SLOVENSKI STANDARD

SIST HD 120 S1:2002

prva izdaja
september 2002

Characteristic impedance and dimesions of radi-frquency coaxial cables

ICS 33.120.10

Referenčna številka
SIST HD 120 S1:2002(en)

CENELEC

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INFORMATION SHEET

HD 120 S1

Issue 3 1988-01-20

Characteristic impedances and dimensions of radio-frequency coaxial cables

Impédance caractéristiques et dimensions des câbles coaxiaux pour fréquences radioélectriques

Wellenwiderstand und Abmessungen von HF-Koaxialkabel

RD: IEC 78 (1967) ed 3; IEC/SC 46A (not appended)

The Harmonization Document consists of the following :

- Title Page

Related to Directive: -

date of ratification : 1974-05-07
date of announcement :
date of latest publication : 1976-01-01
date of withdrawal :

List of national deviations

LIST OF NATIONAL STANDARDS IS GIVEN OVERLEAF

AT : NOS

BE : NOS

CH : SEV/ASE 3018.1970

DE : DIN 47 260/06.71

DK : DS/IEC 78 (1978)

ES : UNE 20 527 II

FI : NOS

FR : NOS

GB : BS 2316 : Part 3 : 1969 (1981)

GR : NOS

IE : NOS

IT : NOS

LU : NOS

NL : NEN 10 078 (1967)

NO : NOS

PT : NOS

SE : SEN 43 03 01 (1961)

COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

(affiliée à l'Organisation Internationale de Normalisation — ISO)

RECOMMANDATION DE LA CEI

INTERNATIONAL ELECTROTECHNICAL COMMISSION

(affiliated to the International Organization for Standardization — ISO)

IEC RECOMMENDATION

Publication 78

Troisième édition — Third edition

1967

Impédances caractéristiques et dimensions des câbles coaxiaux pour fréquences radioélectriques

Characteristic impedances and dimensions of radio-frequency coaxial cables

Bureau Central de la Commission Electrotechnique Internationale

1, rue de Varembé

Genève, Suisse

Prix Fr. s.
Price S. Fr. 7.50

INTERNATIONAL ELECTROTECHNICAL COMMISSION

CHARACTERISTIC IMPEDANCES AND DIMENSIONS OF RADIO-FREQUENCY COAXIAL CABLES

FOREWORD

1) The formal decisions or agreements of the I E C on technical matters, prepared by Technical Committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.

2) They have the form of recommendations for international use and they are accepted by the National Committees in that sense.

3) In order to promote this international unification, the I E C expresses the wish that all National Committees having as yet no national rules, when preparing such rules, should use the I E C recommendations as the fundamental basis for these rules in so far as national conditions will permit.

4) The desirability is recognized of extending international agreement on these matters through an endeavour to harmonize national standardization rules with these recommendations in so far as national conditions will permit. The National Committees pledge their influence towards that end.

PREFACE

This Recommendation has been prepared by Sub-Committee 40-2, R.F. Transmission Lines and their Accessories (now Sub-Committee 46A, R.F. Cables and their Accessories) of IEC Technical Committee No. 46, Cables, Wires and Waveguides for Telecommunication Equipment.

The international standardization of the rated characteristic impedances of radio-frequency coaxial cables was first discussed at an informal meeting of a Group of Experts held in the Hague in 1953. From this discussion, it appeared that the majority of countries were in favour of standardizing the impedances of 50 ohms and 75 ohms, although in some countries the value of 60 ohms was used or was the only standard. The subject was further discussed officially at the first meeting of Sub-Committee 12-5, High-frequency Cables and Connectors, held in Lugano in 1954 and again at a meeting held in Philadelphia in 1954. During the latter meeting, a draft was accepted for submission to the National Committees for approval under the Six Months' Rule. This draft specified standard diameters over dielectric appropriate to solid polyethylene dielectric cables of 50 and 75 ohms impedance. As a result, the first edition of IEC Publication 78 was published in 1956.

