

Communication cables - Specifications for test methods
- Part 1-11: Electrical test methods - Characteristic
impedance, input impedance, return loss

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN 50289-1-11:2016 sisaldab Euroopa standardi EN 50289-1-11:2016 ingliskeelset teksti.	This Estonian standard EVS-EN 50289-1-11:2016 consists of the English text of the European standard EN 50289-1-11:2016.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 16.12.2016.	Date of Availability of the European standard is 16.12.2016.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 33.120.20

Standardite reprodutseerimise ja levitamise õigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonsesse süsteemi või edastamine ükskõik millises vormis või millisel teel ilma Eesti Standardikeskuse kirjaliku loata on keelatud.

Kui Teil on küsimusi standardite autorikaitse kohta, võtke palun ühendust Eesti Standardikeskusega:
Koduleht www.evs.ee; telefon 605 5050; e-post info@evs.ee

The right to reproduce and distribute standards belongs to the Estonian Centre for Standardisation

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without a written permission from the Estonian Centre for Standardisation.

If you have any questions about copyright, please contact Estonian Centre for Standardisation:

Homepage www.evs.ee; phone +372 605 5050; e-mail info@evs.ee

English Version

**Communication cables - Specifications for test methods - Part
1-11: Electrical test methods - Characteristic impedance, input
impedance, return loss**

Câbles de communication - Spécifications des méthodes
d'essai - Partie 1-11: Méthodes d'essais électriques -
Impédance caractéristique, impédance d'entrée,
affaiblissement de réflexion

Kommunikationskabel - Spezifikationen für Prüfverfahren -
Teil 1-11: Elektrische Prüfverfahren - Wellenwiderstand,
Eingangsimpedanz, Rückflußdämpfung

This European Standard was approved by CENELEC on 2016-09-05. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.



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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents	Page
European foreword	4
1 Scope	5
2 Normative references	5
3 Terms and definitions	5
4 Test method for mean characteristic impedance (S_{21} type measurement)	10
4.1 Principle	10
4.2 Expression of test results	10
5 Test method for input impedance and return loss (S_{11} type measurement)	10
5.1 Method A: measurement of balanced cables using balun setup	10
5.1.1 Test Equipment	10
5.1.2 Test sample	11
5.1.3 Calibration procedure	11
5.1.4 Measuring procedure	12
5.2 Method B: measurement of balanced cables using balun-less setup	12
5.2.1 Test Equipment	12
5.2.2 Test sample	13
5.2.3 Calibration procedure	13
5.2.4 Measuring procedure	13
5.3 Method C: measurement of coaxial cables	14
5.3.1 Test Equipment	14
5.3.2 Test sample	14
5.3.3 Calibration procedure	14
5.3.4 Measuring procedure	15
5.4 Expression of test results	15
6 Test report	17
Annex A (normative) Function fitting of input impedance	18
A.1 General	18
A.2 Polynomial function for function fitting of input impedance	18
A.3 Fewer terms	19
Annex B (normative) Correction procedures for the measurement results of return loss and input impedance	21
B.1 General	21
B.2 Parasitic inductance corrected return loss (<i>PRL</i>)	21
B.3 Gated return loss (<i>GRL</i>)	23
B.4 Fitted return loss (<i>FRL</i>)	25
B.5 Comparison of gated return loss (<i>GRL</i>) with fitted return loss (<i>FRL</i>)	31

B.6 Influence of the correction technique on return loss peaks	32
Annex C (normative) Termination loads for termination of conductor pairs.....	35
C.1 General	35
C.2 Verification of termination loads.....	36
Bibliography	37

This document is a preview generated by EVS

European foreword

This document [EN 50289-1-11:2016] 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) 2017-09-05
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2019-09-05

This document supersedes EN 50289-1-11:2001.

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.

1 Scope

This part of EN 50289 details the test methods to determine characteristic impedance, input impedance and return loss of cables used in analogue and digital communication systems.

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

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 50289-1-1:2001, *Communication cables - Specifications for test methods - Part 1-1: Electrical test methods - General requirements*

EN 50289-1-5:2001, *Communication cables - Specifications for test methods - Part 1-5: Electrical test methods - Capacitance*

EN 50289-1-7:2001, *Communication cables - Specifications for test methods - Part 1-7: Electrical test methods - Velocity of propagation*

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

3 Terms and definitions

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

3.1

characteristic impedance

Z_c

(wave) impedance at the input of a homogeneous line of infinite length. The characteristic impedance Z_c of a cable is defined as the quotient of a voltage and current wave which are propagating in the same direction, either forwards or backwards.

$$Z_c = \frac{u_f}{i_f} = \frac{u_r}{i_r} \quad (1)$$

where

Z_c is characteristic impedance;

$u_{f,r}$ is voltage wave propagating in forward respectively reverse direction;

$i_{f,r}$ is current wave propagating in forward respectively reverse direction.