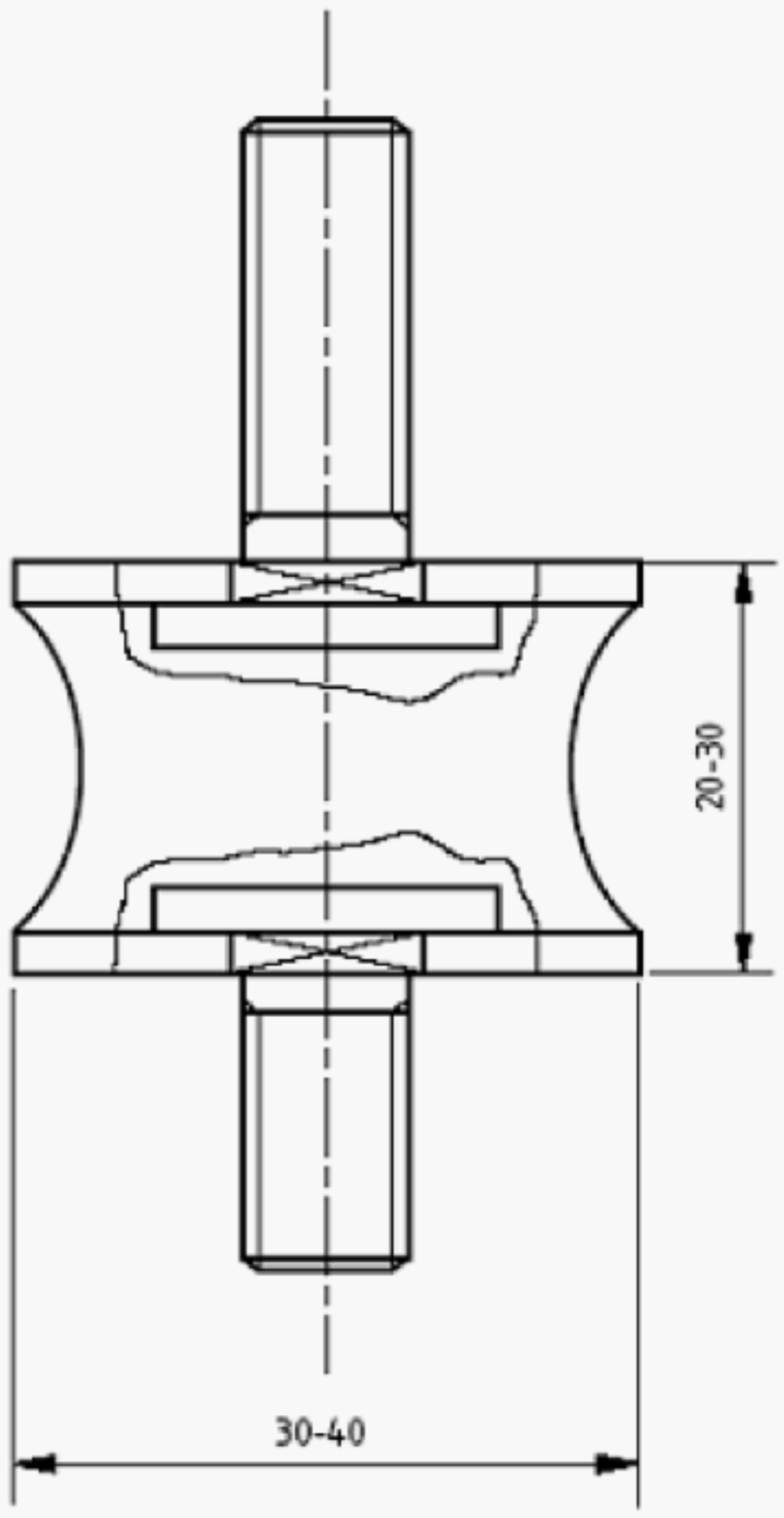
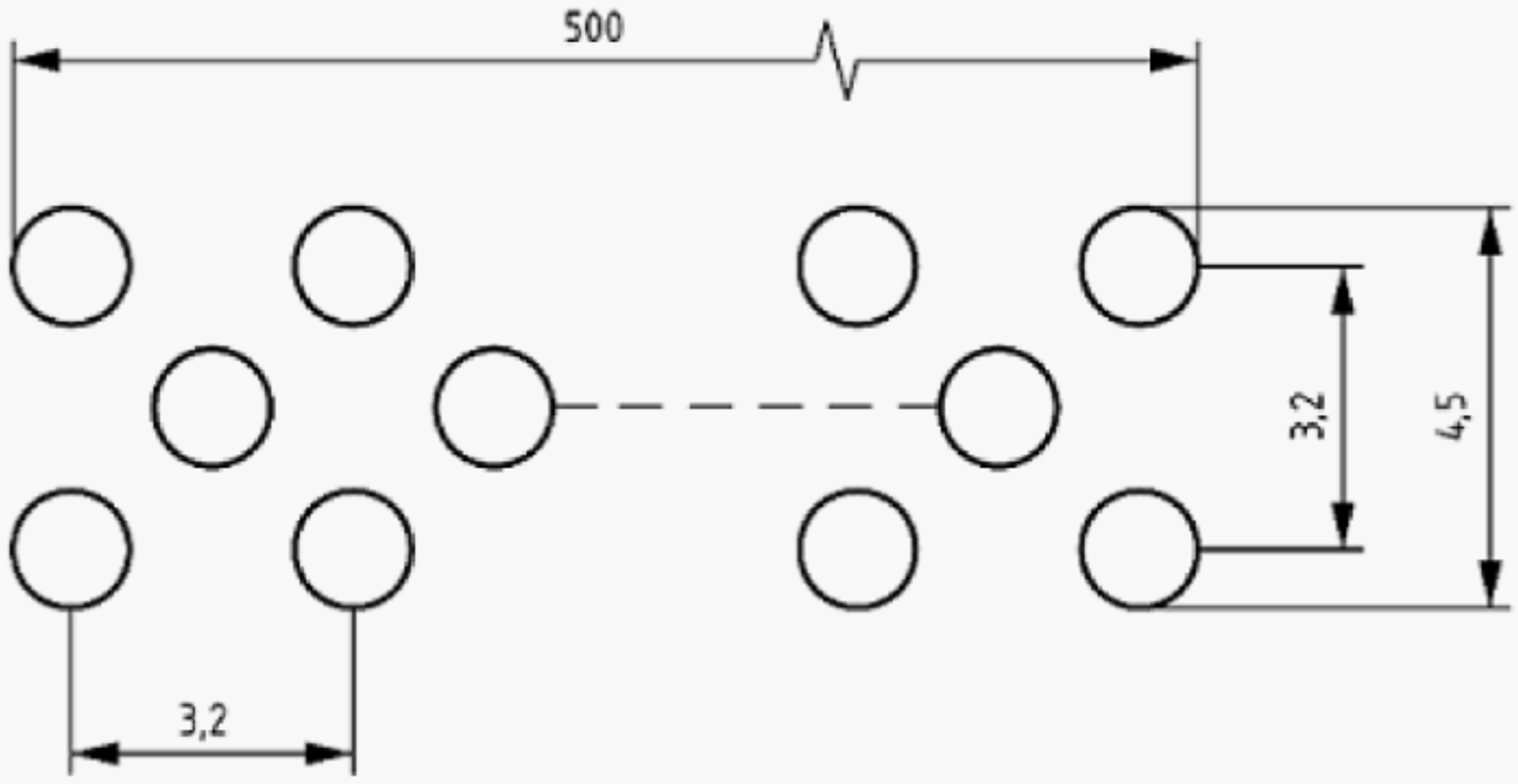


