SLOVENSKI STANDARD
oSIST prEN 3475-811:2023

01-julij-2023

Aeronavtika - Električni kabli za uporabo v zračnih plovilih - Preskusne metode - 811. del: Neenakomerno slabljenje

Aerospace series - Cables, electrical, aircraft use - Test methods - Part 811: Unbalance attenuation

Luft- und Raumfahrt - Elektrische Leitungen für Luftfahrtverwendung - Prüfverfahren - Teil 811: Unsymmetriedämpfung

Série aérospatiale - Câbles électriques à usage aéronautique - Méthode d'essai - Partie 811: Affaiblissement de dissymétrie

Ta slovenski standard je istoveten z: **prEN 3475-811**

ICS:

29.060.20	Kabli	Cables
49.060	Letalska in vesoljska električna oprema in sistemi	Aerospace electric equipment and systems

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EUROPEAN STANDARD

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English Version

Aerospace series - Cables, electrical, aircraft use - Test methods - Part 811: Unbalance attenuation

Série aérospatiale - Câbles électriques à usage aéronautique - Méthode d'essai - Partie 811: Affaiblissement de dissymétrie

Luft- und Raumfahrt - Elektrische Leitungen für Luftfahrtverwendung - Prüfverfahren - Teil 811: Unsymmetriedämpfung

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee ASD-STAN.

If this draft becomes a European Standard, CEN 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.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

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Contents

Page

European foreword 3
1 Scope 4
2 Normative references 4
3 Terms and definitions 4
4 Preparation of specimens 5
5 Apparatus 5
6 Methods 6
6.1 Calibration 6
6.2 LCL measurement 7
6.3 LCTL measurement 7
7 Requirements 8
Bibliography 9

European foreword

This document (prEN 3475-811:2023) has been prepared by the Aerospace and Defence Industries Association of Europe — Standardization (ASD-STAN).

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

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 3475-811:2009.

The main changes compared to the previous edition are as follows:

— addition of reference to EN 50289-1-9 to the scope;

— editorial revision of the document.

Any feedback and questions on this document should be directed to the users' national standards body. A complete listing of these bodies can be found on the CEN website.

1 Scope

This document specifies methods for measuring unbalance attenuation signal in common mode converted into differential mode caused by the characteristics of symmetry of transmission cables. Terms relative to this attenuation are defined in Clause 3.

It is intended to be used together with EN 3475-100 and EN 50289-1-9.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

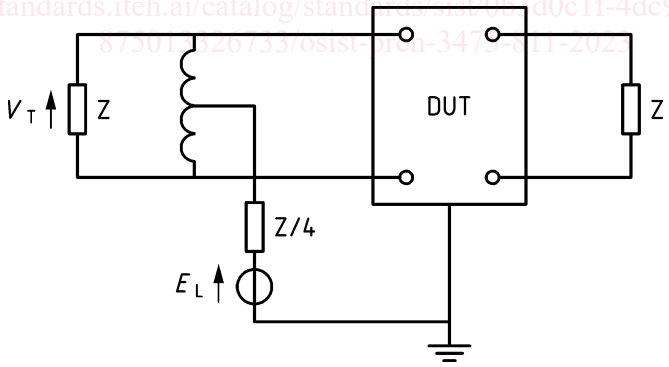
ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp/

— IEC Electropedia: available at https://www.electropedia.org/

3.1
longitudinal conversion loss
LCL
logarithmic ratio of the signal injected in common mode at the near end with the resulting differential signal at the near end from a symmetrical pair

Note 1 to entry: The LCL is equal to the attenuation of dissymmetry to the near end when the cable under test is finished with the same impedance that defines for the measurement of the asymmetrical attenuation. (See Figure 1.)



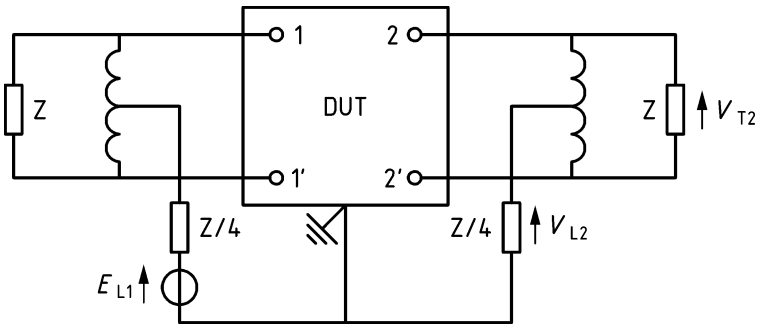
$$\mathrm{LCL} = 20 \log_{10} \left| \frac{E_{\mathrm{L}}}{V_{\mathrm{T}}} \right| \mathrm{dB}$$

NOTE DUT Device Under Test.

