BS EN 50577:2015

BSI Standards Publication

Electric cables — Fire resistance test for unprotected electric cables (P classification)

bsi.

...making excellence a habit.™

National foreword

This British Standard is the UK implementation of EN 50577:2015.

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.

ISBN 978 0 580 78382 1

ICS 13.220.50; 29.060.20

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 December 2015.

Amendments issued since publication

Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 50577

December 2015

ICS 13.220.50; 29.060.20

English Version

Electric cables - Fire resistance test for unprotected electric cables (P classification)

Câbles électriques - Essai de résistance au feu des câbles électriques non protégés (Classification P)

Kabel und Leitungen - Feuerwiderstandsprüfung an ungeschützten Kabeln und Leitungen (P-Klassifikation)

This European Standard was approved by CENELEC on 2015-11-02. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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

Contents

Figures

European foreword

This document (EN 50577:2015) has been prepared by CLC/TC 20 "Electric cables".

The following dates are fixed:

• latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2016-11-02
• latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	2018-11-02

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.

The cables are tested in a standardized representative installation, under conditions of minimum bending radius and subject to exposure to fire under conditions of the EN 1363-1 standard time/temperature curve which satisfies the requirements of Mandate M/117 for the P classification.

NOTE The test method in EN 50200 includes exposure to fire under specified conditions of constant temperature attack and satisfies the requirements of Mandate M/117 for the PH classification.

Introduction

The purpose of this test is to evaluate the ability of an electric cable to maintain electrical circuit integrity during a defined time whilst exposed to fire under conditions of the EN 1363-1 standard time/temperature curve and when installed in a standardized representative condition.

The fire exposure conditions and general arrangement in this European Standard are similar to those given in prEN 1366-11 [1], developed by CEN/TC 127, and a future document on Cable management systems (CMS) for fire resistant installations, to be developed by CLC/TC 213 [2]. Each of these standards has been developed under a Mode 4 co-operation between CEN/TC 127, CLC/TC 213 and CLC/TC 20.

The test installation has been designed such that vertical and horizontal furnaces can be used to carry out the test.

The standardized representative condition can be arranged in the following configurations:

a) a “U” or “S” in the horizontal furnace;

b) a “U” and “S” in the horizontal furnace and

c) a “U” in the vertical furnace.

Caution — The attention of all persons concerned with managing and carrying out this fire resistance test is drawn to the fact that fire testing may be hazardous and that there is a possibility that toxic and/or harmful smoke and gases may be evolved during the test. Mechanical, electrical and operational hazards may also arise during the construction of the test elements or structures, their testing and the disposal of test residues.

An assessment of all potential hazards and risks to health should be made and safety precautions should be identified and provided. Written safety instructions should be issued. Appropriate training should be given to relevant personnel. Laboratory personnel should ensure that they follow written safety instructions at all times.

1 Scope

This European Standard specifies a test method to evaluate the maintenance of circuit integrity of electric cables which have intrinsic resistance to fire under fire conditions, in order to classify the electric cable according to EN 13501-3.

The test determines the survival time for circuit integrity of the electric cable when exposed to fire under the conditions of the EN 1363-1 standard time/temperature curve.

This European Standard is used in conjunction with EN 1363-1.

This European Standard applies to electric power and control cables with rated voltage up to and including 600/1 000 V.

The cable is tested in a standardized representative installation condition.

The test does not assess the performance of the cable management system.

NOTE Optical fibre cables and copper communication cables could be tested using this test method, however verification procedures for such cables were still under development when this document has been circulated for vote (2015-07-24).

This European Standard includes field of direct application (Annex A) and rules for extended application of test results (EXAP) (Annex B).

The selection of cables to be tested for classification of a family is given in Annex B. In case the selection of the cables does not comply with Annex B, the test results are only applicable to the tested cables.

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 1363-1, *Fire resistance tests — Part 1: General requirements*

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*[1)]

EN 50200, *Method of test for resistance to fire of unprotected small cables for use in emergency circuits*

EN 61537, *Cable management — Cable tray systems and cable ladder systems (IEC 61537)*

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

1) EN 13501-3 will be amended to include cables

IEC 60269-3, *Low voltage fuses — Part 3: Supplementary requirements for fuses for use by unskilled persons (fuses mainly for household or 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 1363-1 and EN ISO 13943 and the following apply.

3.1
circuit integrity
ability of an electric cable to continue to operate in a designated manner whilst subjected to a specific source of heat for a specified period of time under specified conditions

3.2
standardized representative installation
cable management system based on perforated trays and perforated suspension supports

3.3
cable with intrinsic fire resistance
electric cable designed to continue to operate in a designated manner whilst subjected to a specific source of heat for a specified period of time under specified conditions

3.4
rated voltage
reference voltage for which the cable is designed

4 Test equipment

4.1 Test furnace

The test furnace shall be capable of subjecting the electric cable when installed to the standard heating and pressure conditions specified in EN 1363-1.

The internal dimensions of the test furnace shall be able to accommodate the standardized representative installation as specified in 4.4.

NOTE 1 Furnaces of the following minimum internal dimensions have been found to be suitable:

— 3 m long;

— 1,5 m deep;

— 2,5 m high.

It is acceptable to extend the vertical furnace to achieve the above minimum internal dimensions that have been found to be suitable.

NOTE 2 The typical dimensions of a horizontal furnace is 4 m (length) x 3 m (width) x 2,5 m (height) and of a vertical furnace, including any necessary extensions, 3 m (length) x 1,5 m (depth) x 2,5 m (height)

The centreline of burners shall be at least 500 mm away from the closest portion of the standardized representative installation.