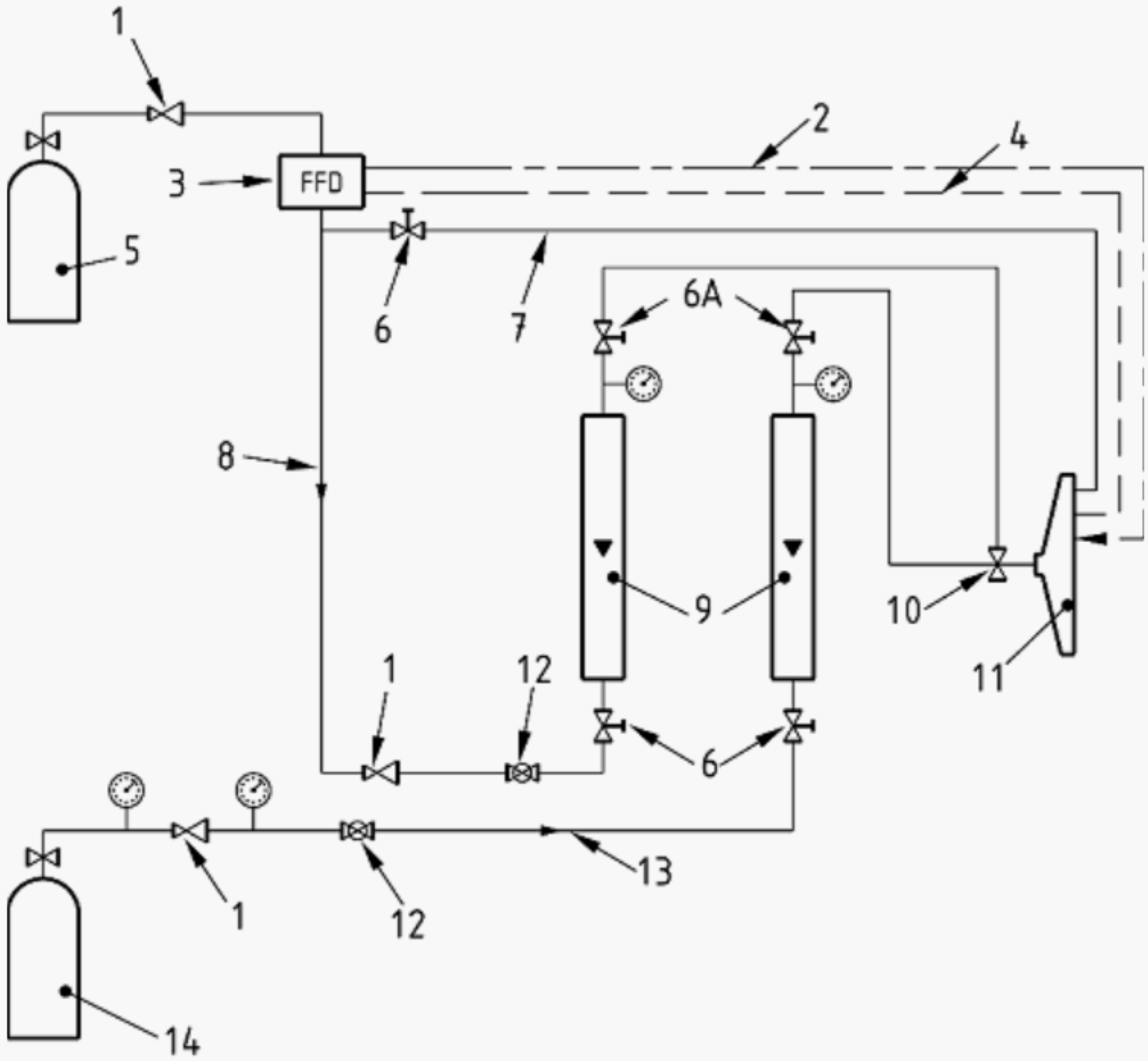
Figure 4 — Typical rubber bush (hardness: 50-60 shore A) for fastening the wall to the rigid supports

