SLOVENSKI STANDARD
SIST EN 50289-4-11:2002

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Communication cables - Specifications for test methods - Part 4-11: Environmental test methods - A horizontal integrated fire test method

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Kommunikationskabel - Spezifikationen für Prüfverfahren -- Teil 4-11: Umweltprüfverfahren - Horizontale Brandprüfung

Câbles de communication - Spécifications des méthodes d'essai -- Partie 4-11: Méthodes d'essais d'environnement - Méthode intégrée d'essai horizontal au feu

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13.220.40	Sposobnost vžiga in obnašanje materialov in proizvodov pri gorenju	Ignitability and burning behaviour of materials and products
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English version

Communication cables – Specifications for test methods Part 4-11: Environmental test methods – A horizontal integrated fire test method

Câbles de communication – Spécifications des méthodes d'essai Partie 4-11: Méthodes d'essais d'environnement – Méthode intégrée d'essai horizontal au feu

Kommunikationskabel – Spezifikationen für Prüfverfahren Teil 4-11: Umweltprüfverfahren - Horizontale Brandprüfung

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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat 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 Central Secretariat has the same status as the official versions.

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CENELEC
European Committee for Electrotechnical Standardization
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Foreword

This European Standard was prepared by SC 46XC, Multicore, Multipair and Quad Data communication cables, of Technical Committee CENELEC TC 46X, Communication cables.

The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 50289-4-11 on 2001-11-01.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2002-10-01

- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2004-08-01

Annexes designated "normative" are part of the body of the standard.
Annexes designated "informative" are given for information only.
In this standard, annex A is normative and annexes B and C are informative.

This European Standard has been prepared under the European Mandate M/212 given to CENELEC by the European Commission and the European Free Trade Association.

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LIST OF FIGURES AND TABLES

1 Scope

This Part 4-11 of EN 50289 specifies a horizontal integrated fire test method for determining flame-propagation distance, optical smoke density, total heat release, heat release rate, time to ignition and flaming droplets/particles for communication cables.

The cables are tested in a representative installed condition.

2 Normative references

This standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the cited publications are listed hereafter. For dated references, subsequent amendments to or revisions of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the cited publication applies, together with any amendments.

EN 60695-4 Fire hazard testing - Part 4: Terminology concerning fire tests (IEC 60695-4)

3 Definitions

For the purposes of this European Standard, the definitions of EN 60695-4 and the following apply:

3.1
flame travel distance
distance that the flame travels beyond the extent of the gas burner flame

3.2
optical density of smoke (OD)
smoke obscuration described in terms of logarithmic ratio of initial light intensity to instantaneous light intensity

3.3
time-to-ignition
first occurrence of initiation of combustion

4 Test environment

The fire-test room in which the test chamber and smoke measurement system are located shall have provision for a free inflow of air to maintain the room at controlled pressure of 0 Pa to 12 Pa of water column greater than ambient barometric pressure and at a temperature of 23 °C ± 3 °C and relative humidity of 50 % ± 5 % throughout each test run. The fire-test room and smoke measurement area shall have controllable lighting.

5 Test apparatus

The fire-test apparatus shall consist of the following:

a) air-inlet chamber;
b) air-inlet shutter;