4.2 Continuity and voltage withstand checking arrangement (See Figure 15)

The arrangement for checking continuity and voltage withstand shall comprise a three-phase star-connected or single-phase transformer(s).

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.

Consideration should be taken of the fuse characteristics when determining the power rating of the transformer.

The current shall be achieved by connecting one end of the sample to the transformer and the other end of the sample to a suitable load and an indicating device (e.g. lamp) to each conductor, or group of conductors.

NOTE 1 A current of approximately 0,25 A at the test voltage through each conductor or group of conductors is suitable at the beginning of the test.

NOTE 2 The voltage applied during the test is the rated voltage of the cable (subject to a minimum a.c. voltage of 100 V).

4.3 Fuse

Fuses used in the test procedure in 7.3 shall be 2 A Type DII complying with IEC 60269-3. 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 the relevant annex of EN 50200.

4.4 Standardized representative installation

4.4.1 General

The cables to be tested shall be installed in the standardized representative installation described in the following subclauses. The standardized representative installation shall be assembled and installed according to the manufacturer's instructions.

4.4.2 System components

The system components used shall comply with EN 61537 and shall be based on the following:

4.4.2.1 Cable tray

Material:	galvanized steel
Thickness:	(1,5 ± 0,15) mm
Perforation in base:	(15 ± 5) %
Width:	(400 ± 20) mm
Side wall height:	(60 ± 5) mm
Safe working load (SWL):	200 N/m

4.4.2.2 Suspensions and horizontal supports (U-shaped and perforated)

Material:	galvanized steel
Cross section:	(220 ± 10) mm^2
Safe working load:	10 kN (Tensile Strength)

4.4.2.3 90-degree fittings

Material: galvanized steel

The 90-degree fittings shall be taken from the same system as the cable tray.

The 90-degree fittings taken from the same system as the perforated cable tray can be perforated or non-perforated. In case of non perforated fittings, holes should be drilled for attaching the steel chains.

4.4.2.4 Right-angled brackets

Material: steel

The right-angled brackets shall be attached to the side walls of the cable tray, outside the furnace, in order to prevent any excessive movement inwards.

4.4.3 Loading

Steel chains shall be used of the following specification to ensure that the load on the standardized installation system is uniformly distributed to the maximum working load:

Material: uncoated mild steel

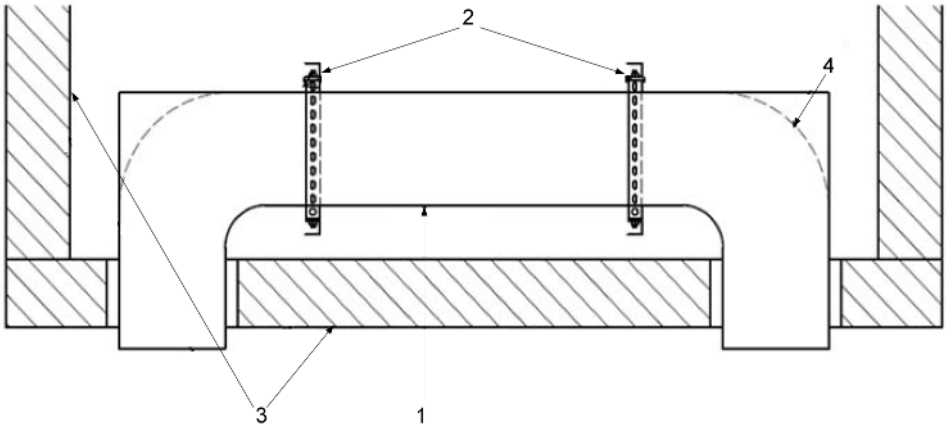
Size: links can be any size

Unit weight: approximately 3,5 kg/m to 4,0 kg/m

4.4.4 General arrangements of installation in furnace

The assembly shall be installed into either a horizontal or a vertical furnace as shown in the following general arrangements (Figures 1, 2, 3 and 4).

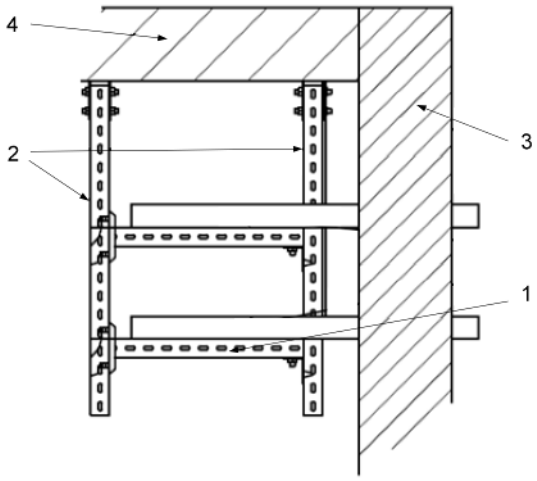
“U” Bend



Key

1	tray	3	furnace wall
2	suspension	4	position of the chain

Figure 1 — Plan view of “U” bend arrangement incorporating straight or curved corners in both horizontal and vertical furnaces

