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TECHNICAL REPORT

RAPPORT TECHNIQUE

Fire performance of communication cables installed in buildings

Tenue au feu des câbles de communication installés dans les bâtiments

IEC/TR 62222:2012

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

FIRE PERFORMANCE OF COMMUNICATION CABLES INSTALLED IN BUILDINGS

FOREWORD

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IEC/TR 62222, which is a technical report, has been prepared by subcommittee 46C: Wires and symmetric cables, of IEC technical committee 46: Cables, wires, waveguides, r.f. connectors, r.f. and microwave passive components and accessories.

This second edition cancels and replaces the first edition published in 2005. It constitutes a technical revision.

The 2005 technical report was the first attempt in understanding the potential fire hazards concerning new installations where large quantities of data cable are involved. Although it is important to remember that data cables will probably not spontaneously combust and offices are still filled with other highly flammable products, the increase of "flood wiring" should be a building design concern. This second edition attempts to align all the installation guides found and further improve safety with fire and its possible transmission. Projects that formed the

overall direction of the 2005 edition have been taken into account, enabling an overall general improvement of the document..

The text of this technical report is based on the following documents:

Enquiry draft	Report on voting
46C/959/DTR	46C/962/RVC

Full information on the voting for the approval of this technical report can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

FIRE PERFORMANCE OF COMMUNICATION CABLES INSTALLED IN BUILDINGS

1 Scope

This Technical Report provides recommendations for the requirements and test methods to be specified for the fire performance of communication cables when installed in buildings.

The recommendations relate to typical applications and installation practices for copper and optical cables in buildings. This Technical Report includes an assessment of the fire hazards presented by such installations, and describes fire scenarios that have been established and the appropriate cable fire performances to mitigate these hazards. ISO/IEC 14763-2 recommends installation methods which, together with this Technical Report, provide guidelines for improving safety during fire.

The recommendations also take into account legislation and regulation applicable to the fire performance of cables, an assessment of known test methods and their ability to measure the recommended fire performance.

Power cables are usually segregated from communication cables for electrical safety and installed differently so they have not been addressed in this Technical Report.

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.

IEC 60332-1 (all parts), *Tests on electric and optical cables under fire conditions – Part 1: Test for vertical flame propagation for a single insulated wire or cable*

IEC 60332-1-2, *Tests on electric and optical fibre cables under fire conditions – Part 1-2: Test for vertical flame propagation for a single insulated wire or cable – Procedure for 1 kW pre-mixed flame*

IEC 60332-1-3, *Tests on electric and optical fibre cables under fire conditions – Part 1-3: Test for vertical flame propagation for a single insulated wire or cable – Procedure for determination of flaming droplets/particles*

IEC 60332-2 (all parts), *Tests on electric and optical cables under fire conditions – Part 2: Test for vertical flame propagation for a single small insulated wire or cable*

IEC 60332-2-2, *Tests on electric and optical fibre cables under fire conditions – Part 2-2: Test for vertical flame propagation for a single small insulated wire or cable – Procedure for diffusion flame*

IEC 60332-3 (all parts), *Tests on electric and optical cables under fire conditions – Part 3: Test for vertical flame spread of vertically-mounted bunched wires or cables*

IEC 60332-3-24, *Tests on electric and optical fibre cables under fire conditions – Part 3-24: Test for vertical flame spread of vertically-mounted bunched wires or cables – Category C*

IEC 60695 (all parts), *Fire hazard testing*

IEC 60695-1-10:2009, *Fire hazard testing – Part 1-10: Guidance for assessing the fire hazard of electrotechnical products – General guidelines*

IEC 60695-1-11, *Fire hazard testing – Part 1-11: Guidance for assessing the fire hazard of electrotechnical products – Fire hazard assessment*

IEC 60695-5-1, *Fire hazard testing – Part 5-1: Corrosion damage effects of fire effluent – General guidance*

