BRITISH STANDARD

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Electrical installations for lighting and beaconing of aerodromes — AGL series transformers

The European Standard EN 61823:2003 has the status of a British Standard

ICS 29.140.50; 93.120

National foreword

This British Standard is the official English language version of EN 61823:2003. It was derived by CENELEC from IEC 61823:2002.

The CENELEC common modifications have been implemented at the appropriate places in the text and are indicated by tags ⟨C⟩ ⟨C⟩.

The UK participation in its preparation was entrusted to Technical Committee EPL/97, Aeronautical ground lighting, which has the responsibility to:

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EUROPEAN STANDARD **EN 61823**

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ICS 29.140.50; 93.120

English version

Electrical installations for lighting and beaconing of aerodromes - AGL series transformers

(IEC 61823:2002, modified)

Installations électriques pour le balisage et l'éclairage des aérodromes - Transformateurs séries AGL (CEI 61823:2002, modifiée)

Elektrische Anlagen für Beleuchtung und Befeuerung von Flugplätzen - Serienstromtransformatoren (IEC 61823:2002, modifiziert)

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CENELEC

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

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Foreword

The text of document 97/94/FDIS, future edition 1 of IEC 61823, prepared by IEC TC 97, Electrical installations for lighting and beaconing of aerodromes, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61823 on 2003-02-01 together with common modifications prepared by the Technical Committee CENELEC TC 97.

The following dates were fixed:

– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2004-01-01

– latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2006-02-01

Annexes designated "normative" are part of the body of the standard.
In this standard, annexes A and ZA are normative.
Annex ZA has been added by CENELEC.

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Endorsement notice

The text of the International Standard IEC 61823:2002 was approved by CENELEC as a European Standard with agreed common modifications.

CONTENTS

ELECTRICAL INSTALLATIONS FOR LIGHTING AND BEACONING OF AERODROMES – AGL SERIES TRANSFORMERS

1 Scope

This standard specifies the characteristics of aeronautical ground lighting series transformers (AGLST) used in aeronautical ground lighting for 6,6 A series circuits, at a service voltage of up to 5 kV, supplied by constant current regulators up to 30 kVA in rating.

AGL series transformers provide power to airport lighting luminaires or other loads (resistive) from their secondary circuits. The AGL series transformers provide continuity of the series circuit in the event of a loss of the load on the transformer, and electrical isolation between the primary circuit supplied by a constant current regulator, and the secondary circuit connected to the load under conditions defined in this standard.

An AGL series transformer is be able to withstand a permanent short or open-circuit secondary series circuit.

Specifications for similar series transformers intended for any primary or secondary currents other than 6,6 A, or to supply alternative voltages, constant power, reactive loads, etc., are not included in this standard.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60085, *Thermal evaluation and classification of electrical insulation*

IEC 61822, *Electrical installations for lighting and beaconing of aerodromes – Constant current regulators*

ISO 48, *Rubber, vulcanised or thermoplastic – Determination of hardness (hardness between 10 IRHD and 100 IRHD)*

3 Definitions and abbreviated terms

3.1 Definitions

For the purposes of this standard the following definitions apply.

Where the terms voltage and current are used, they shall be r.m.s. values unless otherwise stated.

3.1.1
AGL series transformer
aeronautical ground lighting series transformer, as specified in this standard

3.1.2
ambient temperature
the temperature of the air or other medium surrounding the AGL series transformer; for testing purposes, a temperature of (20 ± 5) °C ▌C〉 unless otherwise stated 〈C▐

3.1.3
nominal power
arbitrarily selected values of power used in this standard for convenience to refer to AGL series transformers with different characteristics

3.1.4
rated frequency
the frequency or frequency range for which the AGL series transformer is designed to operate

3.1.5
rated power
the range of powers for which each AGL series transformer is suitable.

NOTE The low and high values of these ranges are given in Table 1.

3.1.6
rated primary current
the current at which the primary of the AGL series transformer is designed to operate

3.1.7
rated secondary current
the current at which the secondary of the AGL series transformer is designed to operate

3.1.8
routine test
test for the purpose of checking manufactured products for compliance with this standard

3.1.9
service voltage
the maximum primary or secondary voltage at which the AGL series transformer is designed to operate

3.1.10
type test
a test to confirm that the product design and production processes are capable of providing products that meet the requirements of this standard

3.1.11
type test sample
a sample consisting of one or more similar samples used for a type test

3.2 Abbreviated terms

AC1	Source of mains power
AC2	High voltage a.c. source
AGLST	AGL series transformer
DC1	Source of d.c. power
CCR	Constant current regulator as specified in IEC 61822
I_1, I_2	Primary and secondary currents respectively, as measured by ammeters or equivalent devices
U_1, U_2	Primary and secondary voltages respectively, as measured by voltmeters or equivalent devices
P_1, P_2	Active power measurements or calculations of respectively the primary and secondary circuits of an AGL series transformer

4 General requirements

4.1 Classification

There are seven types of AGL series transformers specified in this standard, defined by their nominal power, namely 30 W, 45 W, 65 W, 100 W, 150 W, 200 W and 300 W. See Table 1 for the required characteristics.