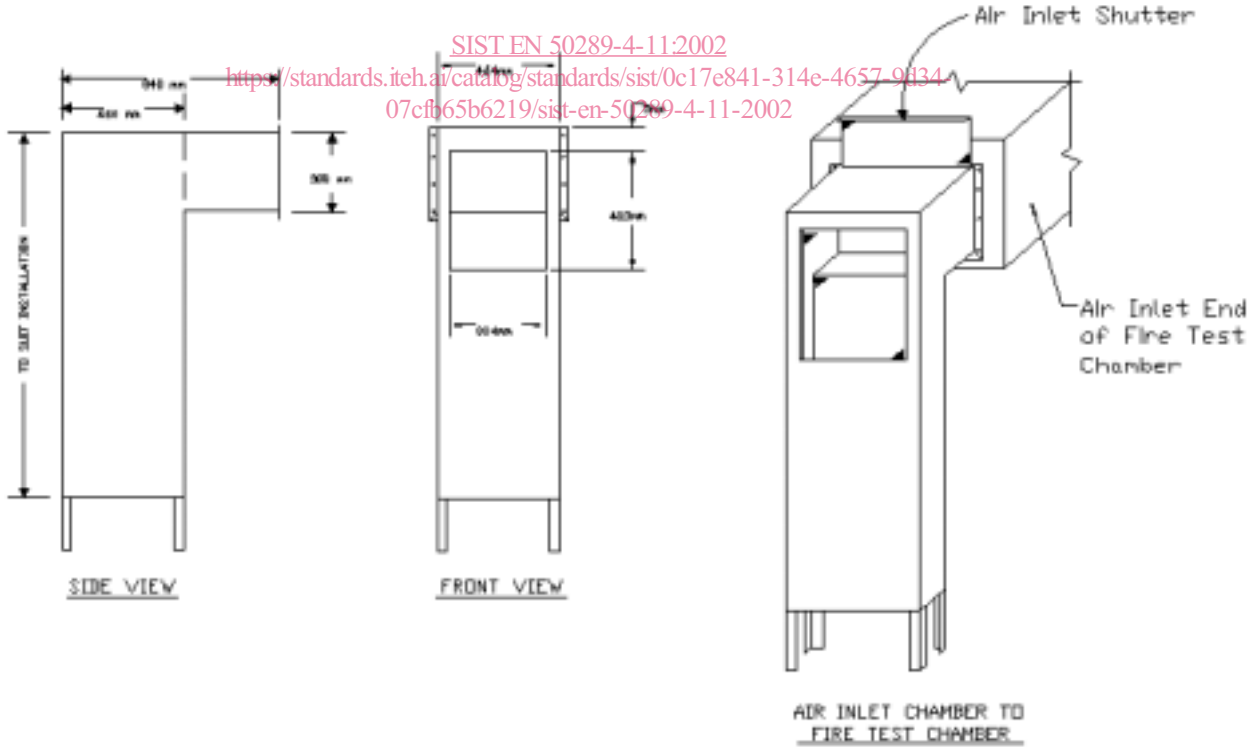
c) fire-test chamber;
d) gas burner;
e) removable top cover;
f) exhaust transition;
g) exhaust duct;
h) exhaust duct velocity measurement system;
i) smoke measurement system;
j) exhaust duct damper;
k) exhaust blower;
l) heat release rate measurement system.

5.1 Air-inlet chamber

The fire-test chamber air-inlet transition shall consist of an L-shaped galvanised steel unit secured to the air-inlet end of the fire-test chamber. The unit shall contain a 300 mm ± 6 mm x 464 mm ± 6 mm rectangular opening to allow air to enter the fire-test chamber through the chamber air-inlet shutter. A schematic of the air-inlet chamber is shown in Figure 1.

5.2 Air-inlet shutter

A vertically sliding shutter, extending the entire width of the test chamber, shall be provided at the air-inlet end of the fire-test chamber. The shutter shall be positioned to provide an air-inlet opening of 76 mm ± 2 mm high, measured from the floor level of the test chamber and across the full width of the chamber, as shown in Figure 1 (see also Figure 2).



NOTE Tolerances are contained in applicable subclauses.

Figure 1 - Schematic of the air-inlet chamber

5.3 Fire-test chamber

The fire-test chamber shall consist of a horizontal duct of the shapes and sizes shown in Figure 2 and Figure 3. The sides and base of the duct shall be lined with insulating masonry, consisting of refractory fire brick, as illustrated in Figure 3. One side shall be provided with a row of two panes of 6 mm thick high temperature glass pressure tight observation windows, with the inside pane mounted flush with the inner wall (see Figure 3).

The exposed window area shall be 70 mm ± 6,4 mm x 280 mm ± 38 mm). The windows shall be located so that the gas burner and the length of the specimens being tested, from the point at which the test fire ends, can be observed from outside the fire-test chamber.

The top cover support ledges shall be fabricated of a structural material capable of withstanding abuse of continuous testing. The ledges shall be level with respect to length and width of the chamber and with respect to each other.