Dimensions in millimetres
Dimensions are approximate



Round holes, 1,32 mm diameter, on centres 3,2 mm from one another, staggered in three rows and centred on face of the burner

Figure 5 — Burner face

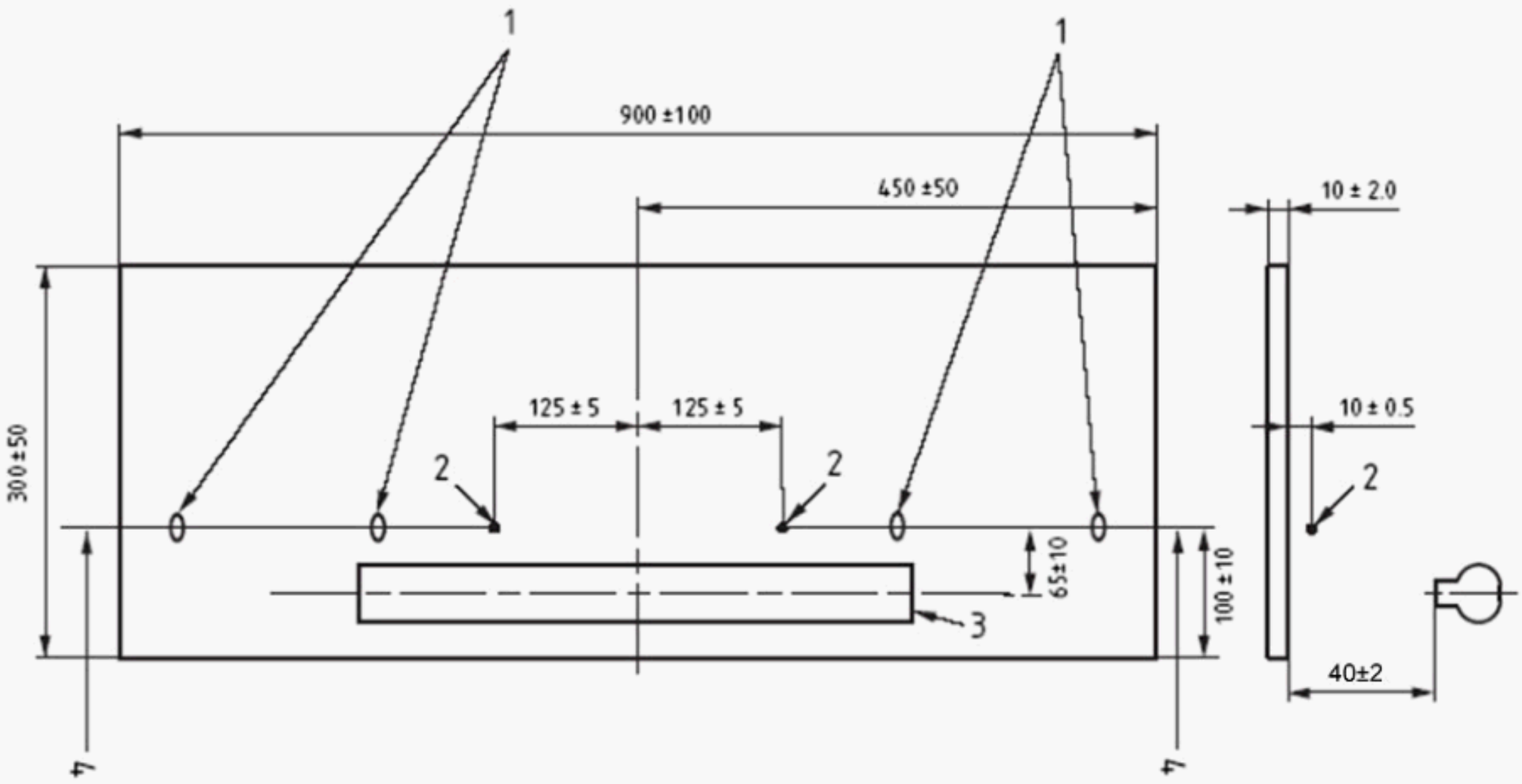


Key

1	regulator	8	gas flow
2	piezoelectric igniter	9	mass flow meters
3	flame failure device	10	Venturi mixer
4	control thermocouples	11	burner
5	propane cylinder	12	ball valve
6	screw valve (6A = alternative position)	13	air flow
7	pilot feed	14	compressed air cylinder