4.2 Rated current

The rated primary and secondary currents shall be 6,6 A.

4.3 Earthing

AGL series transformers may be provided with or without an earthing connection.

4.4 AGL construction

The AGL series transformers shall have two electrically and physically separate windings, one primary and one secondary, wound on a magnetic core. The polarity of the windings shall be such that the primary plug corresponds to the large socket of the secondary receptacle ▌Ⓒ〉 (See Annex A.). 〈Ⓒ▐

All internal electrical connections shall be permanent, e.g. by compression high-pressure crimping, high-temperature soldering, welding, etc.

The shapes of the transformers are optional provided they meet all the requirements of this standard. Sharp edges shall be avoided.

The AGL series transformer including all connector leads shall be able to be inserted through the open end of a cylinder 20 cm in diameter by 25 cm long, and shall easily and totally fit inside such a cylinder.

The transformers shall be designed so that they may be installed and will perform to the requirements of this standard in any orientation.

The AGL series transformers shall be provided with two single-conductor primary leads and a two-conductor secondary lead.

4.4.1 Primary connection leads

The AGL series transformers shall be connected to the AGL primary series circuit cable by two insulated, multi-stranded, copper conductors, with at least a 6 mm^2 cross section, and a length measured from the transformer housing to the face of the connector of $60\ ^{+10}_{0}$ cm. The service voltage for the leads shall be 5 kV. One lead shall have a style 2 male plug at its end. The other lead shall have a style 9 female receptacle at its end. Unless otherwise agreed between the manufacturer and supplier, the connectors shall be provided with disposable shipping caps.

4.4.2 Secondary connection lead

The secondary lead shall consist of two insulated, multi-stranded, copper conductors with an overall jacket, each core of minimum cross section 2,5 mm^2, minimum service voltage 600 V, and a length measured from the transformer housing to the face of the connector of $120\ ^{+10}_{0}$ cm. The lead shall have a type 2, class A, style 7 or style 8 female receptacle at its end. Unless otherwise agreed between the manufacturer and supplier, the connector shall be provided with a disposable shipping cap.

4.5 Encapsulation

The AGL series transformer body, the connectors and the connection lead's sheaths, shall be made of compatible materials. The case shall be composed of material formed directly on the core and coil assembly, or by compound filling a container. The transformer shall be permanently encapsulated without cracks, holes, or internal voids as far as practical. The encapsulation of the transformer must form a watertight casing, and must bond with its connection leads so as to provide a completely waterproof assembly.

The encapsulation material shall have a durometer hardness IRHD (Shore A) of not less than 55 as measured in accordance with the test method of ISO 48.

The minimum thickness of the encapsulation over the internal components shall be 6,5 mm at all points of the surface, for any type of encapsulant.

The encapsulation materials shall be capable of withstanding acid and alkaline soils, as well as limited exposure to chemicals typically present on the aerodrome, including but not limited to oil, gasoline, and de-icing fluids. The encapsulating materials must resist limited UV exposure. These characteristics may be confirmed by testing material samples (only). The characteristics may be confirmed by tests sponsored by the transformer manufacturer, or by test results supplied by the materials manufacturer. These results may be applied to all AGL series transformers using the encapsulation material. If a transformer manufacturer uses more than one material for encapsulation, each such material shall meet these requirements.

4.6 Earthing

The magnetic core shall not be connected to earth or to either of the primary or secondary electrical circuits.

AGL series transformers may be provided with or without an earthing connection. If an earthing connection is provided, it shall be connected to that side of the secondary winding of the transformer which is connected to the larger socket of the secondary connector. The earthing connection must have a water barrier within the transformer body.

4.7 Service conditions

The ambient temperature range shall be –40 °C to +55 °C.

AGL series transformers shall be suitable for continuous outdoor service when installed within enclosures or by direct earth burial.

AGL series transformers shall be capable of operation when completely submerged in water for the life of the transformer.

4.8 Electrical characteristics

4.8.1 Secondary current

With the primary current I_1 at 6,6 A, the secondary current I_2 shall be within ±1 % of the primary current in the range between the low and high load in ohms given in Table 1.

4.8.2 Power factor

With the primary current I_1 at 6,6 A, and the nominal load in ohms (see Table 1) connected to the secondary, the power factor shall be not less than 95 %.

4.8.3 Efficiency

With the primary current I_1 at 6,6 A, and the nominal load in ohms (see Table 1) applied to the secondary, the efficiency shall be not less than 80 % for AGL series transformers whose nominal rating is 30 W, not less than 85 % for AGL series transformers whose nominal rating is 45 W, 65 W or 100 W, and not less than 90 % for AGL series transformers whose nominal rating is above 100 W.