IEC/TS 60695-5-2, *Fire hazard testing – Part 5-2: Corrosion damage effects of fire effluent – Summary and relevance of test methods*

IEC 60695-6-1, *Fire hazard testing – Part 6-1: Smoke obscuration – General guidance*

IEC 60695-6-2, *Fire hazard testing – Part 6-2: Smoke obscuration – Summary and relevance of test methods*

IEC 60695-7-1, *Fire hazard testing – Part 7-1: Toxicity of fire effluent – General guidance*

IEC 60695-7-2, *Toxicity of fire effluent – Part 7-2: Summary and relevance of test methods*

IEC 60695-7-3, *Fire hazard testing – Part 7-3: Toxicity of fire effluent – Use and interpretation of test results*

IEC 60695-8-1, *Fire hazard testing – Part 8-1: Heat release – General guidance*

IEC/TR 60695-8-2, *Fire hazard testing – Part 8-2: Heat release – Summary and relevance of test methods*

IEC 60695-9-1, *Fire hazard testing – Part 9-1: Surface spread of flame – General guidance*

IEC/TS 60695-9-2, *Fire hazard testing – Part 9-2: Surface spread of flame – Summary and relevance of test methods*

IEC 60754 (all parts), *Test on gases evolved during combustion of materials from cables*

IEC 60754-1, *Test on gases evolved during combustion of materials from cables – Part 1: Determination of the halogen acid gas content*

IEC 60754-2, *Test on gases evolved during combustion of materials from cables – Part 2: Determination of acidity (by pH measurement) and conductivity*

IEC 60794 (all parts), *Optical fibre cables*

IEC 61034 (all parts), *Measurement of smoke density of cables burning under defined conditions*

IEC 61034-1:2005, *Measurement of smoke density of cables burning under defined conditions – Part 1: Test apparatus*

IEC 61034-2:2005, *Measurement of smoke density of cables burning under defined conditions – Part 2: Test procedure and requirements*

IEC 61156 (all parts), *Multicore and symmetrical pair/quad cables for digital communications*

IEC 62012-1, *Multicore and symmetrical pair/quad cables for digital communications to be used in harsh environments – Part 1: Generic specification*

ISO/IEC 11801, *Information technology – Generic cabling for customer premises*

ISO 13571, *Life-threatening components of fire – Guidelines for the estimation of time available for escape using fire data*

ISO/IEC 13943:2008, *Fire safety – Vocabulary*

ISO/IEC 14763-2, *Information technology – Implementation and operation of customer premises cabling – Part 2: Planning and installation*

ISO 9705, *Fire tests – Full-scale room test for surface products*

ISO 19706:2011, *Guidelines for assessing the fire threat to people*

EN 13501-1, *Fire classification of construction products and building elements – Part 1: Classification using test data from reaction to fire tests*

EN 13823, *Reaction to fire tests for building products – Building products, excluding floorings, exposed to the thermal attack by a single burning item*

EN 50174-2, *Information technology – cabling installation – Part 2 Installation planning and practises inside buildings*

EN 50267-2-3, *Common test methods for cables under fire conditions – Tests on gases evolved during combustion of materials from cables – Part 2-3: Procedures – Determination of degree of acidity of gases for cables by determination of the weighted average of pH and conductivity*

EN 50289-4-11, *Communication cables – Specifications for test methods – Part 4-11: Environmental test methods – A horizontal integrated fire test method*

EN 50399, *Common test methods for cables under fire conditions – Heat release and smoke production measurement on cables during flame spread test – Test apparatus, procedures, results*

BS 7671, *Requirements for electrical installations*

CSA FT4, Canadian Standards Association, *CSA 22.2 No. 03-01, Vertical flame test – Cables in cable trays*

CSA FT6, Canadian Standards Association, *CSA 22.2 No. 03-01, Horizontal flame and smoke test*

