SLOVENSKI STANDARD
SIST ENV 50231:1999

01-julij-1999

Aviation ground lighting electrical installation - Constant current regulator: Equipment specifications and tests

Aeronautical ground lighting electrical installation - Constant current regulator: Equipment specifications and tests

Ta slovenski standard je istoveten z: **ENV 50231:1997**

ICS:

29.140.50	Instalacijski sistemi za razsvetljavo	Lighting installation systems
93.120	Gradnja letališč	Construction of airports

SIST ENV 50231:1999 **en**

EUROPEAN PRESTANDARD

PRÉNORME EUROPÉENNE

EUROPÄISCHE VORNORM

ENV 50231

February 1997

ICS 93.120

Descriptors: Electrical installation, lighting, aerodrome, regulator, specification, designation, classification, test, marking

English version

Aeronautical ground lighting electrical installation Constant current regulator: Equipment specifications and tests

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).

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CENELEC

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

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Ref. No. ENV 50231:1997 E

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 50231 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

Contents

Introduction

This prestandard concerns Constant Current Regulator (CCR) used to supply airport lighting luminaires, installed to give pilots visual cues during landing, take off and taxiing. These lights are not used to light any ground surface, but shall provide some references to pilots. The light intensity of each cue shall be adjusted with a good accuracy. This fact is obtained by ICAO requirements for isocandela diagrams of each type of source and by monitoring the current by a Constant Current Regulator.

The earth fault indicator is maintained in this Constant Current Regulator prestandard. In the future, the relevant clause should be included in installation and maintenance specifications under consideration.

1 Scope

This prestandard covers constant current regulators used in series circuits of aviation ground lighting installations.
This prestandard is applicable to constant current regulator assemblies, including control and monitoring devices, used for supply of a constant current to series connected light sources in airfield lighting systems. The Constant Current Regulator is designed to produce a constant current output independent of variations in the circuit load or, in some limits, of variations in the input voltage to the Constant Current Regulator.
The object is to provide equipment specifications and tests for constant current regulators used on airport that are considered necessary to meet the operational standards adopted by ICAO and to cover all aspects of safety (electrical, thermal and mechanical).
This prestandard is in accordance with ICAO Annex 14.
Any new operational need for Air Navigation Safety purposes could change some data or principles issued in this prestandard.

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.

EN 50081-2	Electromagnetic compatibility - Generic emission standard Part 2: Industrial environment
EN 50082-2	Electromagnetic compatibility - Generic immunity standard Part 2: Industrial environment
ENV 50232	Aviation ground lighting electrical installation Isolating transformer: Equipment specifications and tests
EN 60204	Safety of machinery - Electrical equipment of machines
EN 60240	Characteristics of electrical infra-red emitters for industrial heating
EN 60529	Degrees of protection provided by enclosures (Code IP)
EN 60947-2	Low-voltage switchgear and controlgear Part 2: Circuit breakers
EN 60950	Safety of information technology equipment, including electrical business equipment
HD 398	Power transformers (IEC 76, modified)
HD 472 S1	Nominal voltages for low voltage public electricity supply systems (IEC 38, modified)
HD 553 S2	Current transformers (IEC 185, modified)

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 9001	Quality systems - Model for quality assurance in design, development, production, installation and servicing

3 Definitions, symbols and abbreviations

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

3.1 Definitions

3.1.1 **Constant Current Regulator:** able to supply with a constant current, a serial loop built with airfield lighting luminaires, each of them very often supplied through an isolating transformer.

3.1.2 **Constant Current:** constant as specified in this prestandard that no significant change could be noticed by an observer.

3.2 Symbols and abbreviations

CCR: Constant current regulator

In: nominal current

LV: Low Voltage

ELV: Extra Low Voltage

HV: High Voltage

4 General requirements

4.1 General characteristics

A CCR is designed to supply airport series lighting circuits with a constant current.
The CCR shall be designed to produce a constant current output independent of variations in the circuit load or, in some limits, of variations in the input voltage to the CCR.

The rated current output by the CCR shall be **6,6 A**.

The CCR shall comprise at least ***5 adjustable*** intensity levels between **2,8 A and 6,6 A.**

The standard power levels on the CCR secondary shall be:

2,5 kVA - 5 kVA - 7,5 kVA - 10 kVA - 12,5 kVA - 15 kVA - 20 kVA - 25 kVA - 30 kVA.