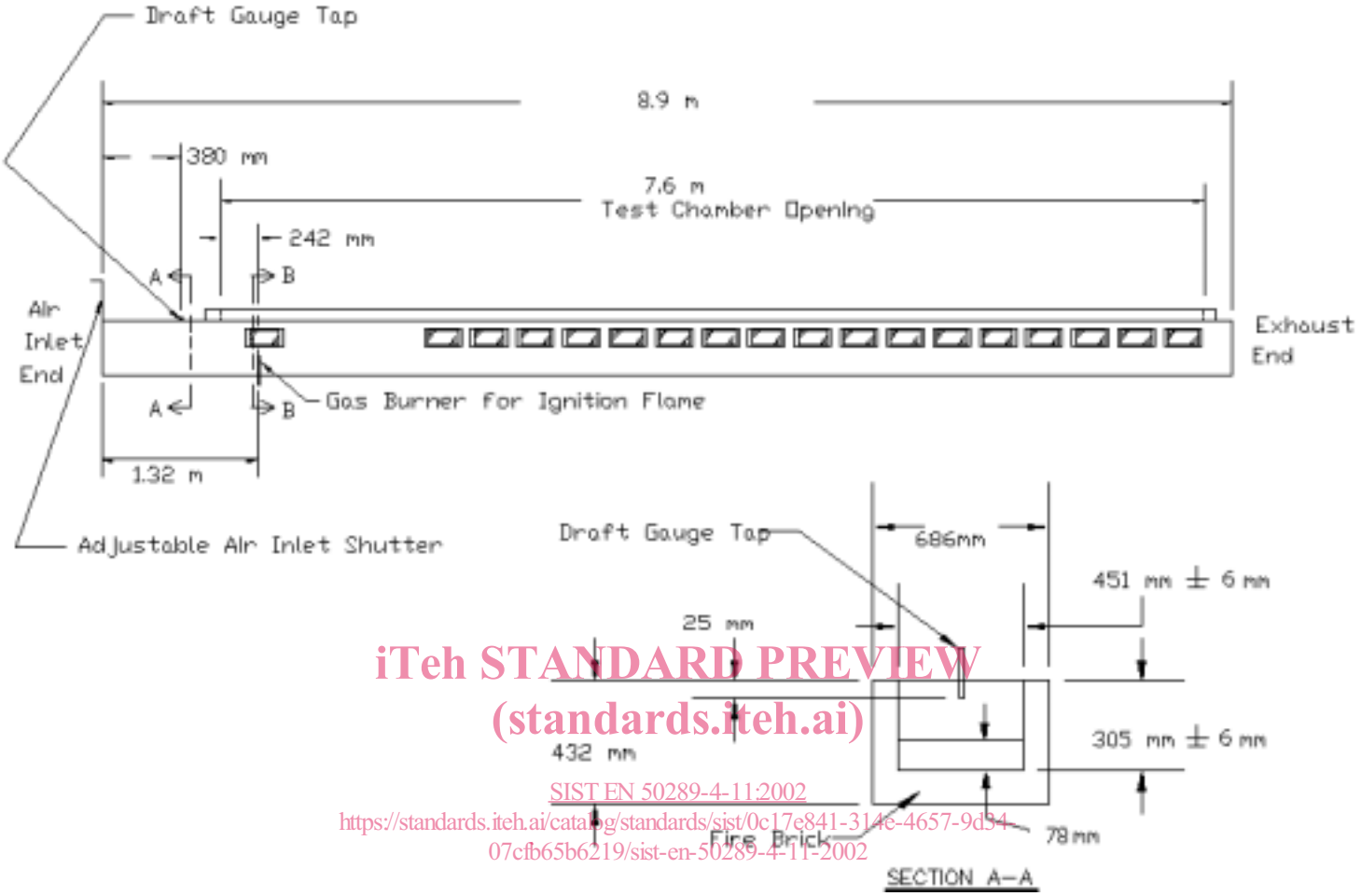
To provide air turbulence for combustion, turbulence baffles shall be provided by positioning six 229 mm x 114 mm x 64 mm thick refractory fire bricks (long dimension vertical and 114 mm dimension parallel to the wall) along the side walls of the chamber at distances of 2,13 m ± 152 mm, 3,66 m ± 152 mm, and 6,10 m ± 152 mm, on the window side (do not obstruct the windows) and 1,37 m ± 152 mm, 2,90 m ± 152 mm, and 4,88 m ± 152 mm on the opposite side, as measured from the center line of the gas burner to the center line of the fire bricks.

