SLOVENSKI STANDARD
SIST EN 3475-805:2004

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Aerospace series - Cables, electrical, aircraft use - Test methods - Part 805: Characteristic impedance

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Luft- und Raumfahrt - Elektrische Leitungen für Luftfahrtverwendung - Prüfverfahren - Teil 805: Wellenwiderstand

Série aérospatiale - Câbles électriques a usage aéronautique - Méthodes d'essais - Partie 805: Impédance caractéristique

Ta slovenski standard je istoveten z: EN 3475-805:2002

ICS:

49.060	Š^æ•\æ¿Á¿^•[||∙\æ ^|^\dã}æÁ]¦^{ æ¿Á~ãc^{ ã	Aerospace electric equipment and systems

SIST EN 3475-805:2004   **en**

2003-01.Slovenski inštitut za standardizacijo. Razmnoževanje celote ali delov tega standarda ni dovoljeno.

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 3475-805

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ICS 49.060

English version

Aerospace series - Cables, electrical, aircraft use - Test methods - Part 805: Characteristic impedance

Série aérospatiale - Câbles électriques à usage
aéronautique - Méthodes d'essais - Partie 805: Impédance
caractéristique

Luft- und Raumfahrt - Elektrischen Leitungen für Luftfahrt
Verwendung - Prüfverfahren - Teil 805: Wellenwiderstand

This European Standard was approved by CEN on 20 January 2002.

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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 CEN member into its own language and notified to the Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36   B-1050 Brussels

Ref. No. EN 3475-805:2002 E

EN 3475-805:2002 (E)

Foreword

This document (EN 3475-805:2002) has been prepared by the European Association of Aerospace Manufacturers (AECMA).

After enquiries and votes carried out in accordance with the rules of this Association, this Standard has received the approval of the National Associations and the Official Services of the member countries of AECMA, prior to its presentation to CEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 2002, and conflicting national standards shall be withdrawn at the latest by December 2002.

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According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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1 Scope

This standard specifies methods for measuring the characteristic impedance of a cable.

It shall be used together with EN 3475-100.

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.

EN 3475-100   Aerospace series – Cables, electrical, aircraft use – Test methods – Part 100: General

EN 3475-804   Aerospace series – Cables, electrical, aircraft use – Test methods – Part 804: Velocity of propagation

3 Preparation of specimens

These shall be stripped and prepared for connection to the measuring device.

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4 Methods

4.1 Method A: measurement with impedance bridge on coaxial cable

Length of sample: $\geq$ 3 m
Equipment: impedance measuring bridge
Frequency: as indicated in the product standard

Measuring principle: the input impedance of the sample shall be measured first with its end in open circuit (Z_{co}) and then with its end in short circuit (Z_{cc}).

The characteristic impedance of the cable shall be calculated from these two measurements using the following formula:

$$Z_c = \sqrt{Z_{co} \cdot Z_{cc}}$$

4.2 Method B: reflectometer measurement on coaxial cable

The measurement shall be taken using the same equipment and on the same sample as for the velocity of propagation, connected in the same way according to EN 3475-804.

The characteristic impedance Z_c of the cable shall be calculated from the reflection coefficient shown on the oscilloscope screen using the formula:

$$Z_c = Z_o \frac{1 + \rho}{1 - \rho}$$

so that Z_o = value in ohms of characteristic impedance in common mode.

EN 3475-805:2002 (E)

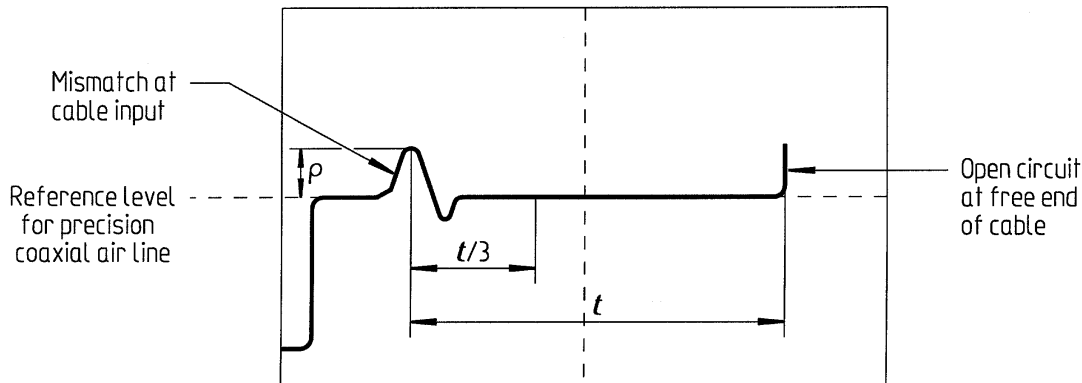Measurement of ρ shall be taken one metre from the cable input ($t/3$).