During the meeting of Sub-Committee 40-2, which had, in the meanwhile, succeeded Sub-Committee 12-5, held in Munich in 1956, it was decided that a questionnaire should be circulated to National Committees, regarding the inclusion in a second edition of additional values for characteristic impedances appropriate to dielectrics other than solid polyethylene. The answers received were discussed during a meeting held in Zurich in 1957 and the Secretariat was requested to draw up a draft for this second edition. A draft was accepted at a meeting held in Stockholm in 1958 for submission to the National Committees for approval under the Six Months' Rule. Comments received during the Six Months' voting period were discussed at a meeting held in Ulm in 1959; when a few amendments were accepted for submission to the National Committees for approval under the Two Months' Procedure. The second edition of Publication 78 was published in 1961.

After approval of a number of additional diameters over dielectric together with the introduction of a specification sheet for a cable having a characteristic impedance of 100 ohms, the Secretariat circulated a proposal for revision of the second edition. Resulting from the comments received, a draft was circulated to the National Committees for approval under the Six Months' Rule in December 1965.

The following countries voted explicitely in favour of publication:

Australia	Netherlands
Belgium	Sweden
Czechoslovakia	Switzerland
Denmark	Turkey
Finland	United Kingdom
France	United States of America
Germany	Union of Soviet Socialist Republics
Japan	

CHARACTERISTIC IMPEDANCES AND DIMENSIONS OF RADIO-FREQUENCY COAXIAL CABLES

1. Scope

This Recommendation gives recommendations for rated characteristic impedances and associated dimensions over the dielectric for radio-frequency cables.

2. Characteristic impedances

All impedances in this clause are defined at a frequency of 200 MHz (Mc/s) and at the reference temperature of 20 °C.

2.1 *Coaxial cables*

Standard values of rated characteristic impedance are:

50 ohms
75 ohms
100 ohms

2.2 *Twin conductor cables*

Standard value of rated characteristic impedance is:

— For unscreened types: 300 ohms.

2.3 *Dual coaxial cables*

For dual coaxial types no standard values of characteristic impedance are specified. It is recommended that the construction of these cables shall be based on the standardized coaxial cables in Clause 3.

3. Standard diameters over dielectric and characteristic impedances for coaxial cables

3.1 Standard rated diameters over dielectric, the characteristic impedances for coaxial cables and the tolerances thereon shall be in accordance with Table I.

TABLE I

Dielectric	Impedance in ohms		Diameter over dielectric			
			Millimetres		Inches	
	Rated value	Tolerance ±	Rated value	Tolerance ±	Rated value	Tolerance ±
Solid polyethylene	50	2.0	1.50	0.10	0.060	0.004
		2.0	2.95	0.13	0.116	0.005
		2.0	7.25	0.25	0.285	0.010
		1.0 *	7.25	0.15	0.285	0.006
		2.0	11.50	0.30	0.453	0.012
		2.0	17.30	0.40	0.680	0.016
	75	3.0	3.70	0.13	0.146	0.005
		1.5 *	3.70	0.10	0.146	0.004
		3.0	7.25	0.25	0.285	0.010
		1.5 *	7.25	0.15	0.285	0.006
		3.0	17.30	0.40	0.680	0.016
Cellular polyethylene	75	5.0	3.70	0.33	0.146	0.005
			4.80	0.18	0.189	0.007
			7.25	0.25	0.285	0.010
Polytetrafluorethylene	50	3.5	0.87	0.07	0.034	0.003
		3.5	1.50	0.10	0.060	0.004
		2.0	2.95	0.13	0.116	0.005
		2.0	7.25	0.15	0.285	0.006
		2.0	11.50	0.30	0.453	0.012
	75	5.0	1.50	0.10	0.060	0.004
		3.0	3.70	0.13	0.146	0.005
		3.0	7.25	0.25	0.285	0.010
Semi air-spaced polyethylene	100	6.0	3.70	0.13	0.146	0.005

* Close tolerance cables

Notes 1. — The standardized characteristic impedances are based upon the value of Z_m determined from measurement of velocity ratio and capacitance on any suitable length of cable.

2. — The specified tolerances do not take into account experimental errors in measurement.

3.2 For future development the diameters over dielectric of the standard types shall be adopted wherever possible.

Note. — For cables having an impedance of 100 ohms, a specification sheet for one type has been included in IEC Publication 96-2, Radio-Frequency Cables, Part 2, Relevant Cable Specifications, and reference is made to this cable in Table I. Specification sheets for other types of cable having an impedance of 100 ohms may be included in IEC Publication 96-2 in the future.