Figure 1 —LCL measurement schematic

3.2
longitudinal conversion transfer loss
LCTL
logarithmic ratio of the signal injected in common mode at the near end with the resulting differential signal at the far end distant from a symmetrical pair

Note 1 to entry: The LCTL is equal to the attenuation of dissymmetry at the far end added with the attenuation from the cable under test when this one is terminated with the same impedance that defines for the measurement of the attenuation of dissymmetry. (See Figure 2.)



$$\mathrm{LCTL} = 20 \log_{10} \left| \frac{E_{\mathrm{L1}}}{V_{\mathrm{T2}}} \right| \mathrm{dB}$$

Figure 2 — LCTL measurement schematic

4 Preparation of specimens

Test specimen shall be of (100 ± 1) m length.

The ends of the cable under test shall be prepared in such way that the assembly of the pairs/quads is maintained.

For unscreened twisted pair cables, it is mandatory to create a defined return common-mode path. This is normally achieved by earthing all other pairs. However, the cable under test may be wound onto a metal drum. In this case the drum, the adjacent pairs and screens, if present, should be earthed.

5 Apparatus

— HF Network Analyser;

— two impedance transformers with centre tap on the secondary windings available (3 ports baluns);

— coaxial cables;

— different resistors terminations.

The baluns should have the following characteristics:

— primary impedance:	50 Ω	unbalanced;
— secondary impedance:	100 Ω	balanced;
— common-mode port impedance:	high impedance;	
— insertion loss:	3 dB	maximum;
— return loss secondary:	20 dB	minimum;
— return loss, common mode:	10 dB	minimum;
— longitudinal balance:	60 dB	minimum;
— output signal balance:	50 dB	minimum;
— common-mode rejection:	50 dB	minimum.

6 Methods

6.1 Calibration

a) For the reference line calibration over the whole specified frequency range the same coaxial cables used for the measurements shall be used by connecting them between the analyser output and the input.

b) Two identical baluns shall be used for the measurements. The baluns shall be connected back to back on the symmetrical output side and their attenuation measured over the specified frequency range. A short length connection shall be used (see Figure 3). The calculated insertion loss is recorded as $Il_{bal,DM}$.

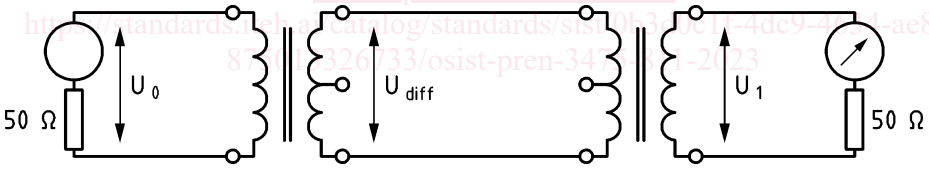


Figure 3 — Set-up for the measurement of the differential-mode loss of the baluns

c) The attenuation of the common signals of the test balun is measured by connecting the common-mode port terminals to the differential output terminals of the test balun (see Figure 4). The output terminals of the test balun are short-circuited and connected to the inner conductor of the coaxial test lead. The outer shield of the coaxial test lead should be bonded to the ground plane. The measured insertion loss is recorded as $Il_{bal,CM}$.