Figure 6 — Schematic diagram of an example of a burner control system

Dimensions in millimetres

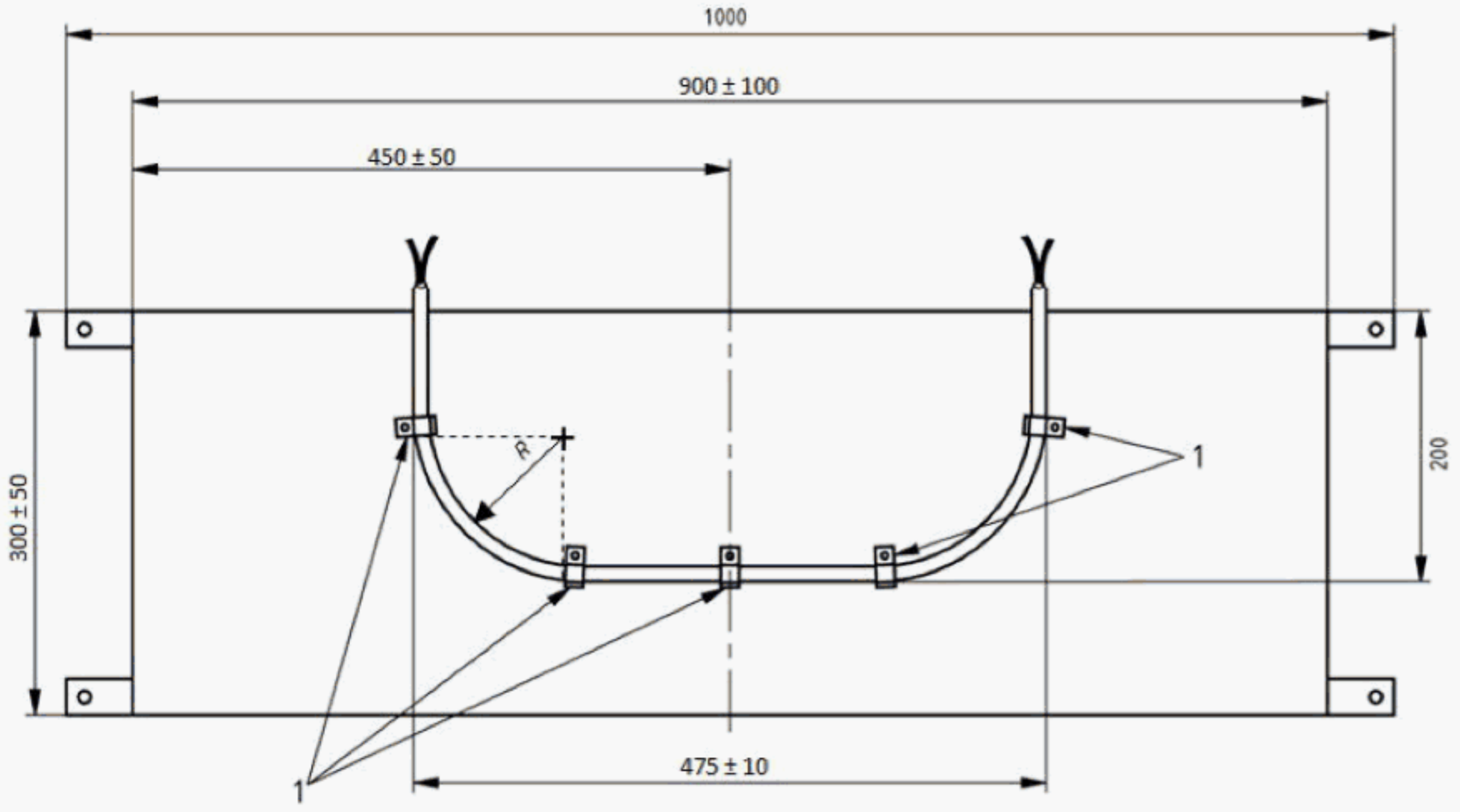


Key

1	thermocouple supports	3	burner
2	thermocouple tip	4	1,5 mm type K sheathed thermocouples