NFPA 262, *Standard method of test for flame travel and smoke of wires and cables for use in air handling spaces (formerly UL 910)*

UL 1666, Underwriters Laboratories, Inc., *Test for flame propagation height of electrical and optical fibre cables installed vertically in shafts*

UL 1685, Underwriters Laboratories, Inc., *Standard for vertical tray fire propagation and smoke release test for electrical and optical fibre cables*

UL VW-1, Underwriters Laboratories, Inc., *VW-1 (vertical specimen) flame test – UL 1581, Reference standard for electrical wires, cables and flexible cords*

3 Terms, definitions and abbreviations

For the purposes of this document, the terms and definitions given in ISO/IEC 13943, some of which are reproduced below for the user's convenience, as well as the following apply, together with some which are based on EN 13501-1.

3.1 Defined terms

3.1.1
asphyxiant
toxicant that causes hypoxia, which can result in central nervous system depression or cardiovascular effects

[SOURCE: ISO 13943:2008, 4.17]

3.1.2
cabling
system of telecommunication cables, cords and connecting hardware that can support the connection of information technology equipment

3.1.3
chimney effect
upward movement of hot fire effluent caused by convection currents confined within an essentially vertical enclosure

[SOURCE: ISO 13943:2008, 4.41]

3.1.4
combustible
capable of being ignited and burned

[SOURCE: ISO 13943:2008, 4.43]

3.1.5
combustion
exothermic reaction of a substance with an oxidizing agent

Note 1 to entry: Combustion generally emits fire effluent accompanied by flames and/or glowing.

[SOURCE: ISO 13943:2008, 4.46]

3.1.6
fire compartment
enclosed space, which may be subdivided, separated from adjoining spaces by fire barriers

Note 1 to entry: Compartments are also known as "fire compartments".

[SOURCE: ISO 13943:2008, 4.102]

3.1.7
compartmentation
division of a premise into compartments in order to provide protection for the rest of the premises

3.1.8
convection
transfer of heat by movement of a fluid

[SOURCE: ISO 13943:2008, 4.54]

3.1.9
contribution to fire
energy released by a product influencing the fire growth

3.1.10
corrosion damage
physical and/or chemical damage or impaired function caused by chemical action

[SOURCE: ISO 13943:2008, 4.56]

3.1.11
damaged length
maximum extent in a specified direction of damaged area

3.1.12
draught-free environment
space in which the results of experiments are not significantly affected by the local air speed

Note 1 to entry: A qualitative example sample is a space in which a wax candle flame (3.1.36) remains essentially undisturbed. Quantitative example examples are small-scale fire tests in which a maximum air speed of 0,1m.s^{-1} or 0,2 m.s^{-1} is sometimes specified.

[SOURCE: ISO 13943:2008, 4.70]

3.1.13
enclosure
<built environment> volume defined by bounding surfaces, which may have one or more openings

[SOURCE: ISO 13943:2008, 4.77]

3.1.14
end use application
real application of a product in relation to all aspects that influence the behaviour of that product under different fire situations

3.1.15
fire
<general> process of combustion characterized by the emission of heat and fire effluent and usually accompanied by smoke, flame, glowing or a combination thereof

3.1.16
fire attack
thermal attack by fire test burner

3.1.17
fire behaviour
change in, or maintenance of, the physical and/or chemical properties of an item and/or structure exposed to fire

Note 1 to entry: This concept covers both reaction to fire and fire resistance.

