

SLOVENSKI STANDARD

SIST EN 50289-1-5:2002

01-september-2002

Communication cables - Specifications for test methods - Part 1-5: Electrical test methods - Capacitance (Note: Applies in conjunction with EN 50289-1-1)

Communication cables - Specifications for test methods -- Part 1-5: Electrical test methods - Capacitance

Kommunikationskabel - Spezifikationen für Prüfverfahren -- Teil 1-5: Elektrische Prüfverfahren - Kapazität

Câbles de communication - Spécifications des méthodes d'essais -- Partie 1-5: Méthodes d'essais électriques - Capacité

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Ta slovenski standard je istoveten z: EN 50289-1-5:2001

ICS:

33.120.20	Źice in simetrični kabli	Wires and symmetrical cables
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en

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EUROPEAN STANDARD

EN 50289-1-5

NORME EUROPÉENNE

EUROPÄISCHE NORM

June 2001

ICS 33.120.20

English version

Communication cables - Specifications for test methods Part 1-5: Electrical test methods - Capacitance

Câbles de communication -
Spécifications des méthodes d'essais
Partie 1-5: Méthodes d'essais électriques -
Capacité

Kommunikationskabel - Spezifikationen
für Prüfverfahren
Teil 1-5: Elektrische Prüfverfahren -
Kapazität

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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.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

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 50289-1-5 on 2001-03-01.

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) 2002-04-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2004-04-01

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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1 Scope

Part 1-5 of EN 50289 details the test methods to determine the capacitance characteristics of the finished cables used in analogue and digital communication systems.

It is to be read in conjunction with Part 1-1 of EN 50289, which contains essential provisions for its application.

2 Normative references

This European 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 publications are listed hereafter. For dated references, subsequent amendments to or revisions of any 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 publication referred to applies (including amendments).

EN 50289-1-1 2001 Communication cables – Specifications for tests methods -- Part 1-1: Electrical test methods – General requirements

EN 50290-1-2¹⁾ - Communication cables -- Part 1-2: Definitions

3 Definitions

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For the purpose of this European Standard, the definitions of EN 50290-1-2 apply in addition to the following ones.

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3.1

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mutual capacitance

the mutual capacitance/km (C_{mu}) of a pair (or with respect to the side of a quad) is the effective capacitance under balanced conditions, see Figure 1.

$$C_{mu} = C_{AB} + (C_{AG} \times C_{BG} / (C_{AG} + C_{BG})) \quad (\text{nF/km}) \quad (1)$$

It can be measured directly with balanced bridges.

3.1.1

measure of a pair under unbalanced conditions

alternatively, the mutual capacitance/km (C_{mu}) can be determined from the asymmetrical capacitances and calculated using the following formula :

$$C_{mu} = \frac{C_1 + C_2}{2} - \frac{C_3}{4} - \frac{(C_1 - C_2)^2}{4C_3} \quad (\text{nF/km}) \quad (2)$$

where

C_1 = capacitance/km between conductor “a” and conductor “b” with conductor “b” connected to all other conductors, screen, if any, and earth.

Accordingly, to the figure below, $C_1 = C_{AB} + C_{AG}$;

¹⁾ At draft stage

C_2 = capacitance/km between conductor “b” and conductor “a” with conductor “a” connected to all other conductors and screen, if any.

Accordingly, to the figure below, $C_2 = C_{AB} + C_{BG}$;

C_3 = capacitance/km between the conductors of the pair connected together and all other conductors connected to the screen, if any, and earth

Accordingly, to the figure below, $C_3 = C_{AG} + C_{BG}$.

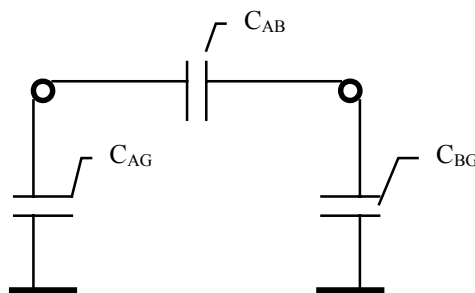


Figure 1 - Mutual capacitance

3.1.2 coaxial cables

the capacitance between inner and outer conductor with outer conductor connected to earth (when measuring).

3.2 capacitance unbalance to earth

the capacitance unbalance/km (C_u) to earth of a pair (or with respect to the side of a quad) is defined as

$$C_u = C_{AG} - C_{BG} \quad (\text{pF/km}) \quad (3)$$

It can be measured directly with balanced bridges.

3.2.1 measurement under unbalanced conditions

using asymmetrical test equipment the capacitance unbalance/km (C_u) to earth of a pair (or with respect to the side of a quad) is defined as

$$C_u = C_1 - C_2 \quad (\text{pF/km}) \quad (4)$$

where

C_u = capacitance unbalance of reference length and reference temperature;

C_1 = capacitance between conductor ‘a’ and conductor ‘b’ with conductor ‘b’ connected to all other conductors, to the screen and to earth;

C_2 = capacitance between conductor ‘b’ and conductor ‘a’ with conductor ‘a’ connected to all other conductors, to the screen and to earth.

4 Test method

4.1 Equipment

The measurement of the mutual capacitance and capacitance unbalance to earth shall be performed with a.c. at a frequency range between 500 Hz and 2 kHz.

To measure mutual capacitance a three (3) terminal capacitance bridge shall be used for balanced conditions and a two (2) terminal capacitance bridge shall be used for unbalanced conditions.

The accuracy shall be better than 1 %.

4.2 Test sample

The cable under test (CUT) shall have a minimum length of 100 m and both ends of the CUT shall be prepared to avoid stray capacitance.

4.3 Procedure

The test shall be carried out on the CUT after the continuity or the conductor resistance test.

The measuring equipment shall be calibrated according to the manufacturers specification. Test leads shall be involved in the calibration procedure.

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4.3.1 Unsymmetrical cables

For coaxial cables C_{mu} is measured between the inner and the outer conductor with the outer conductor connected to earth.

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For multicore cables C_{mu} shall be measured with one conductor against all others (circulating all conductors) and the screen, if any, connected to the earth.

4.3.2 Symmetrical cables

4.3.2.1 Mutual capacitance measured under balanced conditions

The measuring voltage shall be applied to the pair or side of a quad with all other conductors and screens, if any, connected to earth.

4.3.2.2 Mutual capacitance measured under unbalanced conditions

Measure C_1 , C_2 , and C_3 in accordance with 3.1.1.

4.3.3 Capacitance unbalance to earth

The capacitance unbalance to earth shall be measured in accordance with 3.2. All screens shall be earthed.

5 Expression of test results

5.1 Expression of mutual capacitance

The test result of the mutual capacitance shall be normalised to the reference length of 1 km.