4.8.4 Short circuit secondary current

With the primary current I_1 at 6,6 A, the secondary short circuit current shall not exceed 6,8 A for all AGL series transformers.

4.8.5 Open circuit secondary voltage

With the primary current I_1 at 6,6 A, and with the secondary circuit open, the voltage at the secondary connector terminals shall not exceed the limits given in Table 1.

4.8.6 Characteristics

To allow for lamp power tolerances and losses in the circuit connecting the lamps to the AGL series transformers, the permanent acceptable load on the secondary may vary from the nominal value between the low and high limits given in Table 1.

Table 1 – Transformer characteristics

Nominal power W	Rated power W		Load (resistive) Ω			Maximum open circuit voltage V
	Low	High	Low (maximum)	Nominal	High (minimum)	50 Hz and 60 Hz
30	25	40	0,57	0,69	0,92	20
45	35	60	0,80	1,03	1,38	20
65	50	85	1,15	1,49	1,95	30
100	80	125	1,84	2,30	2,87	40
150	120	178	2,75	3,44	4,13	60
200	160	230	3,67	4,59	5,28	70
300	220	338	5,05	6,89	7,81	110

NOTE Tolerance on loads is ±1 %.

4.9 Temperature rise

The temperature rise of the transformer shall be determined using the resistance method. The temperature rise shall not exceed the maximum temperature permitted by the insulation class, according to IEC 60085, of the most critical insulation, less 60 °C. The transformer shall be operated in air at ambient temperature, with primary current set at 6,6 A, under each of the following conditions:

- high resistive load, see Table 1;
- short circuit;
- open circuit.

5 Type and routine tests

5.1 Type tests

The type tests are divided into two groups, which apply respectively to the encapsulation method (see 5.1.1), and to the electrical characteristics of each transformer (see 5.1.2).

5.1.1 Encapsulation method type tests

The following tests shall be successfully completed for three samples of one type from each family of AGL series transformers, where a family is defined as AGL series transformers of the same physical size (e.g. made in the same mould), differing only in characteristics which will not effect the physical performance. Such differences would include, but are not necessarily limited to:

- primary and/or secondary connector configurations;
- length of primary and/or secondary leads;
- electrical construction (e.g. number of turns, number of laminations or core size).

Before beginning, each AGL series transformer to be tested shall have its connector dimensions confirmed as being in accordance with the tolerances given in Annex A.

Table 2 – Encapsulation method type tests

Sequence	Test	Reference
1	Physical size demonstration	6.10
2	Initial ratio	6.2.1 and 6.2.1.1
3	Shock tests (impact and lead rigidity)	6.7
4	Gas tightness	6.9
5	Final ratio	[a]
6	AC leakage current test	6.5
7	DC leakage current cycling test	6.6

[a] The transformer shall first be subjected to the “warm-up” procedure in accordance with 6.2.1. Then the primary current I_1 shall be set between 6,58 A and 6,62 A, and the value recorded. The secondary current I_2 shall be measured. This value shall be adjusted by multiplying by the measured primary current in this sequence divided by the measured primary current in sequence 2. The resulting value shall not be different from the secondary current measured in sequence 2 by more than ±67 mA.

The encapsulation type tests shown in Table 2 shall be carried out in the sequence given.

If one or more of the three test transformers fails any one of the tests, the full test sequence shall be repeated with three new samples.

The results of these tests shall be recorded and kept for future reference.

5.1.2 Electrical characteristic type tests

These tests shall be run on three samples of each type. Types which are essentially the same electrically, differing only in characteristics that will not materially effect the electrical performance, may be covered by a test on one representative type. Such differences would include, but not necessarily be limited to,

- primary and/or secondary connector configurations;
- lead lengths;
- with and without earth connection.

Table 3 – Electrical characteristic type tests

Sequence	Test	Reference
1	Ratio, power factor and efficiency under load	6.2
2	Short circuit	6.3
3	Open circuit	6.4
4	AC leakage current	6.5
5	Temperature rise	6.8

The electrical type tests shown in Table 3 shall be carried out in the sequence given.

If one or more of the three test transformers fails any one of the above tests, the full test sequence shall be repeated with three replacement transformers.

The results of these tests shall be recorded and kept for future reference.

5.2 Routine tests

All of the AGL series transformers manufactured shall be subjected to the tests shown in Table 4.

Any transformer that fails any of the tests in Table 4 shall be discarded.

The results of these tests shall be recorded and kept for future reference. These results may include pass/fail only.

Table 4 – Routine tests

Test	Reference
Ratio	7.1
Earthing continuity (if earth connection supplied)	7.2
Leakage current test – either d.c. or a.c.	7.3

6 Test requirements

6.1 Introduction to electrical testing

6.1.1 Safety

During these tests, lethal voltages and high energy levels may be developed. It is essential that the operators and witnesses be aware of the appropriate safety provisions.