Figure 7 — Temperature measuring arrangement

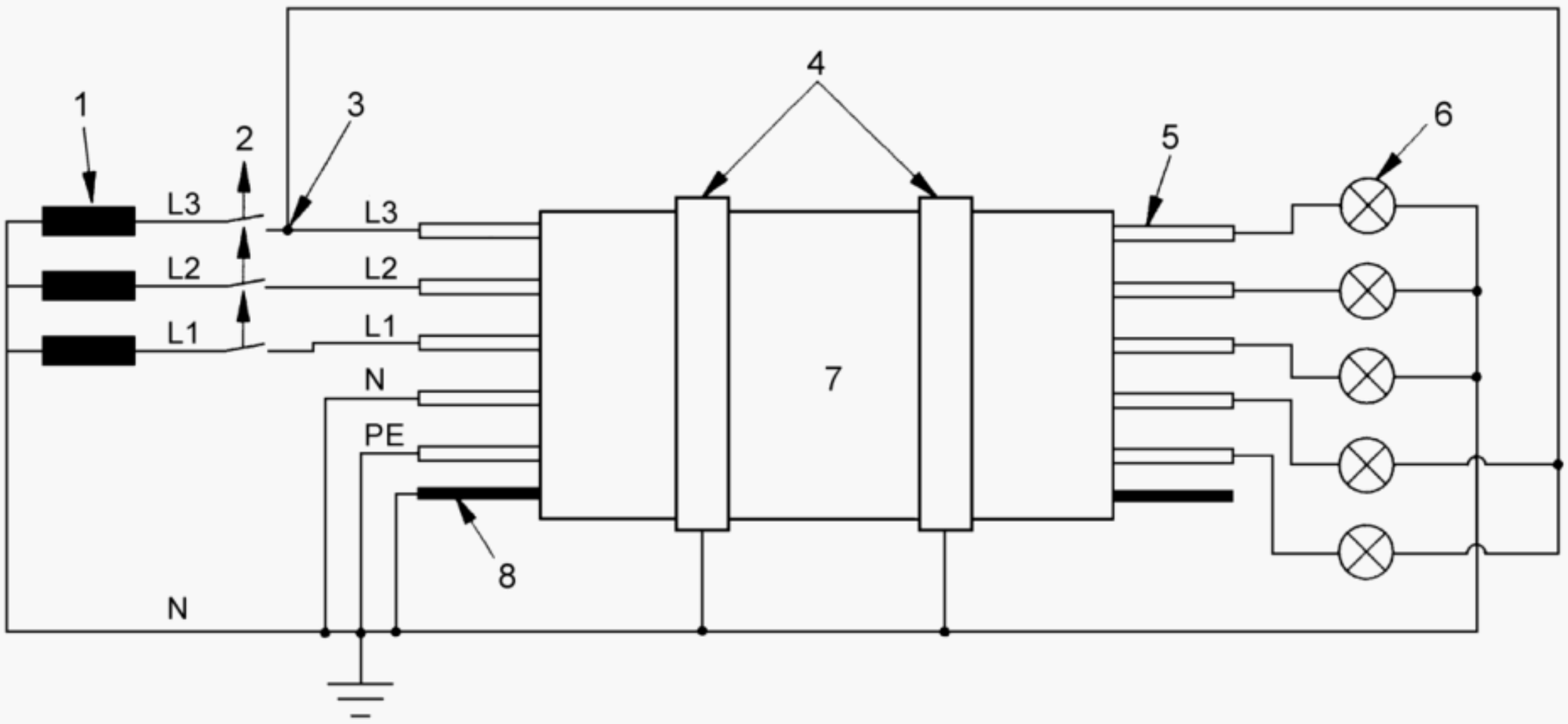
Dimensions in millimetres
Dimensions are approximate except where toleranced



Key

1	copper clips	*R*	minimum bending radius in normal use

Figure 8 — Example of method of mounting a sample for test



Key

L1, L2, L3	phase conductors (L2, L3 if present)
N	neutral conductor (if present)
PE	protective earth (if present)

1	transformer	5	test conductor or group
2	fuse (2 A)	6	load and indicating device (e.g. lamp)
3	connection to phase L1 (or L2 or L3)	7	sample
4	copper clips	8	metal screen (if present)

Figure 9 — Basic circuit diagram —
Electric power and control cables with rated voltage up to and including 600 V/1 000 V

Annex A
(informative)

Guidance on the choice of recommended test equipment

NOTE The information given in Annex A, covering named products and their suppliers, is given for the convenience of users of this European Standard and does not constitute an endorsement by CLC/TC 20 of the product named. Equivalent products may be used if they can be shown to lead to the same results.

A.1 Burner and Venturi

A commercially available burner face meeting the requirements of this European Standard is the AGF burner insert 11-55, and a suitable 500 mm burner including the specified burner face is the AGF reference 1857B.

A recommended Venturi mixer is the AGF 14-18.

www.agfburner.com

A.2 Test wall material

Examples of materials which have been found to be suitable for the wall are:

i) Sindanyo H61 - Tenmat Limited, UK;

ii) Isoplan 1100 - Frenzelit-Werke, Germany;

iii) Skamolex V-1100 Mk.2 - Skamol, Denmark;

iv) Monolux 500 - Elit, France.

A.3 Rubber bushing

Commercially available bushings which have been found to be suitable for mounting the wall include:

i) Autogem rubber bushing Type SM1 (UK);

ii) Paulstra “Radiaflex R diabolo” Type Ref 521403 (France);

iii) Vibro Stop TA 431 (Germany).

Annex B
(normative)

Field of direct application and extended application of test results (Electric power and control cables with rated voltage up to and including 600 V/1 000 V)

B.1 Definitions

For the purposes of Annex B, the following terms and definitions apply.

B.1.1
direct field of application
outcome of a process (involving the application of defined rules) whereby a test result is deemed to be equally valid for variations in one or more of the product properties and/or intended end use applications

B.1.2
classification
process defined in EN 13501, whereby the fire performance parameters obtained from the results of one test, or a set of tests, or from a process of extended application, are compared with limiting values for those parameters that are set as criteria for achieving a certain classification

[SOURCE: EN 15725:2010, 3.1, modified – The note is deleted]

Note 1 to entry: The relevant classes and related criteria are specified in the following Commission Decisions: EC Commission Decision 2000/367/EC (O.J. L133 of 6.6.2000).

B.1.3
product (cable) family
range of cables within defined limits of constructional design (as defined by this Annex B)

B.1.4
extended application of test results
EXAP
outcome of a process (involving the application of defined rules that may incorporate calculation procedures) that attributes, for a cable family, a test result on the basis of one or more test results to the same test standard

B.2 Field of direct application

B.2.1 Orientation

Cables with PH-classification according to EN 13501-3 and tested in accordance with EN 50200 are suitable for both horizontal and vertical installation.

B.2.2 Bending radius

The bending radius of the cable in normal use shall not be smaller than the minimum bending radius tested.

B.3 Extended Application of test results (EXAP)

B.3.1 General

Clause B.3 gives guidance on the procedure and rules for extended application using test results obtained from EN 50200 in order to evaluate and classify the resistance to fire performance of electric power and control cables.