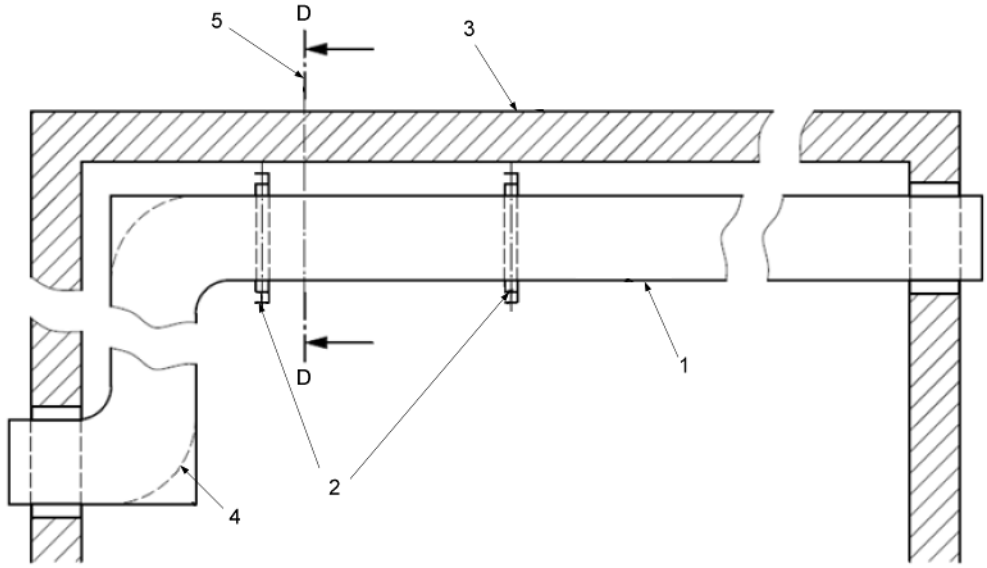


Key

1	tray	3	furnace wall
2	suspension	4	ceiling

Figure 2 — End elevation of “U” bend arrangement in both horizontal and vertical furnaces

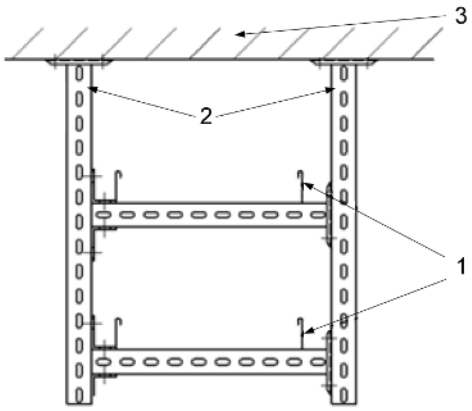
“S” Bend



Key

1	tray	4	position of the chain
2	suspension	5	plane for end elevation (Figure 4)
3	furnace wall		

Figure 3 — Plan view of “S” bend arrangement in horizontal furnace only



Key

1	tray	3	furnace ceiling
2	suspension		

Figure 4 — End elevation of “S” bend arrangement in horizontal furnace only

4.5 Installation of standardized representative installation

4.5.1 Details of “U” bend arrangement

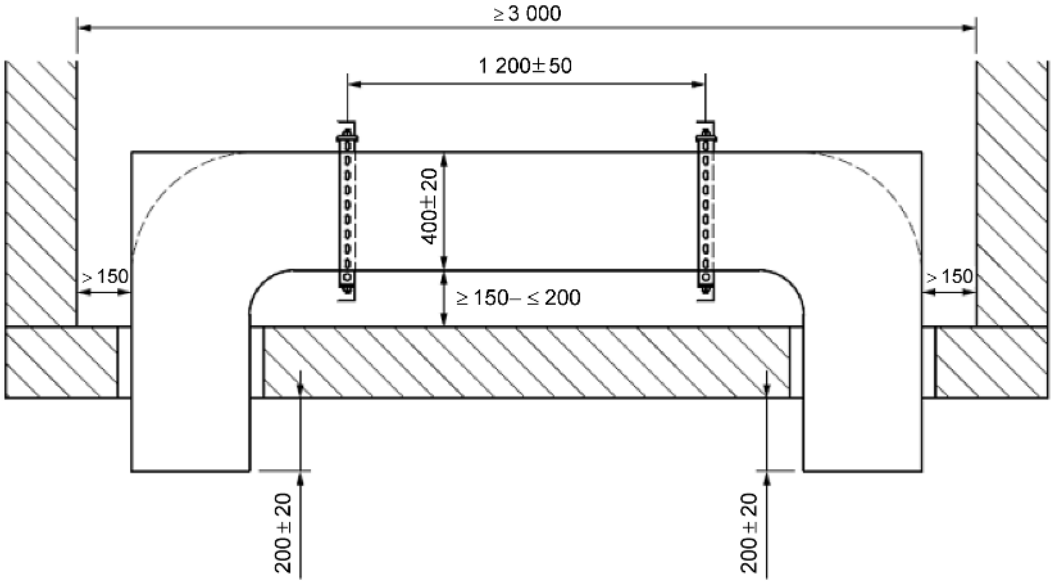
Figures 5 and 6 show how the assembly of trays and cables, mounted on the tray as described in 6.4 and 6.5, is located in the furnace.

Suspensions shall be fixed to the ceiling of the furnace.

The distance between the tray and the furnace walls shall be 150 mm to 200 mm for the inner edge of the straight section and greater than 150 mm between the other parts and the side walls and back wall (see Figure 5).

A maximum of 3 trays shall be installed directly above each other using the same vertical suspension. The distance between the base of the top tray and the ceiling shall be greater than 300 mm. If more than 1 tray is used then the vertical separation distance between any 2 trays shall be (300 ± 30) mm and the horizontal separation distance between trays shall be at least 500 mm.