6.1.2 Power

All testing shall be with a sinusoidal waveform of the rated frequency of the device, (50 Hz ± 1) Hz or (60 Hz ± 1) Hz. If a transformer is rated for both 50 Hz and 60 Hz, all electrical tests shall be carried out at both frequencies.

6.1.3 Loads

When resistors are used as loads for a transformer, they shall be of very low inductance, not more than 0,25 µH per ohm of resistance. They shall also be inherently temperature stabilized, or their temperature shall be stabilized, and the resistance value confirmed, prior to measurements being taken.

6.1.4 Measurement

All measuring instruments shall read r.m.s.

High impedance voltage measurement equipment shall be used (at least 1 MΩ).

When measuring the current ratio, the primary and secondary currents shall be measured simultaneously.

Allowances shall be made for the power consumption of any meters if this is material to the results.

Metering shown in Figures 1, 2, 3, 4, and 5 is only suggestive. Other forms of metering may be used if they accomplish the same objective.

6.2 Tests under load

6.2.1 Warm-up procedure

The transformer shall be connected as shown in Figure 1. The AC1 source shall be set between 6,58 A and 6,62 A, and the load *R* to the nominal value as given in Table 1. The transformer shall be in ambient temperature air lying on its largest flat surface on a dry solid wooden plate at least 30 mm thick. This warm-up shall continue for a minimum of 6 h, after which the tests of 6.2.1.1 and 6.2.1.2 shall be carried out.

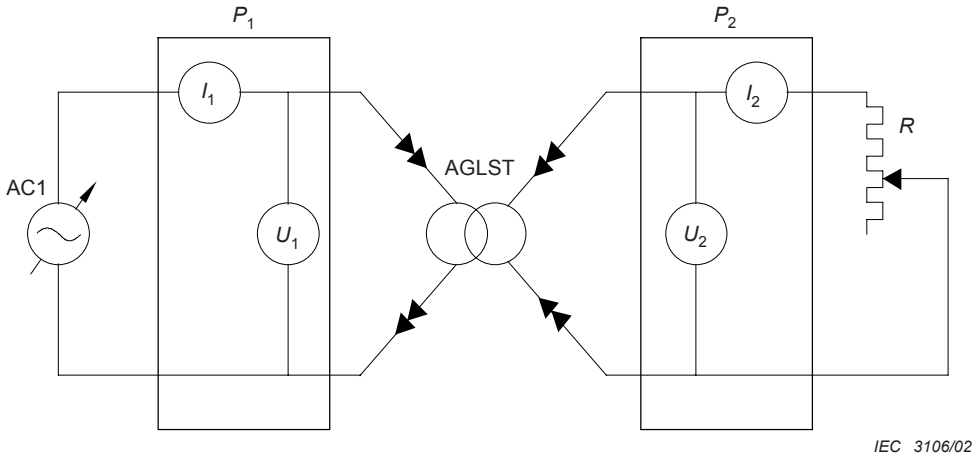

Figure 1 – Tests under load

6.2.1.1 Ratio measurement polarity

The input current I_1 shall be set between 6,58 A and 6,62 A, and the value recorded. The secondary current I_2 shall be within ±67 mA of the measured primary current for each of the low, nominal, and high values of load given in Table 1.

6.2.1.2 Power factor and efficiency

The load *R* shall be set at the nominal load ±1 % given in Table 1, and the voltage, current, and power of both the primary and the secondary circuits shall be measured and recorded.

6.2.1.2.1 Power factor

The power factor shall be measured directly, or calculated as follows:

$$PF = P_1 / I_1 \times U_1$$

where

PF is the power factor;

P_1 is the primary power in watts;

I_1 is the primary current in amperes;

U_1 is the primary voltage in volts.

The value of the power factor shall be not less than 0,95.

6.2.1.2.2 Efficiency

The efficiency shall be measured directly, or calculated as follows:

$$\text{Efficiency} = P_2 \times 100 / P_1$$

where

P_1 is the primary power in watts;

P_2 is the secondary power in watts.

The efficiency shall be not less than 80 % for AGL series transformers whose nominal rating is 30 W, not less than 85 % for AGL series transformers whose nominal rating is 45 W, 65 W, or 100 W and not less than 90 % for AGL series transformers whose nominal rating is above 100 W.

6.3 Short circuit current

The transformer shall be at ambient temperature and be connected as shown in Figure 1.

The primary current I_1 shall be set between 6,58 A and 6,62 A.

The load R shall be a short circuit presenting a voltage drop of less than 0,1 V as measured at the secondary connector of the sample.

The secondary current shall be not more than 6,8/6,6 times the measured primary current.

6.4 Open circuit voltage

The transformer shall be at ambient temperature, and connected as shown in Figure 1.

The load R shall be removed (open circuit).

The primary current shall be set between 6,58 A and 6,62 A.

The voltage U_2 shall be not more than the value given in Table 1.

