
Preskusi požarne odpornosti servisnih inštalacij - 11. del: Požarni zaščitni sistem za kabelske sisteme in pripadajoče dele

Fire resistance tests for service installations - Part 11: Fire protective systems for cable systems and associated components

Feuerwiderstandsprüfungen für Installationen - Teil 11: Brandschutzsysteme für Kabelanlagen

Essais de résistance au feu des installations de service - Partie 11: Systèmes de protection incendie pour les systèmes de câbles et composants associés

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**Fire resistance tests for service installations - Part 11: Fire
protective systems for cable systems and associated
components**

Essais de résistance au feu des installations de service -
Partie 11: Systèmes de protection incendie pour les
systèmes de câbles et composants associés

Feuerwiderstandsprüfungen für Installationen - Teil 11:
Brandschutzsysteme für Kabelanlagen

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 127.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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Foreword

This document prEN 1366-11 has been prepared by Technical Committee CEN/TC 127 " Fire safety in buildings". the secretariat of which is held by BSI.

This document is submitted to the CEN Enquiry.

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

EN 1366 '*Fire resistance tests for service installations*' consists of the following:

Part 1: Ducts

Part 2: Fire dampers

Part 3: Penetration seals

Part 4: Linear joint seals

Part 5: Service ducts and shafts

Part 6: Raised access floors and hollow floors

Part 7: Closures for conveyors and trackbound transportation systems

Part 8: Smoke extraction ducts

Part 9: Single compartment smoke extraction ducts

Part 10: Smoke control dampers

Part 11: Fire Protection system for essential services (in course of preparation)

Introduction

The purpose of this test is to evaluate the ability of the protective system to allow cables and components of their installation (connectors, glands, junctions, mountings, etc.) to maintain during a defined time a reliable function whilst exposed to fire. The purpose of this test is to verify compliance with building regulations or any other requirements regarding the circuit integrity of systems for example as those for fire fighting lifts, pressure boosters, emergency lighting, fire alarm systems etc.

The fire exposure conditions and general arrangement in this European Standard are similar to those given in prEN 50577, developed by CLC/TC 20, and prEN xxxx, under development by CLC/TC 213. Each of these standards has been developed under a Mode 4 co-operation between CEN TC 127, CLC/TC 213 and CLC/TC 20.

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 and operational hazards may also arise during the construction of the test elements or structures, their testing and 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.

(standards.iteh.ai)

SIST EN 1366-11:2018

<https://standards.iteh.ai/catalog/standards/sist/0ddc50dc-f87a-4119-b6ca-fce46d150c08/sist-en-1366-11-2018>

1 Scope

This part of EN 1366 describes the method to evaluate the performance of protective systems for electrical cable systems in order to maintain the circuit integrity under fire conditions to classify the protective system according to EN 13501-3 for the P classification. The test examines the behaviour of cable protection systems exposed to fire from outside. The tests specified in this standard are not aimed for assessing the performance of the fire protective system and the penetration seal for maintaining the requirements of the penetrated wall or ceiling (classification E / I).

This standard is used in conjunction with EN 1363-1.

The test results apply to fire protective systems for electrical cable systems rated for voltages up to 1 kV.

This test procedure shall also be used to determine the functionality for optical and data cables in case of fire.

The protective system may include ventilation devices, inspection hatches, fixed or removable lids etc.

The tests specified in this standard are not aimed for assessing the performance of sprayed or painted coatings (e. g. intumescent or ablative coating, plastic film, epoxy resin) and similar protective layers (e. g. wrap, bandage) applied directly on the cables or bus bars as fire protective system. Also cables and bus bars with intrinsic resistance to fire, and without fire protective systems around, are excluded (see CENELEC standard under development).

This method is very different to EN 50200 for the PH classification, which is not designed for fire protective systems for electrical cable systems.

This test method is not applicable for cabinets for electrical accessory containing bus systems, relays or similar.

