



SLOVENSKI STANDARD

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Aeronautical ground lighting electrical installation - Isolating transformer: Equipment specifications and tests

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ICS:

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93.120	Gradnja letališč	Construction of airports

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Descriptors: Electrical installation, lighting, aérodrome, transformer, specification, designation, classification, test, marking

English version

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This European Prestandard (ENV) was approved by CENELEC on 1996-07-02 as a prospective standard for provisional application. The period of validity of this ENV is limited initially to three years. After two years the members of CENELEC will be requested to submit their comments, particularly on the question whether the ENV can be converted into a European Standard (EN).

CENELEC members are required to announce the existence of this ENV in the same way as for an EN and to make the ENV available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force (in parallel to the ENV) until the final decision about the possible conversion of the ENV into an EN is reached.

CENELEC members are the national electrotechnical committees of Austria, Belgium, 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 Prestandard was prepared by the CENELEC BTTF 72-3, Lighting fittings for aerodromes.

The text of the draft was submitted to the CENELEC questionnaire and vote and was approved as ENV 50232 on 1996-07-02.

The following date was fixed:

- latest date by which the existence of the ENV
has to be announced at national level (doa) 1996-12-01

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Introduction

This prestandard concerns isolating transformers used in electrical series circuits for supplying ground airport lighting luminaires, installed to give pilots visual cues during approach, landing, take off and taxiing. These lights are not used to light any ground surface, but shall provide some references to pilots.

This is why there is a strong link between the following requirements and those issued from ICAO standards.

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1 Scope

This prestandard specifies the nominal characteristics of the isolating transformers used in airfield ground lighting for 6,6 A series circuits supplied by Constant Current Regulators up to 30 kW in rating.

This prestandard is applicable to isolating transformer used to supply through its secondary circuit airport lighting luminaires. The isolating transformer provides electrical insulation, between the primary circuit supplied by a constant current regulator and the secondary connected to the load (generally the lamp of the luminaire) under conditions specified in this prestandard.

Specific transformers used to deliver a alternative voltage or a constant current on its secondary circuit, are not included in this prestandard.

The document is in accordance with ICAO Annex 14.

In any case any new operational need for Air Navigation Safety could change some data or principle issued in this document.

2 Normative references

This European prestandard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at 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.

ENV 50231	Aviation ground lighting electrical installation Constant current regulator: Equipment specifications and tests
prENV 50233	Aviation ground lighting electrical installation Connecting devices: Equipment specifications and tests
EN 60742	Isolating transformer and safety isolating transformers Requirements (IEC 742 + A1, mod.)
HD 383	Conductors of insulated cables (IEC 228)
ICAO	International standards and recommended practices, Aerodromes Annex 14 to the Convention on International Civil Aviation, Volume 1 and 2, Aerodrome Design and Operations (Issued by International Civil Aviation Organisation)
ISO 9002	Quality systems - Model for quality assurance in design, development, production, installation and servicing

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of this prestandard the following definitions apply, as well as those given in ICAO Annex 14.

3.1.1 isolating

In all this document the word "isolating " shall be interpreted as defined in EN 60742.

3.1.2 type test

A test for the purpose of checking compliance of the design of a given product with the requirements of the relevant specification. Type tests are selected in agreement with the manufacturer or responsible vendor.

3.1.3 production test

A test for the purpose of checking the compliance of a batch of series products for acceptance. This test is defined in this standard.

3.1.4 rated voltage

The RMS voltage at which the transformer was designed to operate under normal load conditions.

3.1.5 nominal wattage

The wattage at which the transformer was designed to supply full resistive load under normal conditions.

3.1.6 rated current

The RMS current at which the transformer was designed to operate.

3.1.7 rated frequency

The frequency or frequency range for which the transformer has been designed.

3.1.8 isolating transformer

Isolating transformers are defined in EN 60742.

3.1.9 safety isolating transformer

Safety isolating transformers are defined in EN 60742.

3.1.10 safety Extra-Low Voltage (SELV)

Safety Extra low voltage is defined in EN 60742.

3.2 Symbols and abbreviations

IT:	Isolating transformer used in airfield lighting.
CCR:	Constant Current Regulator as specified in ENV 50231.
A1, A2:	primary and secondary currents measured by ammeters.
V1, V2:	primary and secondary voltages measured by voltmeters.
W1, W2:	wattage measurements of respectively primary and secondary circuit of IT.

4 General requirements

4.1 Isolating transformer

The rated primary current shall be **6,6 A**.

The transformers shall be enclosed in a permanently sealed insulating case so as to produce a completely watertight assembly. The thickness of the encapsulation shall be not less than **6,5 mm** anywhere, whatever the type of encapsulation.

The transformers shall have two electrically and physically separate windings, one primary and one secondary wound on a magnetic circuit.

The magnetic core shall have no connection neither to earth, nor to one of the electrical circuits.

An external earthing terminal linked to a well identified pole of the secondary may be required.

All internal connections shall be made by high-pressure crimping or high-temperature soldering.

The nominal characteristics as the nominal values on the secondary and the nominal wattage are specified in table 1.

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Table 1

Nominal wattage W	Primary current A
45	6,6
65	6,6
100	6,6
150	6,6
200	6,6
300	6,6

The encapsulation of the transformers shall provide a continuous and watertight bond with its connection cables/connectors.

The construction of the transformer shall ensure its characteristics given in 4.3 and the dielectric strength between the primary circuit on one hand and either the secondary circuit or the outside surrounding on the other hand shall be at least **12 kV RMS** for **1 min**.