6.5 AC leakage current test

The transformer's primary and secondary leads shall be connected to the corresponding connectors of primary and secondary leads. No additional protection such as tape or compound shall be used on the connectors. The transformer including all connectors shall be immersed in a tank of tap water at ambient temperature.

6.5.1 Primary

The transformer shall be connected as shown in Figure 2. The AC2 source shall be adjusted to a minimum of 10 kV a.c., and applied for at least 1 min.

The measured value of I_1 shall not exceed 10 mA.

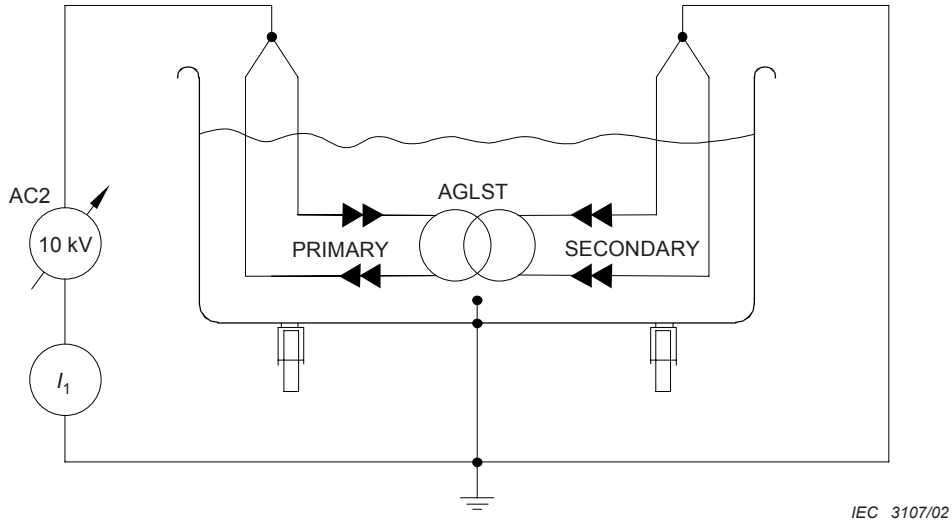

Figure 2 – Primary a.c. leakage current test

6.5.2 Secondary

The transformer shall be connected as shown in Figure 3. The AC2 source shall be adjusted to a minimum of 3,5 kV a.c., and applied for at least 1 min.

The measured value of I_1 shall not exceed 10 mA.

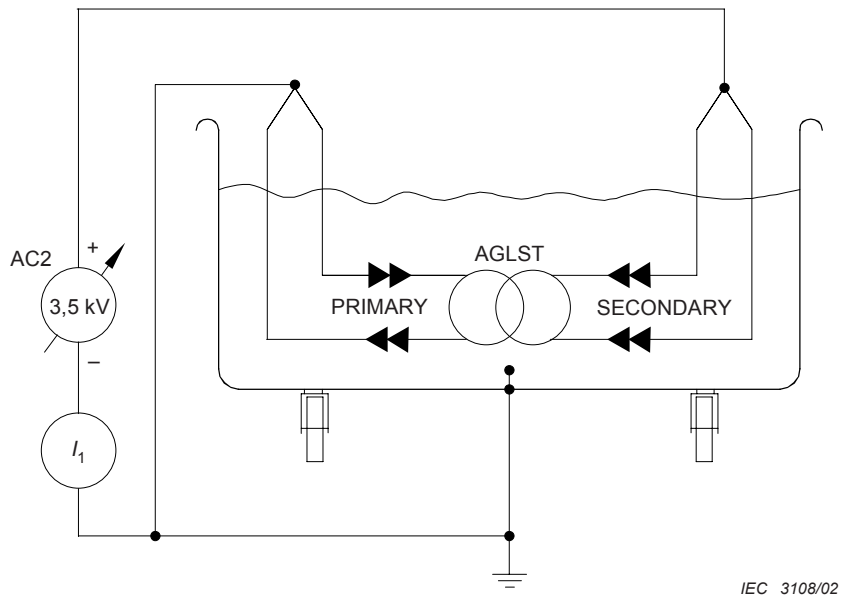

Figure 3 – Secondary a.c. leakage current test

6.6 DC leakage current cycling test

Three sample AGL series transformers shall be prepared as specified in 6.6.1, and then subjected to a sequence of the three operations specified in 6.6.2, 6.6.3 and 6.6.4. Repeat the sequence 20 times.

6.6.1 Initial preparation

Test harnesses complete with corresponding connectors that are compliant to the dimensions in Annex A shall be installed on the three connectors of the AGL series transformers. No additional protection such as tape or compound shall be used on the connectors. The corresponding connectors shall not be removed before completion of the 20 cycle testing. If they are removed for any reason, tests shall be repeated so that the AGL series transformers and their connectors satisfactorily pass 20 continuous cycles.