Figure 1

4.3 Method C: shielded symmetric cable measurement

The characteristic impedance of the cable at the specified frequency shall be derived from the input impedance of a length of cable when its far end is put in open and short circuit, using the following formula:

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$$Z_c = \sqrt{Z_{co} \cdot Z_{cc}} \qquad (1)$$

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Z_{co} and Z_{cc} shall be derived from the reflection coefficients ρ_{co} and ρ_{cc} at the input of the length of cable, using the following formulas:

$$Z_{co} = Z_b \cdot \frac{1 + \rho_{co}}{1 - \rho_{co}} \qquad (2)$$

$$Z_{cc} = Z_b \cdot \frac{1 + \rho_{cc}}{1 - \rho_{co}} \qquad (3)$$

In which Z_b is the characteristic impedance of the test set up at the place where the cable is connected.

4.3.1 Apparatus

– A vectoriel network analyser able to make reflexion measurement on one port devices

– A balun with:

    1) coaxial port matched to the characteristic impedance Z_c of the network analyser;

    2) symmetrical port with characteristic impedance $Z_b = 75\ \Omega$.
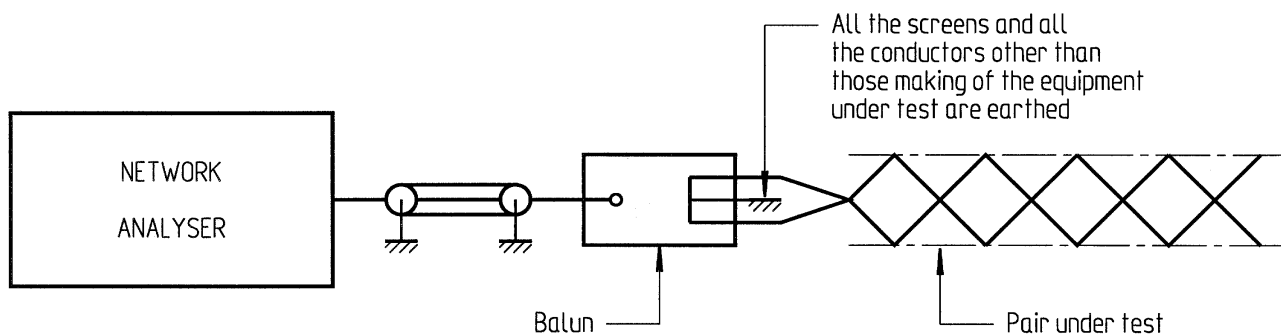
See figure 2.

Figure 2

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4.3.2 Measurement procedure

Calibration

The scattering parameters of the balun shall be derived from the reflection coefficients measured at the coaxial port of the balun when its symmetrical port is loaded as it follows:

– open circuit $\qquad$ ρ sym co

– short circuit $\qquad$ ρ sym cc

– matched $Z_b = 75\ \Omega$ $\qquad$ ρ sym ad

by the following formulas:

$$s_{11} = \rho\ \text{sym ad} \qquad\qquad (4)$$

$$s_{22} = \frac{2\ \rho\ \text{sym ad} - \rho\ \text{sym cc} - \rho\ \text{sym co}}{\rho\ \text{sym cc} - \rho\ \text{sym co}} \qquad (5)$$

$$s_{12} \cdot s_{21} = (\rho\ \text{sym ad} - \rho\ \text{sym cc})\ (1 - s_{22}) \qquad (6)$$

4.3.3 Measurements

The values of the reflection coefficients at the coaxial port of the balun shall be measured with the symmetrical port loaded by the length of cable to be measured, when its far end is as it follows:

– open circuit $\qquad$ ρ'_{co}

– short circuit $\qquad$ ρ'_{cc}

The values of the reflection factor at the input of the cable shall be derived from the above values by the following formulas:

$$\ell_{cc} = \frac{\rho'_{cc} - s_{11}}{s_{22}\ (\rho'_{cc} - s_{11}) + s_{12} \cdot s_{21}}$$

$$\ell_{co} = \frac{\rho'_{co} - s_{11}}{s_{22}\ (\rho'_{cc} - s_{11}) + s_{12} \cdot s_{21}}$$

Z_{co} and Z_{cc} are derived from the formulas given in (2) and (3).

Z_c is derived from the formula given in (1).

5 Requirement

The characteristic impedance shall be within the limits indicated in the product standard.