The standard input voltage should be obtained between two lines of the local network voltage.

The standard values are the following values as specified in HD 472 S1:1989 and IEC 38:1983:

$$400\ V\ ^{+10}_{-10}\ \%$$

$$230\ V\ ^{+10}_{-10}\ \%$$

The frequency shall be one of the two following values:

50 Hz ± 2 Hz or 60 Hz ± 2 Hz

4.2 Operating conditions

The equipment shall be designed to operate sheltered in the following conditions:

a) temperature limits: **from - 20 °C to + 50 °C,**
b) Relative humidity of **95 %** or less, non-condensing.
c) Altitude **from 0 m to 1000 m**, with the derating characteristics according to clause 9 of HD 553 S2.

4.3 Power transformer

This transformer shall comply with the requirements of HD 398.
The two following types could be accepted:

- dry type cooled by natural air convection;
- oil immersed.

The insulation requirements between primary and secondary, and between secondary and ground shall meet the requirements of following values:

Type I: Voltage test **3 000 V a.c.**
Type II: Voltage test **10 000 V a.c.**
Type III: Voltage test **20 000 V a.c.**

4.4 Regulation

The CCR shall be equipped with at least five adjustable steps.
The nominal outputs are listed in table 1.

4.4.1 On resistive load

The r.m.s. value of the output current shall be maintained within the limits 1 % for each setting, at any load between full load and short-circuit. The input voltage could vary **from 95 % to 110 %** of the nominal input voltage.

The CCR shall accept a sudden load variation of up to 50 % of the rated value, in which case the recovery to ± 1 % accuracy shall be less than **0,25 s**.

Table 1: For 5 steps CCR

Steps	Nominal Output (r.m.s.) A	Limits of minimal value A	Limits of maximal value A
5	6,6	6,53	6,67
4	5,2	5,14	5,26
3	4,1	4,05	4,15
2	3,4	3,35	3,45
1	2,8	2,75	2,85

4.4.2 On reactive load

The limits of the regulation shall be met at nominal voltage, with a load connected via isolating transformers. The percentage of secondaries of the transformers in open-circuit shall represented no more than 30 % of the connected load.

The load of the CCR before opening of the secondaries could be between 50 % and 100 % of the nominal load.
If more than 30 % of the transformers are in open circuit, the current shall not exceed 6,7 A.

4.5 Efficiency

The efficiency of the CCR operating on a full resistive load shall not be less than 0,90 for any CCR.
It shall be measured at maximum intensity step for rated supply voltage and frequency.

4.6 Power factor

With a nominal resistive load and at maximum intensity step brightness, for rated supply voltage and frequency, the power factor of the CCR shall be at least 0,90 for any CCR rating.

4.7 Load matching

Regulators, rated **10 kVA** and more, shall match connected loads from rated load to approximately 50 % of the rated load.

The following requirements shall be met:
On resistive loads in the range **from 75 % to 100 %** of the nominal load, at rated supply voltage, current set at 6,6 A, the efficiency and the power factor shall be not less than the value specified above.

If not, partial load taps shall be provided to allow a more precise adjustment.
Load steps of a value close to 1/8 of the nominal load are considered to be satisfactory.

4.8 Remote control system

The system shall be controlled remotely for any levels of output current by parallel wiring or serial interfaces.
The design of the remote control shall be such that the following inputs and outputs are available, given in table 2:

Table 2: Example for 6 brillancies

Input

Numbering	Designation
1	Common
2	Request brilliancy 1 (maximum i.e. 6,6 A)
3	Request brilliancy 2
4	Request brilliancy 3
5	Request brilliancy 4
6	Request brilliancy 5
7	Request brilliancy 6
8	
9	

Output

Numbering	Designation
1	Common
2	Brilliancy 1 (maximum i.e. 6,6 A) request and obtained
3	Brilliancy 2 request and obtained
4	Brilliancy 3 request and obtained
5	Brilliancy 4 request and obtained
6	Brilliancy 5 request and obtained
7	Brilliancy 6 request and obtained
8	
9	
10	CCR in local mode
11	CCR on
12	Open circuit fault
13	Regulation fault
14	Overcurrent fault
15	CCR in remote mode

Options

1	Common
2	Insulation of secondary circuit threshold alarm level 1
3	Insulation of secondary circuit threshold alarm level 2
4	Warning alarm for lamps failures