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 1363-2: Fire resistance tests — Part 2: Alternative and additional procedures

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 50289-4-16: Communication cables - Specifications for test methods -- Part 4-16: Environmental test methods - Circuit integrity under fire conditions

EN 50582: Method of test for resistance to fire of unprotected optical fibre cables for use in emergency circuits (diameter less than or equal to 20 mm)

EN 50525-2-11: Electric cables –Low voltage energy cables of rated voltages up to and including 450/750 V – 2-11Cables for general applications – Flexible cables with thermoplastic PVC insulation

EN 50288-7: Multi-element metallic cables used in analogue and digital communication and control – Part 7: Sectional specification for instrumentation and control cables

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EN 60269-1: Low voltage fuses – Part 1: general requirements

EN 61537: Cable management - Cable tray systems and cable ladder systems

HD 603-3: Distribution cables of rated voltage 0.6/1 kV – Part 3 : PVC insulated cables – unarmoured

EN 50363: Insulating, sheathing and covering materials for low-voltage energy cables

3 Terms and definitions

For the purposes of this part of EN 1366, the definitions given in EN 1363-1 and EN ISO 13943, together with the following, apply:

3.1

Fire Protective System: heat-insulating assembly of flexible or rigid materials inside which cables or cable systems are arranged. The protective system may be ducts, shafts, conduits, trunkings, jacket enclosures, or similar systems

3.2

Duct: horizontal self-supporting enclosure made of rigid boards or slabs for combustible or non-combustible cables or bus bars with or without suspension device. Jacket enclosures are included.

3.3

Range of ducts: Ducts with different cross sectional area and with the same thickness of the protective system for a given fire rating

3.4

Shafts: vertical self-supporting enclosure made of rigid boards or slabs for combustible or non-combustible cables or bus bars with or without suspension device. Jacket enclosures are included.

3.5

suspension device: mechanical support provided in the form of clips, ties, hangers, ladder racks or trays, or any device designed to carry the load of the cables and the protective system

3.6

Conductor: element intended to carry electric current

3.7

busbar: low-impedance conductor to which several electric circuits can be connected at separate points

3.8

busbar trunking system: factory-built assembly in the form of a conductor system comprising busbars which are spaced and supported by insulating material in a duct, trough or similar enclosure

3.9

Connecting elements: e.g. sleeves and junction boxes

3.10

Cable management system: assembly includes different system components intended for the accommodation of insulated conductors, cables and possibly other electrical equipment in electrical and / or communication systems

Note 1 to entry: examples of cable management system are conduit system, cable ductory system, cable trunking system, cable tray system, cable ladder system, cable cleat, cable tie

3.11

Maintenance of circuit integrity: Circuit integrity is deemed to be maintained if there is no short circuit or circuit interruption in the cable system when exposed to fire from outside

3.12

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 specific conditions

3.13

Power cables: cables of voltages up to 0,6/1 kV

3.14

Signal/control cables: Multi-element metallic cable used in instrumentation and control systems

3.15

supporting construction: wall, partition or floor which the duct/shaft passes through in the test

3.16

Jacket enclosures: special kind of duct or shaft for protective systems consisting of an assembly of flexible materials (e. g. wraps, bandage), inside which cable trays or ladders are arranged with cables or cabling systems

3.17

Penetrating systems: installations (e. g. pipe, cable) crossing the fire protective system (passing through from one side to another or from inside to outside) including the seal

4 Test equipment

4.1 Furnace

The test shall be carried out using the equipment and procedures in accordance with EN 1363-1, and if appropriate EN 1363-2, modified if necessary as described in this standard. The furnace shall be at least $b \times l = 2\,000\text{ mm} \times 3\,000\text{ mm}$ in size (internal dimensions).

5 Test conditions

5.1 Heating conditions

The heating conditions and the furnace atmosphere shall conform to those given in EN 1363-1.

For each fire protective system there shall be one plate thermocouples at each side in mid height for at least two positions within the length of the furnace. The opposite side of "A" of the plate thermocouples shall be orientated to the surface of the samples. The distance from the specimen shall be 100 mm. The maximum distance (length) between the thermocouples shall be 1.5 m. The maximum distance between the furnace wall and the thermocouples shall be 0.8 m in the direction of the axis.

For the position of the thermocouples see figures 1 and 2.

5.2 Pressure conditions

The furnace pressure shall be controlled to a minimum of 20 Pa throughout the test at the top of the uppermost fire protective systems. Fire protective systems shall only be in the zone where the positive pressure exceeds 10 Pa (a minimum pressure of 10 Pa shall be maintained at the lowest point of the lowest fire protective system).