B.3.2 Product families for EXAP

An EXAP is only possible when cables belong to a defined family.

For the application of these EXAP rules and procedure, a cable family shall be defined as follows:

A family of cables is a specific range of products of the same general construction (design elements) and varying only in conductor size and number of cores.

A change to the construction (rigid or flexible) or form (circular or shaped) of the conductor shall constitute a different family. EN 60228 class 1 and class 2 conductors are rigid conductors, EN 60228 class 5 and class 6 conductors are flexible conductors.

An armour or concentric layer shall not be considered solely as a conductor in determining a product family. An armoured or a concentric construction shall be considered as a different family to a construction without such armour or concentric layer. An armour and a concentric conductor are different design elements.

The cable family shall be produced by the same manufacturer using the same materials and the same design rules (for instance International standard, National standard, Company standard based on National or International standard).

The full constructional and material details for the family shall be submitted to the certification body prior to the EXAP being applied.

B.3.3 EXAP procedure

The following procedure shall be followed:

1) choose the specific family of cables for which classification is required;

NOTE 1 When the test method is used in support of EN 13501–3 it only applies to cables of less than 20 mm diameter, and, for metallic conductor cables, to those with conductor sizes up to and including 2,5 mm^2. For optical cables, only the less than 20 mm diameter limit applies.

2) demonstrate that the family complies with the definition of a product family given in the EXAP rules;

3) determine the smallest and largest conductor size of the family of cables;

4) carry out the test according to EN 50200 on cables selected as follows:

   a) power cables – single core:

      - select the smallest conductor size in the family;

   b) power and control cables – multicore:

      - select the cable with the largest number of cores and the smallest conductor size in the family, and
      - select the cable with the smallest number of cores and the largest conductor size in the family;

   c) control cables – multipair and multitriple:

      - select the cable as in b) above, except that a test on a screened cable covers unscreened types but not vice versa and a test on a multitriple covers multipairs but not vice versa;

NOTE 2 Extensive tests to this European Standard have shown that within the same cable family the survival time of cables with a larger conductor size is longer.

5) the duration of survival, measured in minutes, to the point of failure shall be recorded for each test specimen up to a maximum survival time of 120 min;

6) the worst result (shortest duration of survival time) shall be used for the classification of the cable family;

7) the classification shall be determined by reference to the classification standard for cables EN 13501-3;

8) the classification determined applies to the whole cable family.

Annex C
(normative)

Fuse characteristic curve

NOTE Figure C.1 is taken from IEC 60269–3:2010/A1:2013, Figure 101 ‘Time-current zones for “gG” fuse-links’. Where a circuit breaker is used instead of a 2 A fuse, the requirement that it shall have equivalent characteristics to the fuse should be interpreted by reference to the zone for 2 A as delineated by the pair of curves closest to the y-axis and between which the number “2” appears.