5.4 Gas burner

One end of the test chamber, designated as the air-inlet end in Figure 2, shall be provided with a dual port gas burner, delivering flames upward, to engulf the test specimens. As shown in Figure 3, the burner shall be positioned transversely to each side of the center line of the furnace so that the flame is evenly distributed over the width of the specimens. The burner shall be spaced 292 mm ± 6 mm from the air-inlet end of the test chamber, and 191 mm ± 6 mm below the removable top cover (see Figure 2 and Figure 3). The burner shall be located 1 320 mm ± 51 mm downstream of the air-inlet shutter, as measured from the burner center line to the outside surface of the shutter. Gas to the burner shall be provided through a single inlet pipe, distributed to each port burner through a tee-section. The outlet shall be a nominal 19 mm elbow. The plane of the ports shall be parallel to the chamber floor, such that the gas is directed upward toward the specimen. Each port shall be positioned with its center line 102 mm ± 6 mm on each side of the center line of the fire-test chamber so that the burner flame is evenly distributed (see Figure 3). The gas burner should be ignited remotely using an electronic ignition system. The controls used to maintain a constant flow of methane gas to the burners shall consist of the following:

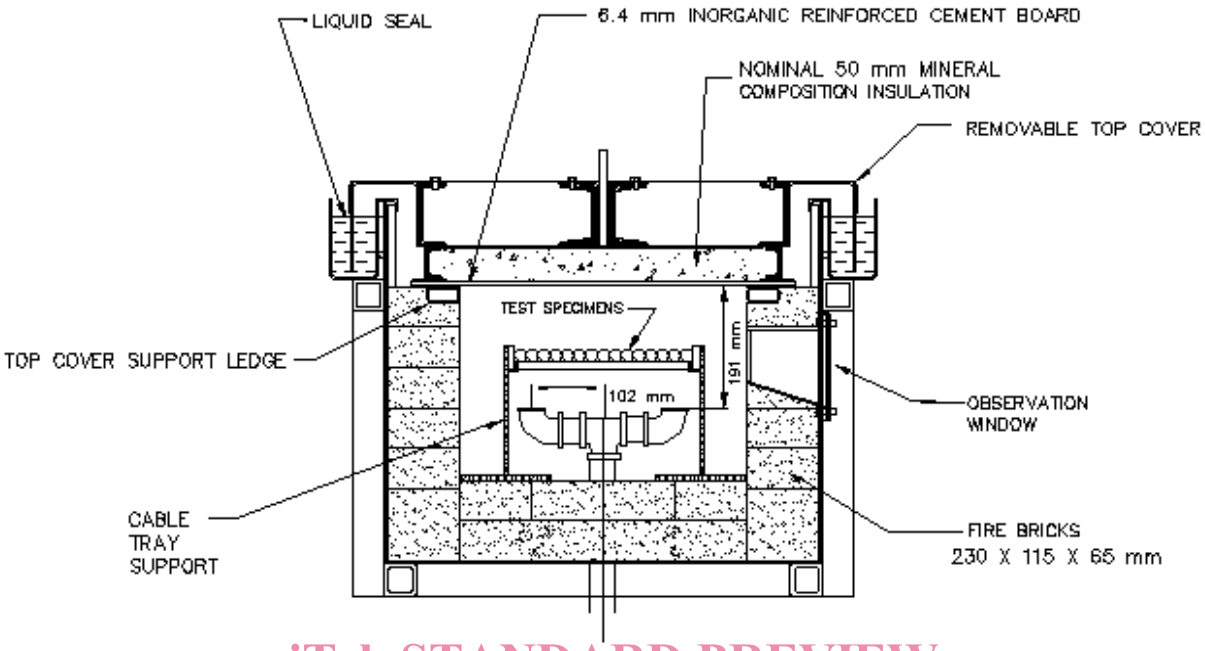
a) a pressure regulator;
b) a gas meter calibrated to read in increments of not more than 2,8 l;
c) a gauge to indicate gas pressure in Pa (or inches of water);
d) a quick-acting gas shutoff valve;
e) a gas metering valve;
f) an orifice plate in combination with a manometer to assist in maintaining uniform gas-flow conditions.