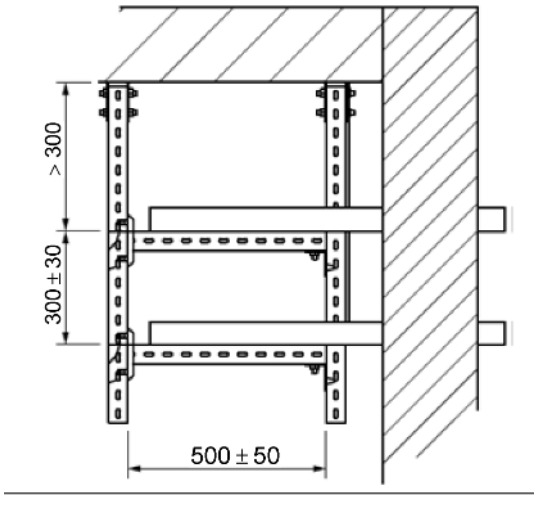
Dimensions in millimetres



Not to scale

Figure 5 — Plan view of “U” bend standardized installation with curved or straight corners

Dimensions in millimetres



Not to scale

Figure 6 — End elevation of “U” bend standardized installation

4.5.2 Details of “S” bend arrangement

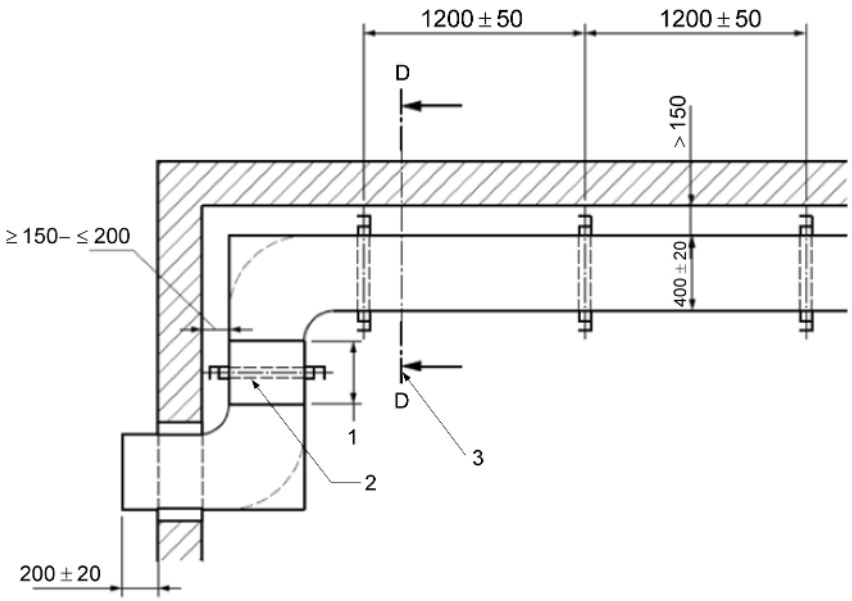
Figures 7 and 8 show how the assembly of trays and cables, mounted on the tray as described in 6.4 and 6.5, is located in the furnace.

The suspensions shall be fixed to the ceiling of the furnace.

The distance between the tray and the furnace walls shall be greater than 150 mm (with the exception of the distance between the parts near the exit holes and the wall with the exit hole).

A maximum of 3 trays shall be installed directly above each other using the same vertical suspension. The distance between the base of the top tray and the ceiling shall be greater than 300 mm. If more than 1 tray is used then the vertical separation distance between any 2 trays shall be 300 mm ± 30 mm and the horizontal separation distance between trays shall be at least 500 mm.

Dimensions in millimetres



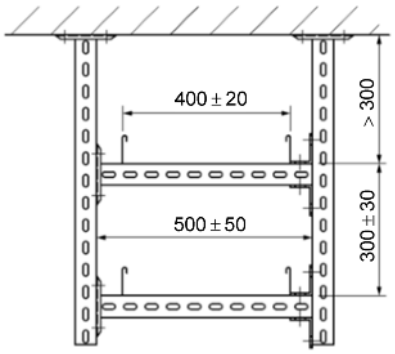
Not to scale

Key

1 length of straight section changes with cable diameter and manufacturer’s minimum bending radius
2 suspension support where corner sections are joined by straight section
3 plane for end elevation (Figure 8)

Figure 7 — Plan view of “S” bend standardized representative installation with curved and straight corners

Dimensions in millimetres



Not to scale

Figure 8 — End elevation of "S" bend standardized representative installation

4.5.3 Application of the chains

Before or after the assembly has been located into the furnace, the chains (see 4.4.3) shall be applied.

A chain or chains shall be attached along both the outer and inner edges of the tray. Each chain shall be attached to the underside of the tray in loops using steel wire of at least 1,0 mm diameter at a maximum fixing distance of 250 mm.

At the corners, the fixing distance of the chain and the chain length between fixing points shall be the same as for the straight tray sections. The length of the chain should be sufficiently longer than the length of the standardized installation system so as not to restrict movement of the assembly.

The distance between chains at corners shall be maintained at approximately 400 mm.

The lengths of loops formed during fixing of the chain to the tray shall be adjusted until the total unit load applied to the tray by the combination of the chains and the cable test specimens reaches ($200\ ^{+0}_{-20}$) N/m.

Each chain shall follow a path as described above until coming to a vertical support at which the chain path shall divert around the inner surface of the vertical support and rest onto the upper surface of the horizontal support.

4.5.4 Exit holes from the furnace for the test installation

The gaps around the cable trays at the exit holes shall be filled with mineral wool in such a way as to allow for movement of the components in the standardized representative installation.

