



SLOVENSKI STANDARD

SIST EN 50290-4-1:2015

01-junij-2015

Nadomešča:

SIST EN 50290-4-1:2002

Komunikacijski kabli - 4-1. del: Splošno o uporabi kablov - Okoljski pogoji in varnostni vidiki

Communication cables - Part 4-1: General considerations for the use of cables - Environmental conditions and safety aspects

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Ta slovenski standard je istoveten z: EN 50290-4-1:2014

ICS:

33.120.10 Koaksialni kabli. Valovodi Coaxial cables. Waveguides

SIST EN 50290-4-1:2015

en,fr,de

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EUROPEAN STANDARD

EN 50290-4-1

NORME EUROPÉENNE

EUROPÄISCHE NORM

December 2014

ICS 33.120.10

Supersedes EN 50290-4-1:2001

English Version

Communication cables - Part 4-1: General considerations for the use of cables - Environmental conditions and safety aspects

Kommunikationskabel - Teil 4-1: Allgemeine Betrachtungen für die Anwendung der Kabel - Bedingung der Umgebung und Sicherheitsaspekte

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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.

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

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Foreword

This document (EN 50290-4-1:2014) has been prepared by CLC/TC 46X "Communication 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) 2015-06-05
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2016-09-16

This document supersedes EN 50290-4-1:2001.

EN 50290-4-1:2014 includes the following significant technical changes with respect to EN 50290-4-1:2001:

- Clauses related to fire reaction and fire resistance have been updated to take into account the recent development of supporting standards for the CPR.

This standard should be read in conjunction with EN 50290-1-1 and is completed by generic, sectional, family and detail specifications, as appropriate, to describe in a detailed manner each type of cable with its specific characteristics.

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.

This standard covers the Principle Elements of the Safety Objectives for Electrical Equipment Designed for Use within Certain Voltage Limits (LVD - 2006/95/EC).

EN 50290-4, *Communication cables — General considerations for the use of cables*, is divided into the following sub-parts:

- *Part 4-1: Environmental conditions and safety aspects* [the present document];
- *Part 4-2: Guide to use*.

1 Scope

This European Standard gives the environmental conditions and safety aspects of symmetrical, coaxial and optical cables used for the infrastructure of communication and control networks.

2 Normative references

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

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

EN 13501-6, *Fire classification of construction products and building elements — Part 6: Classification using data from reaction to fire tests on electric cables*

EN 50289-3 (all parts), *Communication cables — Specifications for test methods*

EN 50289-4 (all parts), *Communication cables — Specifications for test methods*

EN 50290-1-2, *Communication cables — Part 1-2: Definitions*

EN 50290-2-2X (all parts), *Communication cables*

EN 50575:2014, *Power, control and communication cables — Cables for general applications in construction works subject to reaction to fire requirements*

EN 60068-2-11, *Environmental testing — Part 2-11: Tests — Test Ka: Salt mist (IEC 60068-2-11)*

EN 60068-2-14, *Environmental testing — Part 2-14: Tests — Test N: Change of temperature (IEC 60068-2-14)*

EN 60068-2-27, *Environmental testing — Part 2-27: Tests — Test Ea and guidance: Shock (IEC 60068-2-27)*

EN 60068-2-42, *Environmental testing — Part 2-42: Tests — Test Kc: Sulphur dioxide test for contacts and connections (IEC 60068-2-42)*

EN 60068-2-53, *Environmental testing — Part 2-53: Tests and guidance: Combined climatic (temperature/humidity) and dynamic (vibration/shock) tests (IEC 60068-2-53)*

FprEN 60794-1-21¹⁾, *Optical fibre cables — Part 1-21: Generic specification — Basic optical cable test procedures - Mechanical tests methods (IEC 60794-1-21)*

EN 61169-1:2013, *Radio-frequency connectors — Part 1: Generic specification — General requirements and measuring methods (IEC 61169-1:2013)*

IEC 62012-1:2002, *Multicore and symmetrical pair/quad cables for digital communications to be used in harsh environments — Part 1: Generic specification*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 50290-1-2 apply.

4 Environmental conditions and installation aspects

4.1 General

The reliability of the cables and their expected lifetime depend upon how the environmental conditions (during storage, installation and operation) are taken into account in their design.