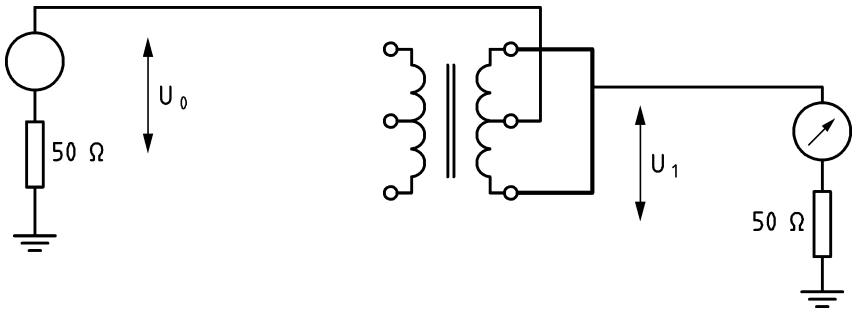
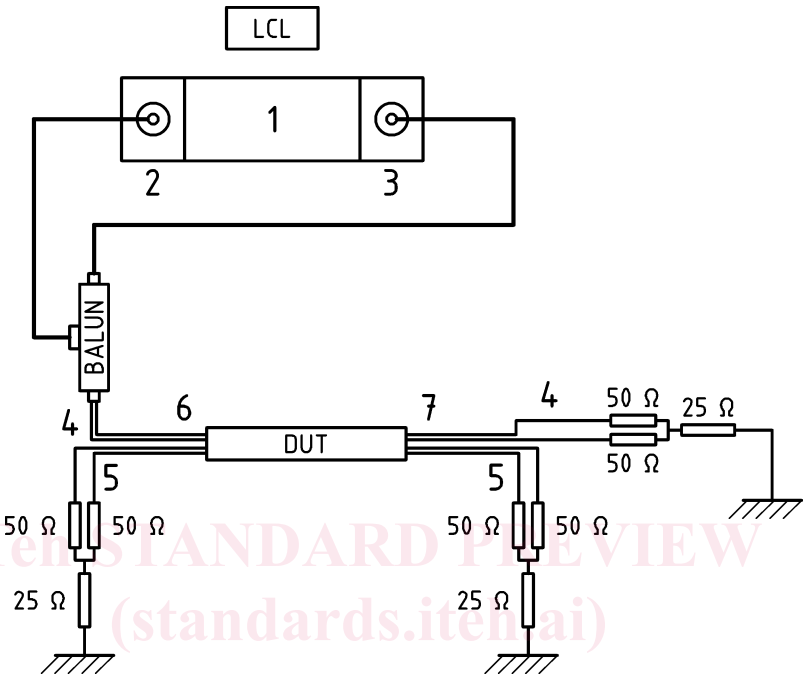


Figure 4 — Set-up for the measurement of the common-mode loss of the baluns

Finally the computing correction is: Cor_LCLcal = 3 dB − $Il_{bal,DM}$ − $Il_{bal,CM}$

6.2 LCL measurement

The DUT pair under test should be connected to the differential mode balun output terminals. All unused pairs should be terminated with the suitable resistors as shown in Figure 5. The loads and the cable shielding should be connected on the same ground plane.



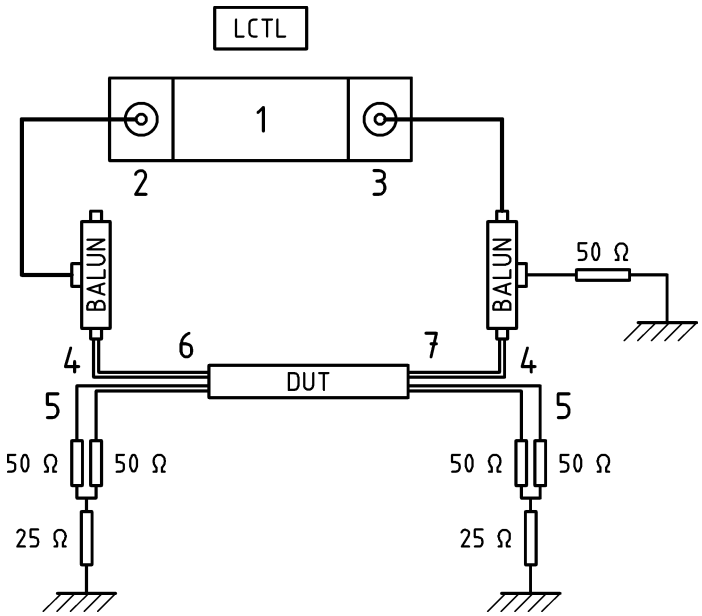
Key

1	net work analyser	5	pair 2
2	port 1	6	near
3	port 2	7	far
4	pair 1		

Figure 5 — DUT termination schematic for LCL

6.3 LCTL measurement

The DUT pair under test should be connected to the differential mode balun output terminals, and the far-end to the second differential mode balun. All unused pairs should be terminated with the suitable resistors as shown in Figure 6. The loads and the cable shielding should be connected on the same ground plane.



Key

1	net work analyser	5	pair 2
2	port 1	6	near
3	port 2	7	far
4	pair 1		

Figure 6 — DUT termination schematic for LCTL

7 Requirements

The LCL or LCTL values obtained shall not exceed the values specified in the product standard.