NOTE 1 This can be achieved by for example locating the regions of the standardized representative installation exiting the furnace on appropriate high-density mineral wool insulation material. The remaining gaps could be filled with appropriate low-density mineral wool insulation material.

NOTE 2 Mineral wool with a density of (95 ± 20) kg/m^3 has been found appropriate as high-density wool. Mineral wool with a density of (45 ± 10) kg/m^3 has been found appropriate as low-density wool.

When in place the mineral wool shall be flush with the external and internal surfaces of the furnace wall and shall completely surround each cable.

Right-angled brackets shall be attached to the outer edges of the tray as it exits the furnace in order to prevent excessive movement inwards due to thermal effects. The brackets shall be touching the outer surface of the furnace wall but not fixed to the wall.

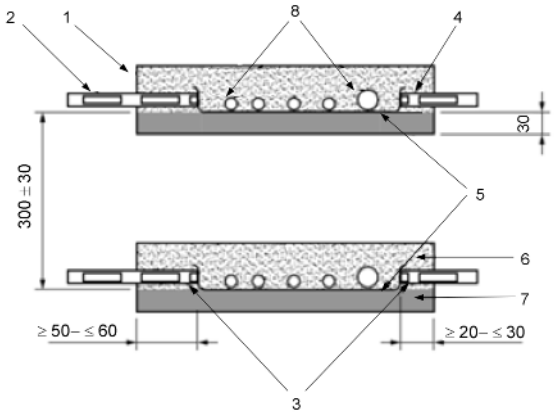
Care shall be taken to install the cables such that they are not damaged during installation and testing by the sharp edges at the point of where the tray ends.

Any movement of the test cables inside the furnace shall not be restricted during the test.

The exposed sheathed cable shall extend beyond the end of the tray and the tray shall extend by (200 ± 20) mm from the outer surface of the furnace wall.

Figures 9 and 10 indicate how this shall be achieved. Figure 9 shows 50 mm – 60 mm gaps at the outer edges of the “U” bend installation (to allow thermal expansion of the trays without damaging the furnace wall), the locations of right angled brackets and the location of mineral wool. Figure 10 shows equal gaps at the inner and outer edges of the “S” bend installation, the locations of the right angled brackets and the location of the mineral wool.

Dimensions in millimetres



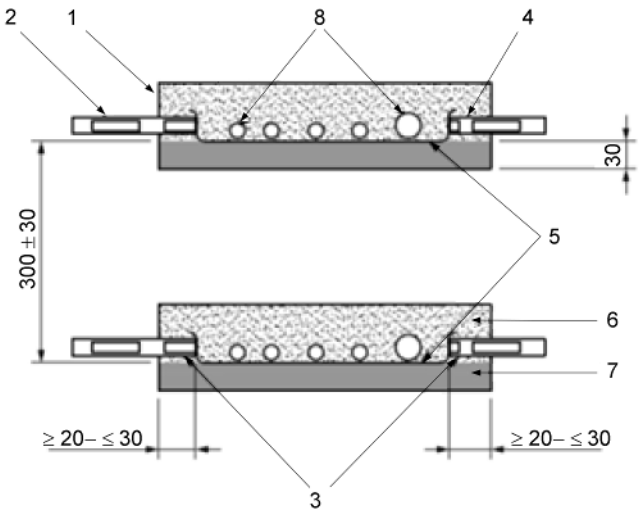
Not to scale

Key

1	hole in wall	6	mineral wool – see notes 1 and 2
2, 3, 4	right angled brackets	7	mineral wool – see notes 1 and 2
5	cable tray	8	cables (test specimens)

Figure 9 — Exit in the furnace wall of the “U” bend installation

Dimensions in millimetres



Not to scale

Key

1	hole in wall	6	mineral wool – see notes 1 and 2
2, 3, 4	right angled brackets	7	mineral wool – see notes 1 and 2
5	cable tray	8	cables (test specimens)

Figure 10 — Exit in the furnace wall of the "S" bend installation

5 Test conditions

5.1 Environmental conditions

The interior of the test furnace shall be between 10 °C and 40 °C at the start of each test. The furnace walls and ceilings constructed for the purpose of this test shall be allowed to dry in ambient conditions for at least 16 h immediately prior to the test.

5.2 Furnace control

The heating and pressure conditions and the furnace atmosphere shall conform to those given in EN 1363-1. The temperature shall be measured at the points specified in 7.2.

The furnace pressure shall be controlled to a pressure of 20 Pa throughout the test at the top of the uppermost cable tray.

6 Test specimen

6.1 Length of test specimen

The length of each test specimen subjected to the test shall be sufficient to allow a minimum of 250 mm and a maximum of 1 000 mm of sheathed cable to exit the furnace for electrical connections.

6.2 Number of test specimens

Two test specimens shall be tested of each individual construction of electric cable under test.

NOTE The range of conductor sizes and numbers of cores combinations required to cover a family of cables is detailed in Annex B.

6.3 Conditioning

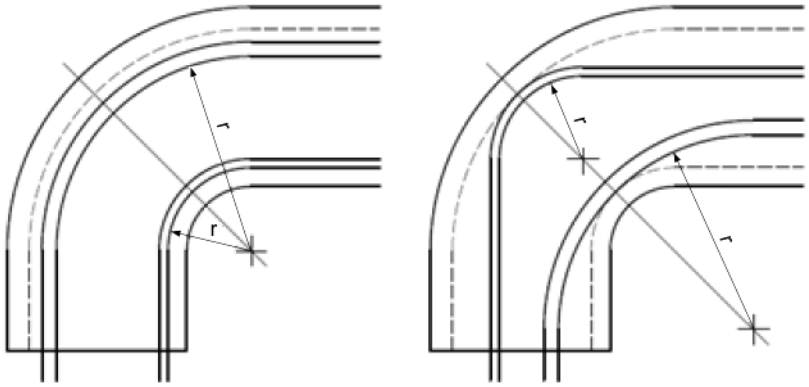
All test specimens shall be kept indoors for at least 16 h at a temperature of (20 ± 10) ºC.