6.6.2 Warm-up

The AGL series transformers shall be operated, with corresponding connectors installed, for a minimum of 6 h in air at ambient temperature, with the primary current set between 6,58 A and 6,62 A, and the secondary circuit open.

6.6.3 Water immersion test

Immediately following the warm-up procedure of 6.6.2, the AGL series transformers, with leads and connectors, shall be submerged in a tank of tap water at ambient temperature. The water (and tank if metallic) shall be earthed. Care shall be taken to ensure that all connectors (including test harness connectors) and transformer leads remain completely immersed in tap water during this test. Additional water may be added to compensate for any evaporation. The AGL series transformers and their connectors shall continue to be soaked in water at ambient temperature for not less than 12 h.

6.6.4 DC leakage current

The primary and secondary d.c. leakage currents shall be measured within 10 min of immersion of the AGL series transformers in water, and at the end of the soaking period.

Measurement of leakage current shall be made with a d.c. voltage source as shown in Figure 4 (primary) and Figure 5 (secondary). The appropriate test voltage as given in Table 5 shall be applied for 1 min between each circuit and earth. After the instrument needle settles down following current inrush, it shall remain steady without fluctuations, and the leakage current shall be not more than the appropriate value specified in Table 5.

Table 5 – DC leakage current test limits

Winding under test	Voltage applied kV d.c.	Maximum leakage current I_1 µA
Primary	15	2
Secondary [a]	5	2
[a] Test not required if the transformer is equipped with an earth connection.		

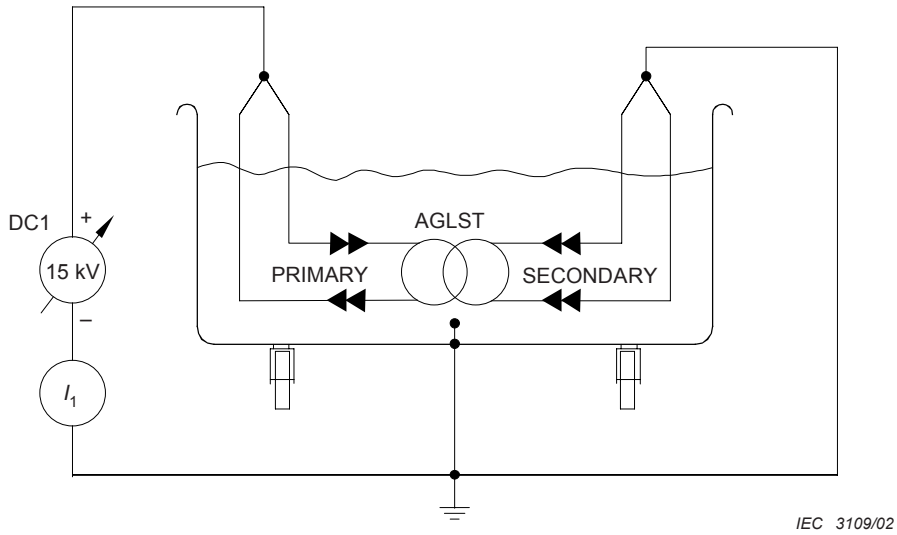

Figure 4 – Primary d.c. leakage current

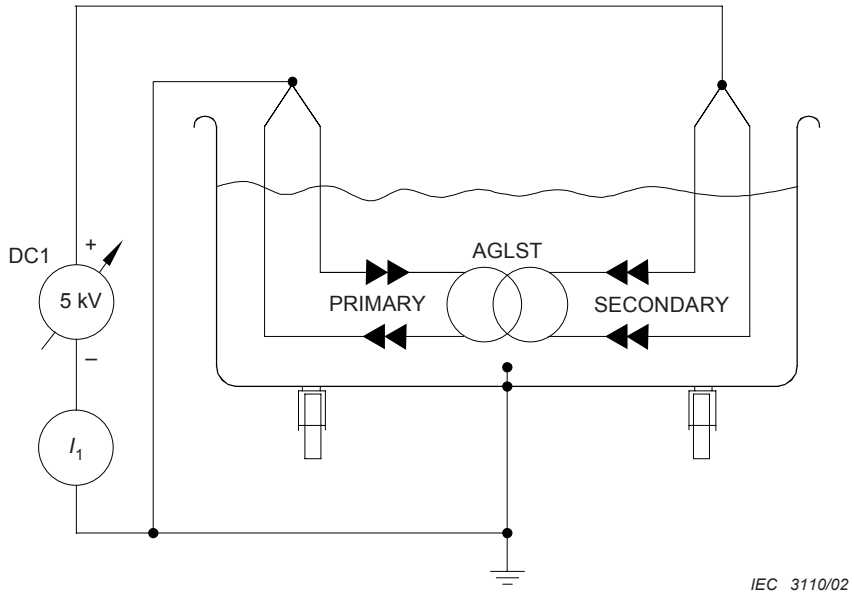

Figure 5 – Secondary d.c. leakage current

6.7 Shock tests

The following tests shall be carried out at ambient temperature.