Alternative control equipment, if shown to be equivalent, shall be permitted.



NOTE Tolerances are contained in applicable subclauses.

Figure 2 - Schematic of the fire test chamber



NOTE Tolerances are contained in applicable subclauses.

Figure 3 - Cross-section of the fire test chamber (section B-B, Figure 2)

5.5 Removable top cover

The removable top cover shall consist of a metal and mineral insulation composite unit whose insulation consists of nominal 51 mm ± 6 mm thick mineral composition material. The top unit is shown in Figure 3 and shall completely cover the fire-test chamber. The metal and mineral composite material shall have physical characteristics as follows:

a) maximum effective use temperature of not less than 650 °C;
b) bulk density of 335 kg/m^3 ± 20 kg/m^3 ;
c) thermal conductivity of 0,072 W/(m.K) to 0,102 W/(m.K) at 150 °C to 370 °C;
d) K_pC product of 1 x 104 (W^2.s)/(m^2.K^2) to 4 x 104 (W^2.s)/(m^2.K^2).

K_pC is equal to the thermal conductivity times the density times the specific heat.

The entire top-panel unit shall be protected with flat sections of high-density (nominally 1 760 kg/m^3 6 mm thick) mineral-fibre/cement board maintained in an unwarped and uncracked condition through continued replacement. While in place, the top panel shall rest on a nominal 3 mm thick woven fibreglass belting, positioned on the top cover support ledges. The top panel shall be completely sealed against the leakage of air into the fire-test chamber during the test. A water-filled trough, as shown in Figure 3 has been found suitable for this purpose.

5.6 Exhaust transition

The exhaust end of the fire-test chamber shall be fitted with a transition piece. The exhaust transition shall consist of a stainless steel unit composed of a 902 mm ± 6 mm long x 686 mm ± 6 mm wide x 432 mm ± 6 mm high rectangular section and an 457 mm ± 6 mm long rectangular-to-transition section connected to the 406 mm ± 3 mm inside diameter (I.D) exhaust duct. The outside of the transition section shall be insulated with a nominal 51 mm ceramic fiber blanket (nominal density 130 kg/m^3). The shape and size of the exhaust transition are shown in Figure 4.

The unit shall be secured to the exhaust end of the fire-test chamber.

5.7 Exhaust duct

The 406 mm ± 3 mm inside diameter exhaust duct shall be constructed from stainless steel and shall extend 4,9 m to 5,5 m horizontally from the vent end of the transition to the center line of the smoke measurement system, to provide for a fully mixed exhaust gas flow. It shall extend a minimum of 8,5 m from the vent end of the exhaust transition section. The exhaust duct shall be insulated with at least 51 mm of high-temperature mineral composition material from the beginning of the exhaust transition piece up to and including the smoke measurement system. The high-temperature mineral composition material shall have the same physical characteristics as the material described in 5.5.

5.8 Exhaust duct velocity measurement system

The velocity in the exhaust duct is determined by measuring the differential pressure in the flow path with a bi-directional probe connected to an electronic pressure gauge, or an equivalent measuring system and a thermocouple.

The bi-directional probe consists of a stainless steel cylinder with a solid diaphragm in the center that divides the probe into two chambers. The probe is 44 mm long with a 22 mm inside diameter. The pressure taps on either side of the diaphragm are to support the probe.

The axis of the probe is located at the center line of the duct. The pressure taps are connected to a pressure transducer having a minimum resolution of 0,25 Pa of water column.

The temperature of the exhaust gas is measured upstream 152 mm from the probe and at the center line of the duct, with a 0,32 mm diameter (28 AWG) Type K thermocouple having an Inconel® sheath.