6.4 Specimen preparation

Each specimen to be tested shall be a piece of cable of the required length. The conductors shall be prepared for the electrical connections and the exposed cores spread apart to avoid contact with each other.

6.5 Mounting of test specimens

Figures 11 and 12 show examples of test specimens mounted in the cable tray.

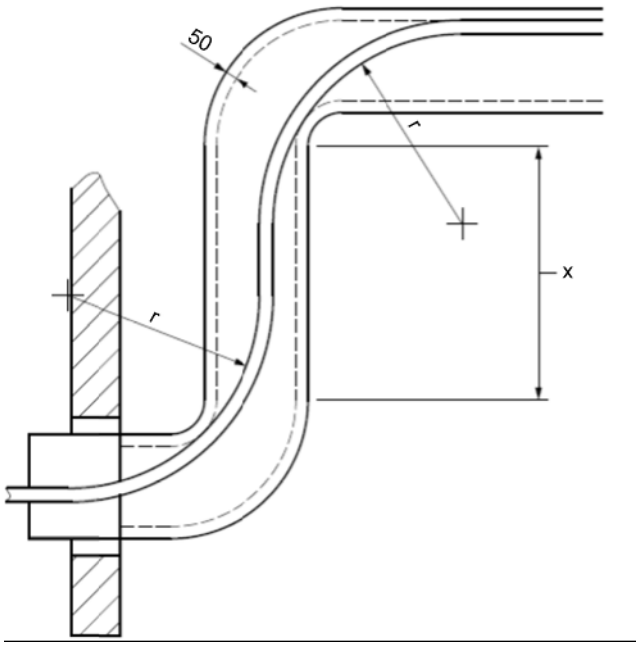


Key

r manufacturer's minimum bending radius in normal use

Figure 11 — Arrangement of test specimens in "U" bend installation

Dimensions in millimetres



Key

x The distance between bends varies with cable diameter and manufacturer's minimum bending radius in normal use.

r manufacturer’s minimum bending radius in normal use

Figure 12 — Arrangement of a test specimen in “S” bend installation

The cable shall be bent to form an approximate arc of a circle. The internal radius ‘r’ of the bend shall be the manufacturer’s declared minimum bending radius in normal use.

Each specimen shall be located such that there is a gap of at least 50 mm between each test specimen and at least 50 mm between the test specimen and the side wall of the cable tray.

Plastic cable ties may be used to maintain the locations of the cables during installation of the assembly into the furnace. Steel cable ties shall not be used. Any fixings external to the furnace shall be removed prior to the test.

7 Test procedure

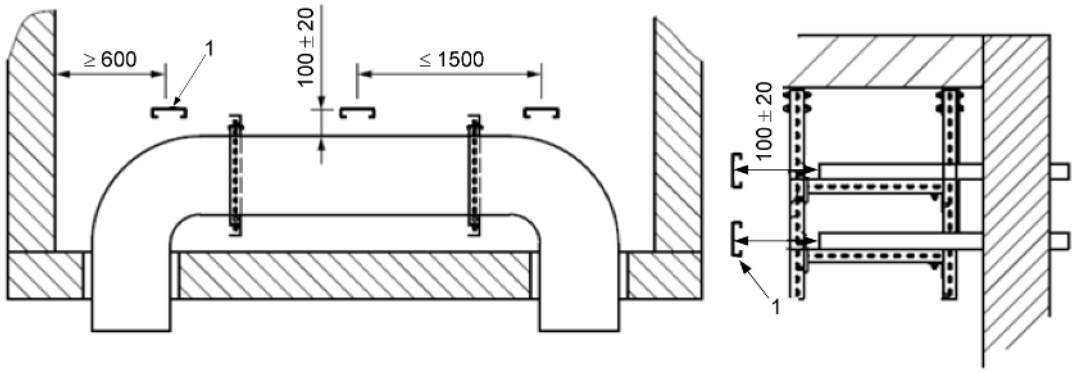
7.1 General

The test shall be carried out using the equipment in Clause 4, and the procedures in this European Standard and EN 1363-1.

7.2 Measuring temperature

Three plate thermometers per tray of the type specified in EN 1363-1 shall be arranged inside the furnace as shown in Figures 13 and 14.The plate thermometers shall be installed with the isolation side oriented to the cable trays.