6.7.1 Impact test

The transformer shall be dropped from a height of not less than 1,8 m, a total of four times, at least once on each of three orthogonal surfaces, and once on a corner, on a flat concrete surface.

6.7.2 Lead rigidity test

After completion of the test in 6.7.1, the transformer leads shall be tested by securing (just below the connector) each lead one at a time, in a clamp fastened to a support, elevated a minimum of 1,5 m above ground. The clamp shall be applied so that it shall not cause damage to the lead at the point of attachment. The connector shall be oriented so the rear of the connector (lead exit) points downward. See Figure 6.

The AGL series transformers shall be lifted above the clamp elevation, and released for a free fall.

6.7.3 Physical confirmation

Any visual evidence of damage to the leads or body which may jeopardize the electrical or watertight properties of the transformer shall be cause for rejection.

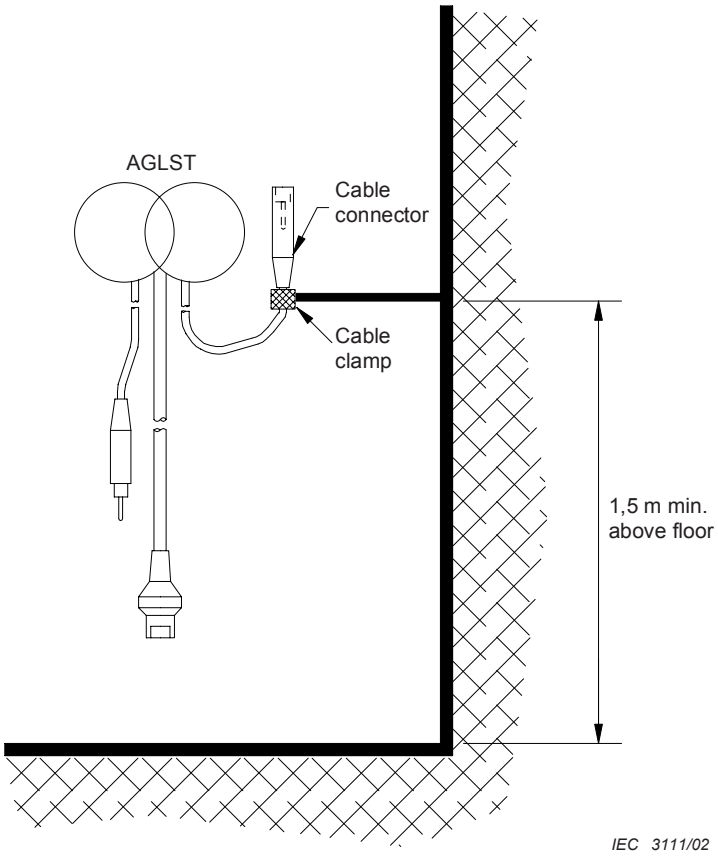

Figure 6 – Lead rigidity test

6.8 Temperature rise

The transformer shall be prepared according to the warm-up procedure of 6.2.1.

The following loads shall then be applied in turn:

a) nominal load – see Table 1;

b) short circuit

c) open circuit

For each load, the transformers shall be operated with the primary current I_1 set between 6,58 A and 6,62 A, and then the temperature rise determined.

The temperature rise of the transformers shall be determined by the resistance method, and shall not be higher than the maximum temperature permitted by the insulation class, according to IEC 60085, of the most critical insulation less 60 °C. All three measurements shall be taken within 15 min of the end of the warm-up procedure.

Temperature rise shall be computed from the following formula:

$$\text{Temperature rise (°C)} = (234{,}5 + T_o) - (R_1 - R_o) / R_o$$

where

T_o is the temperature corresponding to cold resistance in degrees Celsius;

R_o is the cold resistance in ohms;

R_1 is the hot resistance in ohms.

6.9 Gas tightness test

A source of compressed air at 100 kPa above normal atmospheric pressure shall be applied to the transformer's primary female receptacle, and secondary female receptacle, in turn.

The two leads and connectors which are not subjected to the air pressure, and the transformer body, including the earthing connection, shall be fully immersed in tap water at ambient temperature.

For each test the air pressure shall be applied for 15 min, and there shall be no evidence of air bubbles in the water.

6.10 Physical size demonstration

Confirmation of the physical size shall be performed according to the requirements of 4.4.

7 Routine tests

7.1 Ratio test

The transformer shall be set up as in Figure 1.

With the input current I_1 set between 6,58 A and 6,62 A, the secondary current I_2 shall be within ±67 mA of the measured primary current with the load R set at the low and high values given in Table 1.

7.2 Earth continuity test

If a transformer is equipped with the optional earth connection, an earth continuity tester delivering at least 10 A at less than 6 V shall be used to ensure that there is an electrical connection between the earth stud and the large socket of the secondary connector.