[SOURCE: ISO 13943:2008, 4.100]

3.1.18
fire compartment
enclosed space, which may be subdivided, separated from adjoining spaces by fire barriers

[SOURCE: ISO 13943:2008, 4.102]

3.1.19
fire danger
concept including both fire hazard and fire risk

[SOURCE: ISO 13943:2008, 4.103]

3.1.20
fire effluent
totality of gases and aerosols, including suspended particles, created by combustion or pyrolysis in a fire

[SOURCE: ISO 13943:2008, 4.105]

3.1.21
fire-effluent transport
movement of fire effluent from the location of the fire

[SOURCE: ISO 13943:2008, 4.107]

3.1.22
fire exposure
extent to which persons, animals or items are subjected to the conditions created by fire

[SOURCE: ISO 13943:2008, 4.108]

3.1.23
fire extinguishment
process that eliminates combustion

[SOURCE: ISO 13943:2008, 4.109]

3.1.24
fire growth
stage of fire development during which the heat release rate and the temperature of the fire are increasing

[SOURCE: ISO 13943:2008, 4.111]

3.1.25
fire growth rate index
FIGRA index
maximum quotient of heat release rate from a specimen and the time of its occurrence

3.1.26
fire hazard
physical object or condition with a potential for an undesirable consequence from fire

[SOURCE: ISO 13943:2008, 4.112]

3.1.27
fire load
quantity of heat which can be released by the complete combustion of all the combustible materials in a volume, including the facings and bounding surfaces

Note 1 to entry: Fire load may be based on effective heat of combustion gross heat of combustion or net heat of combustion as required by the specifier.

[SOURCE: ISO 13943: 4.114]

3.1.28
fire performance
response of a test specimen when exposed to a fire test

[SOURCE: ISO 13943:2008, 4.117]

3.1.29
fire propagation
combination of flame spread and spread of fire effluent

[SOURCE: ISO 13943:2008, 4.120]

3.1.30
fire resistance
ability of a test specimen to withstand fire or give protection from it for a period of time

Note 1 to entry: Typical criteria used to assess fire resistance in a standard fire test are fire integrity, fire stability and thermal insulation material.

[SOURCE: ISO 13943:2008, 4.121]

3.1.31
fire retardance
flame retardance, fire retardant and flame retardant

[SOURCE: ISO 13943:2008, 4.122]

3.1.32
fire retardant, noun
substance added, or a treatment applied, to a material in order to delay ignition or to reduce the rate of combustion

[SOURCE: ISO 13943:2008, 4.123]

3.1.33
fire risk
probability of a fire combined with a quantified measure of its consequences

Note 1 to entry: It is often calculated as the product of probability and consequence.

[SOURCE: ISO 13943:2008, 4.124]

3.1.34
fire safety management
application and service life maintenance of procedures to achieve fire-safety objectives

[SOURCE: ISO 13943:2008, 4.127]

3.1.35
fire safety objective
desired outcome with respect to the probability of an unwanted fire, relative to essential aspects of the built environment

Note 1 to entry: The essential aspects typically relate to the issues of life safety, conservation of property, continuity of operations, protection of the environment and preservation of heritage.

[SOURCE: ISO 13943:2008, 4.128]

3.1.36
fire scenario
qualitative description of the course of a fire with respect to time, identifying key events that characterize the studied fire and differentiate it from other possible fires

[SOURCE: ISO 13943:2008, 4.129]

3.1.37
fire severity
capacity of a fire to cause damage

[SOURCE: ISO 13943:2008, 4.130]

3.1.38
fire situation
stage in the development of a fire, characterized by the nature, severity and size of the thermal attack on the products involved

3.1.39
fire test
test that measures behaviour of a fire or exposes an item to the effects of a fire

Note 1 to entry: The results of a fire test can be used to quantify fire severity or determine the fire resistance or reaction to fire of the test specimen.

[SOURCE: ISO 13943:2008, 4.132]

3.1.40
flame, noun
rapid, self-sustaining, sub-sonic propagation of combustion in a gaseous medium, usually with the emission of light

[SOURCE: ISO 13943:2008, 4.133]

3.1.41
flame, verb
produce flame

[SOURCE: ISO 13943:2008, 4.134]

3.1.42
flame application time
period of time for which a burner flame is applied to a test specimen

[SOURCE: ISO 13943:2008, 4.135]