1) By the time of publication of the present document, this reference is at Committee Draft stage in the IEC under the reference "6A/1582/CDV".

The following subclauses address environmental aspects that can impact the reliability of the communication cables.

4.2 Relationship with EC directives

4.2.1 EMC Directive

Though cables as products are not under the scope of the EMC directive, they are used to interconnect apparatus as described in the directive.

The equipment supplier, system designer and operators shall be aware that the interconnection of cables may affect the overall system EMC performance.

Mitigation practices as developed in some installation guides can decrease the level of electromagnetic influence.

To help the systems users and the designers to fulfil the EMC directive requirements by an adequate choice of cables, the electromagnetic behaviour of each cable shall be given in the relevant specification and described by screening performance and balanced properties.

4.2.2 Low voltage directive

Depending upon the actual application for which they are used, communication and control cables may have to carry signals, the voltage of which can exceed DC 100 V or AC 75 V.

These cables fall under the low voltage directive and have to be designed, tested and marked accordingly.

The relevant cable specification shall take into account the requirements of the low voltage directive.

Demonstration of compliance with the essential requirements of the LVD is done either through a technical file or when the cable fulfils the following diagram.

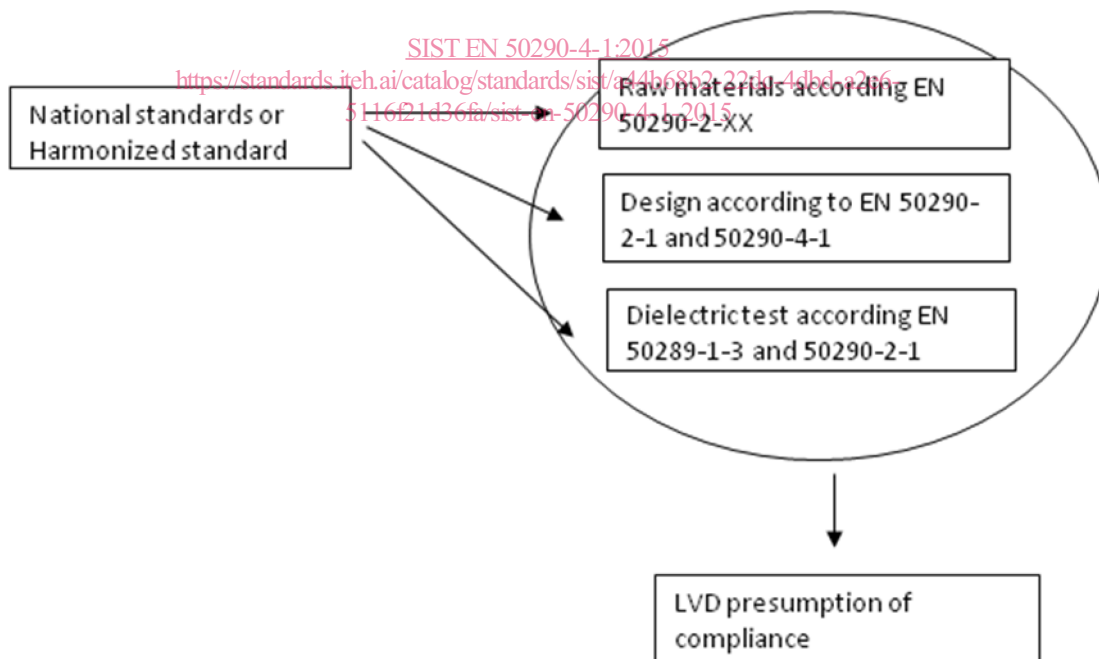


Figure 1

4.2.3 Construction product directive/ Construction Product regulation

4.2.3.1 General

Communication and control cables fall under the scope of the construction product regulation, when installed in construction works.

In case where CPD applies consideration shall be taken to the following:

- resistance to fire where applicable (e.g. for fire alarm systems, fire fighting support systems,...);
- reaction to fire;
- durability;
- release of dangerous substances under normal circumstances.

4.2.3.2 Resistance to fire

Communication cables packaging and/or labelling shall be tested according to EN 50289-4-16 for the claimed Euroclass as defined in EN 13501-3.