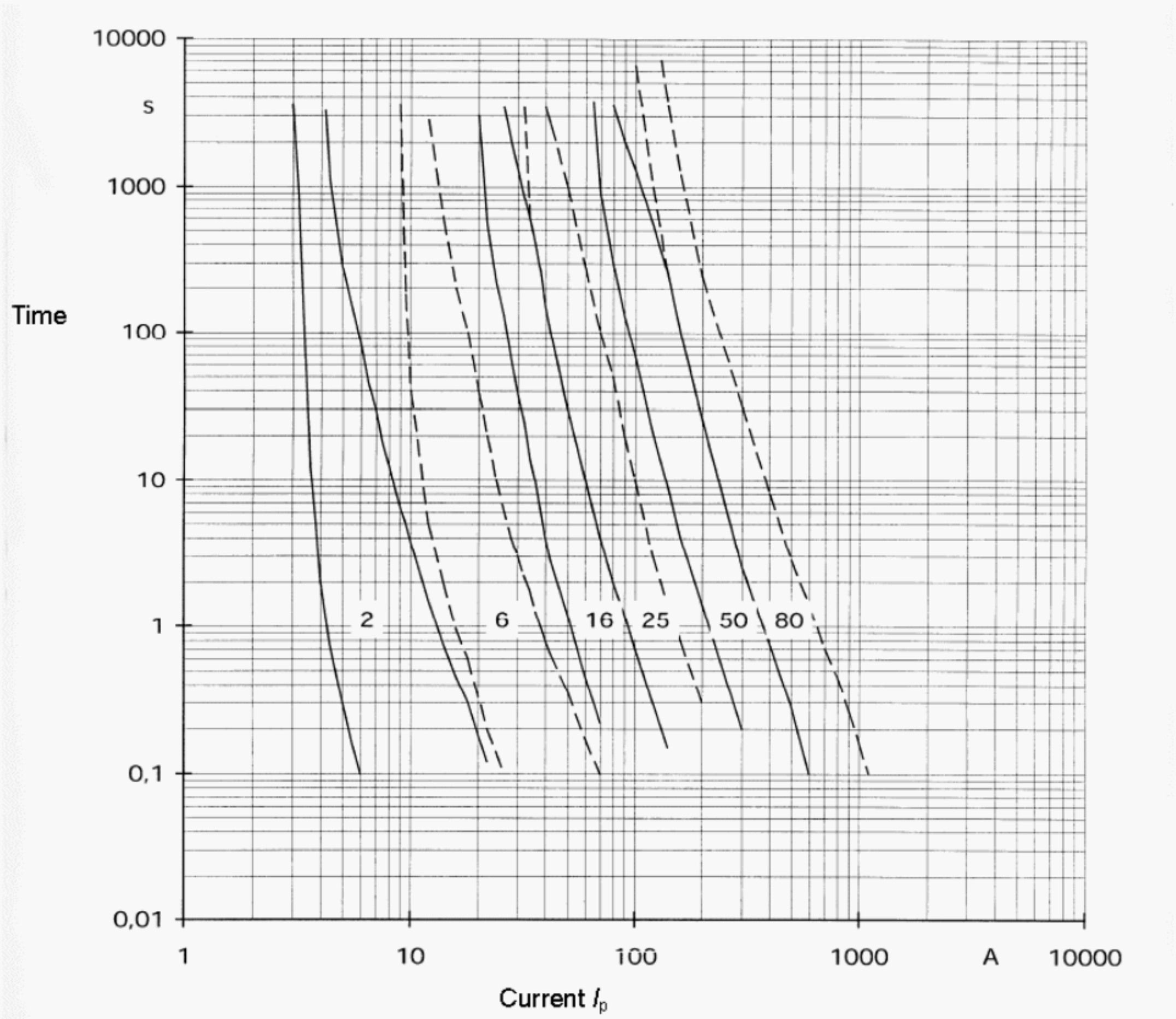


Figure C.1 — Fuse characteristic curve

Annex D
(informative)

Information regarding classification

D.1 General

The purpose of Annex D is to provide information as to the derivation of the fire resistance classification (PH) for continuity of power supply or signal from test data. The classification shall be determined by reference to EN 13501-3.

D.2 Functional requirement (PH) and Interpretation

The classification is based on the ability of electrical cables or optical cables to maintain a reliable form of power supply or signal from the source to the safety installation(s) when exposed to fire.

The performance criterion is continuity of power and/or signal supply.

The PH classification refers to a constant temperature attack of a notional 842 °C.

D.3 Classification

The following classes are defined in the EC Commission Decision 2000/367/EC.

Classification: PH 15, 30, 60, 90, 120.

In accordance with the requirements of EN 13501-3, the number of tests on each cable sample for classification is two. The measured duration of survival of both tests shall be equal to or exceed the stated classification (i.e. 15 min, 30 min, 60 min, 90 min or 120 min).

Annex E
(informative)

Guidance for using optional water spray protocol

E.1 General

A requirement to withstand a water spray when assessing resistance to fire may be a feature of national standards or codes of practice or particular product standards.

Where the water spray requirement is needed, the requirements given in Clause 4 to Clause 9 of this European Standard shall apply with the modifications in Clause E.2.

E.2 Modifications for optional water spray protocol

Subclause 5.1 *Add the following list item:*

g) a water spray device as described in 5.8.

Add new **Subclause 5.8**

The water spray bar shall consist of a metallic tube (copper or stainless steel) of nominal thickness 1,00 mm and overall diameter (15,5 ± 1,0) mm, closed at one end and open at the other to allow the inflow of water. The inflow of water shall be maintained at an approximately constant water pressure.

The tube shall have one row of 17 holes of nominal 0,85 mm diameter drilled on 30 mm centres as shown in Figure E.1.

The bar shall be positioned centrally with respect to the test sample as shown in Figure E.2.

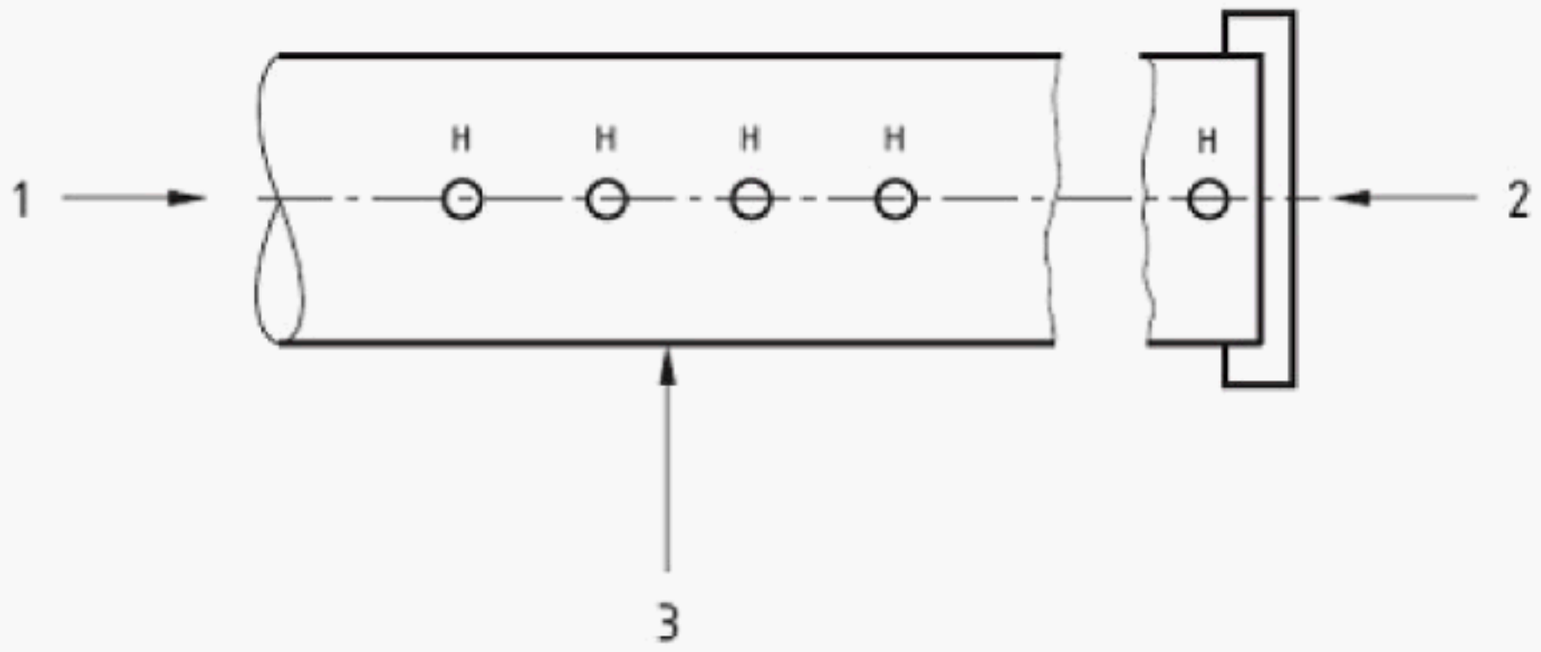
The output of water from the bar shall be at a flow rate of (0,80 ± 0,05) l/min. This shall be verified by volumetric measurement.