Dimensions in millimetres



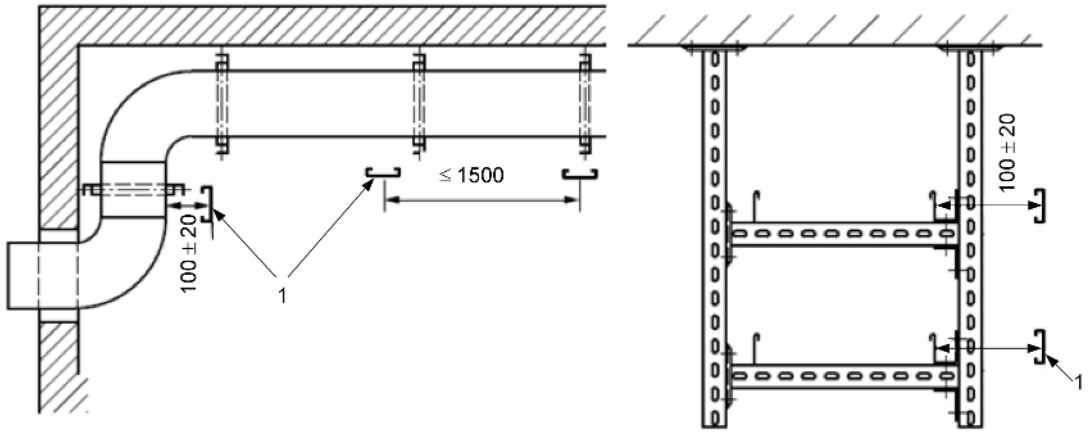
Not to scale

Key

1 plate thermometers

Figure 13 — Locations of plate thermometers in “U” bend installation

Dimensions in millimetres



Not to scale

Key

1 plate thermometers

Figure 14 — Locations of plate thermometers in “S” bend installation

The distance from a single plate thermometer to the closest element of the installation shall be (100 ± 20) mm.

The maximum distance between two adjacent plate thermometers shall be 1 500 mm.

The minimum distance from any plate thermometer to the furnace wall shall be 600 mm.

7.3 Applying the voltage

At the transformer end of the cable sample, earth the neutral conductor, and any protective conductor. Interconnect and earth any metal screens, drain wire or metallic layer and all cable trays, fittings, suspensions and supports. 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 in Figure 15.

Where a metallic sheath, armour or screen or concentric conductor acts as a neutral or protective conductor, it shall be connected as shown in the circuit diagram as illustrated in Figure 15 as for a neutral or protective conductor.

If required by the cable standard (in case the procedure of connecting the neutral core to earth is not appropriate which might be applicable to cables designed for use on systems where the neutral is not earthed), 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.

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), divide the conductors 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 15). Quads shall be treated as 2 pairs.

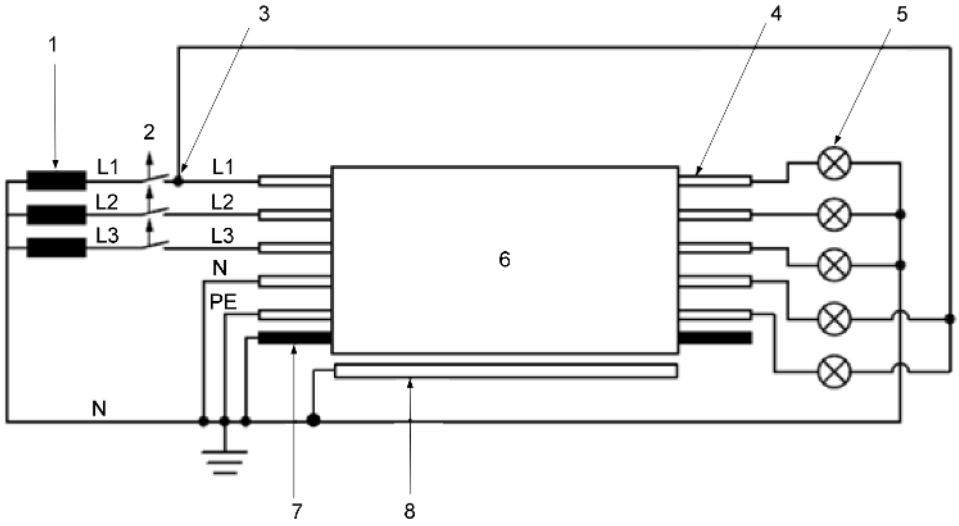
For multitriple cables, the conductors shall be divided into three equal groups, ensuring that the a-core of each triple is connected to one phase, the b-core of each triple to another phase and the c-core of each triple to the third phase of the transformer. (L1, L2 and L3 of Figure 15).

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.

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; the other terminal being earthed; and

– connect the neutral conductor and any protective conductor to one terminal of the load and indicating device, and other terminal being connected to L1 (or L2 or L3) at the transformer end (as illustrated in Figure 15).



Key

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

1	transformer	5	load and indicating device (e.g. lamp)
2	fuse (2 A)	6	sample
3	connection to phase L1 (or L2 or L3)	7	metal screen (if present)
4	test conductor or group	8	cable management system (cable trays, fittings, suspensions and supports)

Figure 15 — Basic circuit diagram — Electric power and control cables with rated voltage up to and including 600/1 000V

7.4 Starting the test

Switch on the electricity supply and adjust the voltage to the rated voltage of the cable (subject to a minimum a.c. test voltage of 100 V). After applying the voltage start the furnace in accordance with EN 1363-1.

The test voltage between conductors shall equal the rated voltage between conductors and the test voltage from conductor to earth shall be equal to the rated voltage from conductor to earth.

8 Duration of survival

8.1 Point of failure

Failure of either one of the following criteria shall be sufficient to show the point of failure for that cable:

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

b) a conductor ruptures during the test as indicated by the indicating device (e.g. lamp extinguishing).

8.2 Survival time

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.

NOTE By agreement between supplier of the cable and the test house the test duration may be extended but not be the basis of classification.

9 Test report

In addition to the items required by EN 1363-1, the following shall be included in the test report.

a) a reference to this European Standard;

b) a full description of cable tested;

c) the manufacturer of cable tested, unique batch information and cable construction;

d) the test voltage;

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

f) the survival time achieved (up to a maximum of 120 min).

NOTE See EN 15725 for guidance on extended application reports.