When applicable, the communication cables packaging and/or labelling will be CE marked according to EN 50XXX:201X²⁾, Annex ZZ.

4.2.3.3 Reaction to fire

EN 50575 specifies reaction to fire performance requirements, test and assessment methods for communication cables, which are intended for use in construction works.

After having been tested according to EN 50575 for the claimed Euroclass as defined in EN 13501-6, communication cables packaging and/or labelling shall be CE marked according to EN 50575:2014, Annex ZZ.

4.2.3.4 Durability

The relevant cable specification shall include mechanical and environmental requirements to be tested in accordance with EN 50289-3 (all parts) and EN 50289-4 (all parts) (see 4.3).

Durability is presumed to be demonstrated when the cables pass the mechanical and environmental tests as given in the sectional specification.

4.2.3.5 Release of dangerous substances

During the normal operating life of the cable no dangerous substances given in the updated list of the Council Directive 76/769/EEC will be released.

Cables using materials according to the EN 50290-2-2X series comply with this requirement.

Other materials shall be subjected to the appropriate tests.

4.3 Environmental conditions

4.3.1 Relationship between environmental conditions and severities of testing

4.3.1.1 General

The purpose of environmental engineering is to render the product and the environment compatible. It should take all economic and technical aspects into consideration and thereby choose the best test methods and correct severities for the evaluation of the product's ability to comply with the environmental conditions. A test program for the product is defined whereby the test sequence together with the test methods and limits are specified.

4.3.1.2 Environmental conditions

The environmental conditions shall be evaluated by measurements or by other information available so that statistically probable characteristic values can be established corresponding to the highest possible

2) At the date of publication of the present document, EN 50XXX:201X, which is currently bound to be entitled, *Power, control and communication cables — Cables for general applications in construction works subject to fire resistance requirements*, is not published yet.

constraints. Each situation has an environment of its own but it is not reasonable to prescribe individual products having slightly different withstand properties for each individual situation. It is necessary to combine these environments into a class forming an envelope of related environments. It is only necessary to take into account those parameters that influence the performance of the product. The environment shall cover all the conditions that occur during the life of the product, i.e. storage, transportation, handling and use.

4.3.1.3 Environmental testing

The purpose of an environmental test is to demonstrate that a product under defined environmental conditions can survive without permanent failure and function according to specification. The severity of the test to be selected will depend on the characteristic values obtained for the parameters, the failure mechanism, the ageing factor, if known, and the consequences of failure. The latter will have been studied by the utilisation of the particular product and depends on its application. This means that the severity of the test can be raised or lowered according to the criticality of the product. If the sampling of the product suggests wide variations in its ability to withstand the environment the level of testing should be increased. If the distribution of environmental constraints and the resistance to the environment of a lot tested are suspected to partially overlap, the test levels can be raised to clarify this weakness.

4.3.2 Climatic environment and severities for environmental tests

4.3.2.1 General

An environmental test can be performed for many purposes. In most cases the environmental tests are one part of the qualification approval tests. In this case a test of resistance to the environment demonstrates the ability of the product to function under constraints or withstand stated constraints.

There are, however, inherent limitations due to the fact that the test is usually carried out on a few samples. The results give protection to a particular design but not to an individual product. The successful test will ensure that the product as a type is capable of withstanding the expected environments. Different kinds of tests and severity levels are necessary for product reliability and endurance.

An outline of the action needed for the preparation of an environmental test specification is given in Figure 2.

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4.3.2.2 Climatic sequence

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The test shall be performed according to EN 50289-4-5. Unless otherwise required in the sectional or detail specification one of the following recommended severities shall be selected:

- low temperature: - 10 °C - 15 °C - 25 °C - 40 °C - 45 °C;
- high temperature: + 60 °C + 70 °C + 85 °C + 125 °C + 155 °C + 200 °C;
- duration: 10 d, 21 d.

4.3.2.3 Damp heat steady state

This test shall be carried out in accordance with Test Ca of EN 60068-2-53 with the specific conditions as described in EN 50289-4-7.

Unless otherwise required in the sectional or detail specification, the following recommended severity shall be selected:

- duration: 10 d.