The tube shall be capable of adjustment such that the resulting water spray is centralised around the burned portion of the test sample.

The use of a metal plate device over the burner to avoid ingress of water is permitted. If a plate is used, the verification shall be carried out with the metal plate in place.

NOTE 1 A steel plate of suitable thickness extending horizontally 12 mm from the burner face and fixed 12 mm vertically above the centre line of the burner has been found to be satisfactory.

NOTE 2 If the metal plate device is not used the flame is likely to be extinguished. In such cases, the gas supply should be turned off and a new test carried out.

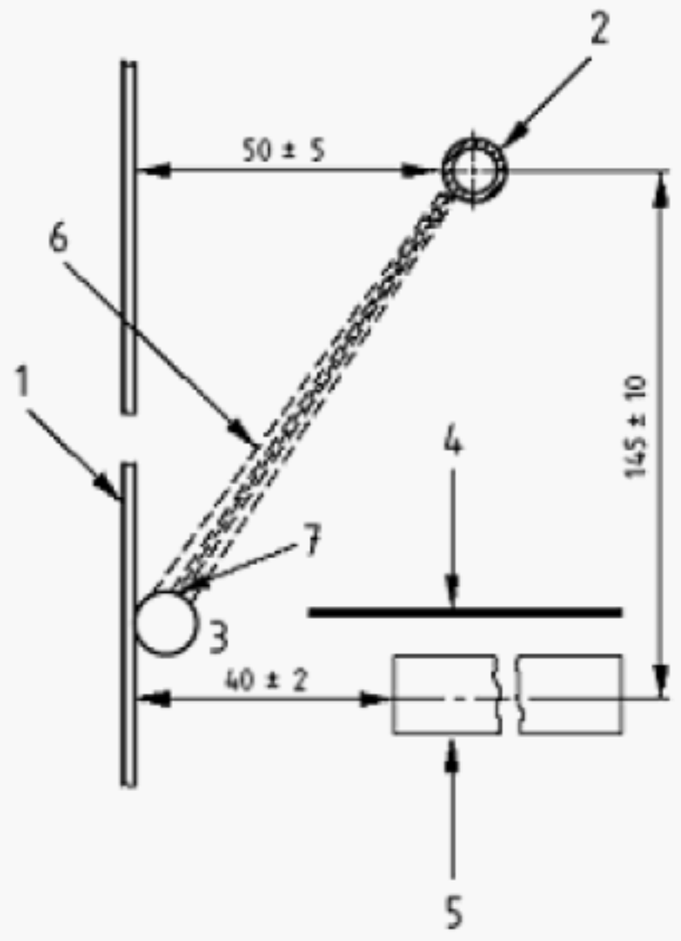


Key

1	inflow of water	3	metallic tube – Diameter = (15,5 ± 1,0) mm
2	closed end	H	17 holes at nominal 30 mm centres

Figure E.1 — Water spray tube

Dimensions in millimetres



Key

1	test wall	5	burner
2	water spray tube	6	spray directed at sample
3	test sample	7	centre point of spray
4	metal plate (see NOTE 1 in Clause E.2)		

Figure E.2 — Water spray application

EN 50200:2015

Subclause 8.3 *Replace the existing text by the following:*

Ignite the burner and adjust the propane and air flow rates to those obtained during the verification procedure (see Clause 6).

Immediately after igniting the burner, switch on the electricity supply as indicated in 8.4, activate the shock producing device and start the test duration timer. The shock producing device shall impact the wall after 5 min ± 10 s from activation and subsequently at 5 min ± 10 s intervals.

After 15 min and with the flame and shock still being applied, the water spray shall be started. The application of water shall continue until the end-point of the test.

Subclause 8.5 *Replace the existing text by the following:*

The duration of survival, measured in minutes, to the point of failure shall be recorded for each cable tested up to a maximum survival time of 30 min, with the water spray being applied for the last 15 min of the test.

Clause 9 *Replace the existing list item j) by the following list items j) and k):*

j) the application of water spray (if applied);

k) the survival time achieved in accordance with this Annex E.

Bibliography

EN 1363-1, *Fire resistance tests - Part 1: General Requirements*

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