Annex A
(normative)

Field of direct application

A.1 Terms and definitions

For the purposes of Annex A, the following term and definition applies.

A.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

A.2 Cable Management System

Cables with P-classification according to EN 13501-3 and tested in accordance with EN 50577 are suitable for installation with any cable management system with P-classification, tested in accordance with the relevant standard of CLC/TC 213 [2][2)].

The classification of the combination of cable and cable management system is the lowest classification of either one.

A.3 Orientation

Cables with P-classification according to EN 13501-3 and tested in accordance with this standard are suitable for both horizontal and vertical installation, provided that clips or brackets with a suitable classification (see A.2.) are used.

A.4 Bending radius

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

2) under development in CLC/TC213

Annex B
(normative)

Extended application of test results

B.1 General

This annex gives guidance on the procedure and rules for extended application using test results obtained from EN 50577 in order to evaluate and classify the resistance to fire performance of power and control cables.

B.2 Terms and definitions

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

B.2.1
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

Note 1 to entry: The relevant classes and related criteria are specified in the following Commission Decisions: EC Decision 2000/367/EC (O J E L 133 of 6.6.2000).

[SOURCE: EN 15725:2010, modified, Note 1 to entry has been modified]

B.2.2
product (cable) family
range of cables within defined limits of constructional design (as defined by this Annex B)

B.2.3
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.3 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).

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

B.4 EXAP procedure

The following procedure shall be followed:

1) Choose the specific family of cables for which classification is required.

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 50577 on cables selected as follows:

   4.1) Power cables:

      a. Select a four or five core cable with the smallest conductor size in the family and

      b. Select a four or five core cable with the largest conductor size in the family, subject to a maximum conductor size of 50 mm².

      NOTE Tests during development of this standard have shown that within the same cable family the survival time of cables with a larger conductor size is longer. Therefore the maximum conductor size is limited to 50 mm², which also has the advantage of a limited bending radius.

      In case the specific family of cables does not include cables with more than three cores, cables with the maximum number of cores in the family shall be tested.

      Two test specimen shall be tested of both cables.

   4.2) Control cables:

      a. Select a two pair or four core cable with the smallest conductor size in the family

      Two test specimen shall be tested of this cable.

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.

In the case of power cable where the conductor size of the tested cable with the largest conductor size is 50 mm², the classification determined also applies to cables within the cable family with conductor sizes greater than 50 mm².

Bibliography

[1] prEN 1366-11 [3], *Fire resistance tests for service installations — Part 11: Fire protective systems for cable systems and associated components*

[2] Document on cable management systems (CMS) for fire resistant installations, to be prepared by CLC/TC 213.

[3] EN 15725, *Extended application reports on the fire performance of construction products and building elements*

[4] EN 60228, *Conductors of insulated cables (IEC 60228)*

[5] EN 13501 (all parts), *Fire classification of construction products and building elements*

[3] Under preparation in CEN/TC 127

This page deliberately left blank

This page deliberately left blank

British Standards Institution (BSI)

BSI is the national body responsible for preparing British Standards and other standards-related publications, information and services.

BSI is incorporated by Royal Charter. British Standards and other standardization products are published by BSI Standards Limited.

About us

We bring together business, industry, government, consumers, innovators and others to shape their combined experience and expertise into standards -based solutions.

The knowledge embodied in our standards has been carefully assembled in a dependable format and refined through our open consultation process. Organizations of all sizes and across all sectors choose standards to help them achieve their goals.

Information on standards

We can provide you with the knowledge that your organization needs to succeed. Find out more about British Standards by visiting our website at bsigroup.com/standards or contacting our Customer Services team or Knowledge Centre.

Buying standards

You can buy and download PDF versions of BSI publications, including British and adopted European and international standards, through our website at bsigroup.com/shop, where hard copies can also be purchased.

If you need international and foreign standards from other Standards Development Organizations, hard copies can be ordered from our Customer Services team.

Subscriptions

Our range of subscription services are designed to make using standards easier for you. For further information on our subscription products go to bsigroup.com/subscriptions.

With **British Standards Online (BSOL)** you'll have instant access to over 55,000 British and adopted European and international standards from your desktop. It's available 24/7 and is refreshed daily so you'll always be up to date.

You can keep in touch with standards developments and receive substantial discounts on the purchase price of standards, both in single copy and subscription format, by becoming a **BSI Subscribing Member**.

PLUS is an updating service exclusive to BSI Subscribing Members. You will automatically receive the latest hard copy of your standards when they're revised or replaced.

To find out more about becoming a BSI Subscribing Member and the benefits of membership, please visit bsigroup.com/shop.

With a **Multi-User Network Licence (MUNL)** you are able to host standards publications on your intranet. Licences can cover as few or as many users as you wish. With updates supplied as soon as they're available, you can be sure your documentation is current. For further information, email bsmusales@bsigroup.com.

BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

Revisions

Our British Standards and other publications are updated by amendment or revision.

We continually improve the quality of our products and services to benefit your business. If you find an inaccuracy or ambiguity within a British Standard or other BSI publication please inform the Knowledge Centre.

Copyright

Useful Contacts:

Customer Services
Tel: +44 845 086 9001
Email (orders): orders@bsigroup.com
Email (enquiries): cservices@bsigroup.com

Subscriptions
Tel: +44 845 086 9001
Email: subscriptions@bsigroup.com

Knowledge Centre
Tel: +44 20 8996 7004
Email: knowledgecentre@bsigroup.com

Copyright & Licensing
Tel: +44 20 8996 7070
Email: copyright@bsigroup.com

bsi.

...making excellence a habit.™