The minimum length of the creepage path between primary and secondary shall be as specified in EN 60742.

4.2 Connection cables

4.2.1 Primary cables

The isolating transformer shall be connected to the airfield lighting primary series circuit cable via two flexible copper cables with at least **6 mm²** cross section, and minimum length **50 cm**. The rated service voltage for the cable shall be **6 kV** test voltage **35 kV DC**.

One cable shall have a moulded on male prENV 50233 type 1, class A, style 2 connector at its end.

The other cable shall have a moulded on female prENV 50233 type 1, class A, style 9 connector.

4.2.2 Secondary

Connection shall be by a section of two-pole cable of section **2 x 4 mm²** or **2 x 2,5 mm²**, service voltage minimum **600 V** and minimum length of **1,2 m**.

These cables shall have female prENV 50233 type 2, class A, style 7 or 8 connectors at their ends.

4.2.3 Characteristics

The connectors shall be protected by watertight plugs/caps.

The connector encapsulation, the cable's sheath and the transformer body shall be made of compatible materials.

No cracks shall appear at the junctions between them, when the transformer and its connectors is manufactured as a single entity.

The primary and secondary cables shall be flexible, class **5** or **6** specified in HD 383.

4.3 Electrical characteristics

4.3.1 Secondary current

The tolerance on the secondary current for nominal loading and a rated current shall be equal to the nominal value $\pm 1 \%$, i.e. **6,53 A** or **6,67 A**.

4.3.2 Power factor

At nominal resistive load and rated primary current, for all types of transformer, the power factor shall be greater than **95 %**.

4.3.3 Efficiency

At nominal resistive load and rated primary current the efficiency of the transformer shall be at least **85 %** for transformers rated below and equal to **70 W** and **90 %** for transformers rated above **70 W**.

4.3.4 Short-circuited secondary

For a rated primary current, the secondary short-circuit current shall be less than **6,90 A**.

4.3.5 Off-load voltage

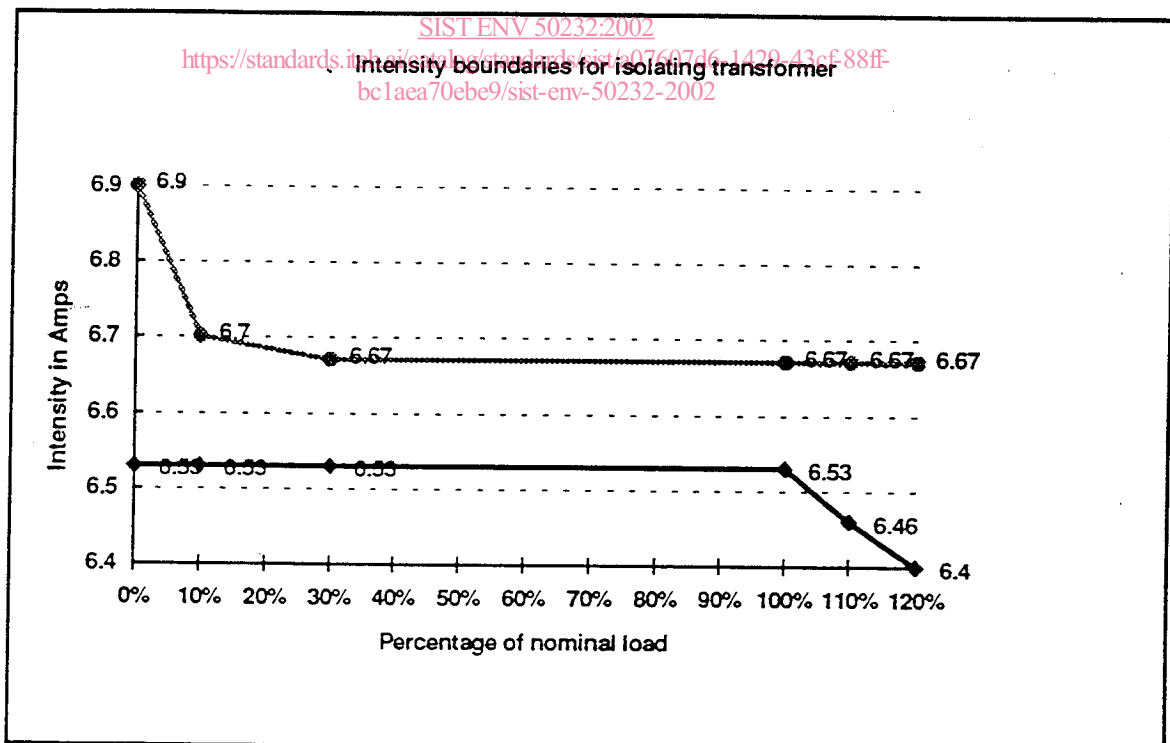
With the secondary in open circuit, the r.m.s. voltage at its terminals shall not exceed **50 V** for all type of transformers.

4.3.6 Acceptable load

In order to take account of the lamp power tolerances, losses in the cables connecting the lights to the transformers, and tolerances on the primary current, the permanent allowable load on the secondary could be above the nominal value in a such a way that the secondary intensity shall be maintained inside of the limits described in 4.3.7 when the load is increased to **120 %** of the nominal value.

4.3.7 Intensity diagram

In any case, for any load **from 0 % to 120 %** of the rated value the secondary current shall be maintained inside of the boundaries described in figure 1.



NOTE: For a secondary current I , different from 6,6 A, the corresponding correcting factor ($I/6,6$ A) shall be applied to the present values.

Figure 1: Intensities boundaries for isolating transformer