6 Test specimen

The specimen shall be installed horizontally in the furnace for the test. The exposed length of the fire protective system shall be at least 3000 mm, but shall not be shorter than 2 x span of the suspension device + minimum of 250 mm at each end.

Fire protective systems shall be tested with the maximum width and height and with the minimum width and height or the maximum and minimum diameter for each range, specified by the sponsor. Any size of the fire protective system may be tested as required by the sponsor.

Outside the furnace, the fire protective system shall be closed by inserting an appropriate mineral wool plate into the end of the fire protective system, fixed in place with an appropriate adhesive (e.g. sodium silicate adhesive) or by fixing boards of the same material as for the fire protective system.

The test configuration shall include at least one joint inside the furnace. If such a joint is intended in practice to be independent from the suspension device the joint shall be located at approximately mid-span.

7 Installation of test specimen

7.1 Fire protective system with cables

7.1.1 The fire protective system (e. g. duct) shall pass straight through the furnace. The length outside the furnace shall not exceed 200 mm. Between furnace wall and fire protective system a minimum gap of 4 cm shall be closed by mineral wool. The fire protective system shall not be fixed to the furnace walls at the penetration of the fire protective system through the walls. The fire protective system shall be suspended on devices attached to the ceiling of the furnace; the spacing of devices shall be specified by the sponsor (see chapter 13). The suspension devices shall be welded or screwed. Other kinds of fixings are not allowed.

Three-sided and two-sided fire protective systems may also be fixed to the wall/ceiling or be suspended by devices attached to the wall/ceiling (see figure 1).

The suspension devices shall be made of steel and be sized such that the calculated stresses do not exceed the values given in the table 3 in chapter 13.6.

7.1.2 Fire protective systems shall be exposed to fire on all four sides (configuration a) or h) in figure 1). The distance between fire protective systems, and the distance between the top of the horizontal four-sided fire protective system and the furnace ceiling, shall be at least 500 mm. Similarly, there shall be a clearance of at least 500 mm between the sides of the fire protective system and the furnace walls.

To cover the direct field of application (see chapter 13) the fire protective system shall additionally be tested to fire exposure on three sides if requested by the sponsor. The distance between fire protective systems, and the distance between the top of the horizontal three sided (see figure 1 e)) fire protective system and the furnace ceiling, shall be at least 500 mm.

The minimum distance from the burner to the lowest part of the fire protective system shall be 500 mm (see figure 2).

7.1.3 Depending on the desired field of application / cable types there are four possibilities for the test configuration

Configuration 1: To represent all types of power cables (rating voltage 300/500 V) for an operating voltage up to 230/400 V (three-phase AC) and signal/data cables for an operating voltage up to 110 V (AC), the following cable types shall be laid in the fire protective system:

- 2 power cables of type H05 VV-F (with PVC insulation and PVC sheath), dimension 4 or 5 x 1.5 mm², according to EN 50525-2-11
- 1 power cable of type H05 VV-F (with PVC insulation and PVC sheath), dimension 4 or 5 x 16 mm², according to EN 50525-2-11,

- 2 signal- and control cables with PVC insulation (one screened and unscreened), dimensions 2 x 2 x 0.8 according to EN 50288-7.

Configuration 2: To represent all types of power cables (rating voltage 400/750 V up to 0,6/1 kV) for an operating voltage up to 400/690 V (Three-phase AC) and signal/data cables for an operating voltage up to 110 V (AC), the following cable types shall be laid in the fire protective system:

- 2 power cables of type H07 VV-F (with PVC insulation and PVC sheath), dimension 4 or 5 x 1.5 mm², according to EN 50525-2-11
- 1 power cable with PVC insulation and PVC sheath, dimension 4 or 5 x 16 mm², according to HD 603-3
- 2 signal- and control cables with PVC insulation (one screened and unscreened), dimensions 2 x 2 x 0.8 according to EN 50288-7

Configuration 3: If only signal-/data cables for an operating voltage up to 110 V (AC) are required by the sponsor, the following cable types shall be laid in the fire protective system:

- 2 signal- and control cables with PVC insulation (one screened and unscreened), dimensions 2 x 2 x 0.8 according to EN 50288-7.

Configuration 4: If data- or optical cables are required by the sponsor, he has to specify the cable.

7.1.4 The cables shall be fixed either directly to the bottom of the fire protective system, or to a tray or ladder according to EN 61537 laid in the fire protective system, using metal clips or suitable plastic fastener spaced at one meter intervals. The position of the cables is shown in figure 3. The cables shall be installed with the minimum stated bending radius in normal use. The tray or ladder shall be earthed.

7.1.5 Fire protective systems shall be subjected to a uniformly distributed equivalent load specified by the sponsor. The equivalent load shall be taken as the difference between the load specified by the sponsor and the load exerted by the tested cables during the test.

Equivalent loads shall be applied on the bottom of the fire protective system if no cable tray is used or on the tray / ladder as line loads of a length of maximum 400 mm with a space of ~50 mm.

Steel chains or cables may be used as an alternative. Steel chains or cables may be continuous.

The loads shall remain fixed in the same position throughout fire exposure.

7.2 Fire protective systems with busbars

7.2.1 Busbars trunking system from a series used for testing shall have the largest and smallest conductor cross sections specified by the sponsor. For each busbar trunking system each conductor type (copper, aluminium) and the maximum number of conductors and the maximum cross section area of the conductors shall be tested. If both orientations of the conductors (vertical and horizontal) are to be covered, both orientations shall be tested.

7.2.2 Connecting elements (e.g. sleeves and junction boxes) shall be included in the test, since they are part of the system. Every type of connecting element and the largest and smallest shall be tested.

The fire protective system with busbars shall be installed in the same way as fire protective systems for cables.

7.3 Special cases

7.3.1 If it is required by the sponsor to test a cable penetrating the wall of the fire protective system an additional power cable with PVC insulation and PVC sheath, dimension 4 or 5 x 16 mm², shall be included in the test specimen (fire protective system) with the smallest cross section. The exposed

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length of the unprotected cable outside the fire protective system shall be at least 300 mm. If another cable is tested than the field of application is limited, see section 13.1.

7.3.2 If it is intended to penetrate the fire protective system with any systems like earthing systems, pipes or something else as defined by the sponsor, they shall be tested in the test specimen (fire protective system) with the smallest cross section. The exposed length of the unprotected system outside the fire protective system shall be at least 300 mm.

7.3.3 If it is required by the sponsor ventilation devices in fire protective systems shall be included in the test specimen and located (side, bottom or top of fire protective system) as specified by the sponsor. They have to be located between two suspension devices. For protective systems incorporating natural ventilation devices, these devices shall be left open at the beginning of the test.

7.3.4 If it is required by the sponsor inspection hatches in fire protective systems shall be included in the test specimen and located (side, bottom or top of fire protective system) as specified by the sponsor. The hatches shall be located between two suspension devices.

7.3.5 If it is intended to have a fire protective system with bending, the test arrangement of the largest test specimen shall include minimum one bend of 90°. All specimens including this bend shall be mounted with the suspension or fixing devices as used in practice.

7.3.6 If it is intended to have a fire protective system with branch, a T-piece with a length of 500 mm without a cable inside shall be included in the largest test specimen. The T-piece with a length of 500 mm shall be loaded by a load as defined by the sponsor. All specimens including this branch shall be mounted with the suspension or fixing devices as used in practice.

7.3.7. If it is required by the sponsor to test a cable junction an additional suitable cable for which the junction is designed shall be included in the test specimen with the smallest cross section. This additional cable shall contain the required junction in the middle of the protective system length.

7.3.8 If it is intended to have a fire protective system attached to a flexible wall configuration e) of figure 1 shall be tested connected to a wall with the design as specified by the sponsor. The wall shall have at least the same E-classification time according to EN 13501-2 tested according to EN 1364-1 as the intended P-classification time.

8 Conditioning

Conditioning of the test construction shall be in accordance with EN 1363-1.

9 Application of instrumentation

9.1 Furnace thermocouples (plate thermocouples)

Plate thermocouples shall be provided in accordance with EN 1363-1.

The side "A" of the plate thermocouples shall be orientated to the wall of the furnace (see also figures.1 and 2).

9.2 Heating cable inside the fire protective system

For all test configurations the initial cable temperature before the start of the test shall be minimum 30°C.