7.3 Leakage current test

Test harnesses complete with corresponding connectors shall be installed on the three connectors of the AGL series transformer. No supplementary protection such as tape or compound shall be used on the connectors. The transformer including its leads and connectors shall be submerged in a tank of ambient temperature tap water.

The transformer shall be tested when its internal temperature is at least 55 °C over ambient, or after it has been soaked for at least 12 h.

The transformer shall be tested with d.c. voltage as specified in 6.6.4, or with a.c. voltage as specified in 6.5.

If the test of 6.5 is used, the primary input voltage shall be set to a minimum of 10 kV a.c. for 1 min, and the leakage current shall not exceed 10 mA a.c. Then the secondary voltage shall be set to a minimum of 3,5 kV a.c. for 1 min, and the leakage current shall again not exceed 10 mA a.c. If the transformer is equipped with the optional earth connection, the secondary test is not required.

If the test of 6.6.4 is used, the primary voltage shall be set to a minimum of 15 kV d.c. for 1 min, and the leakage current shall comply with the limit given in Table 5. Then the secondary voltage shall be set to a minimum of 5 kV d.c., and the leakage current shall comply with the limit given in Table 5. If the transformer is equipped with the optional earth connection, the secondary test is not required.

8 Marking

The following information shall be permanently marked on the body of each AGL series transformer.

Description	AGLST or AGL series transformer
Standard number	IEC 61823
Power rating	Nominal power (as defined in Table 1)
Rated primary and secondary current	6,6/6,6 A
Rated frequency	50 Hz, 60 Hz, or 50/60 Hz
Service voltage	5 000 V
Manufacturer	Name, trademark, or logo of the manufacturer or responsible vendor
Product identification or reference	Catalogue number or other product reference of the manufacturer or responsible vendor.
Date	The year and month of manufacture, or a serial number which can be traced to at least the year and month of manufacture.

Annex A
(normative)

Connector descriptions and interface dimensions

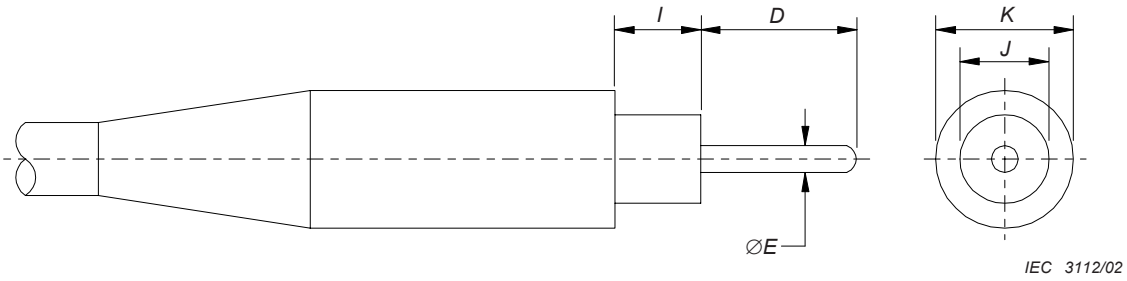

Figure A.1 – Style 2 primary plug

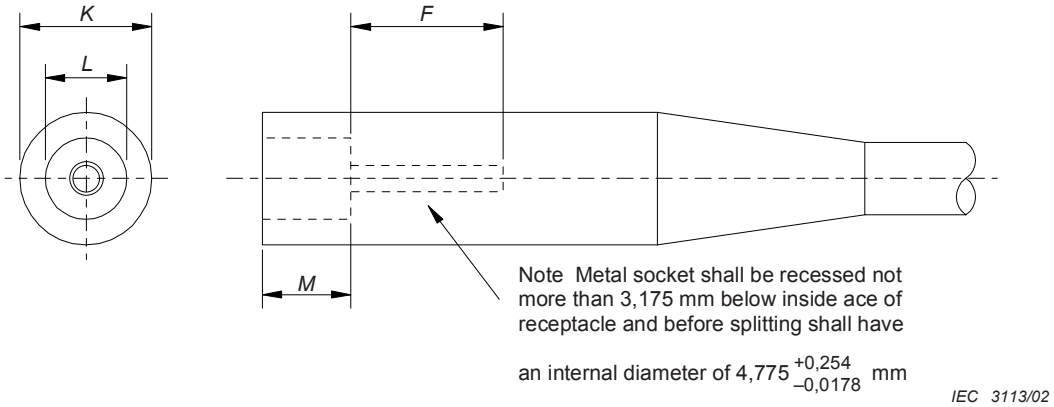

Figure A.2 – Style 9 primary receptacle

Table A.1 – Interface dimensions for Figures A.1 and A.2

Dimension	m
D	26,975 ± 0,381
E	4,7244 ± 0,0254
F	27,432 min.
I	$15{,}062\ ^{+0{,}381}_{0{,}000}$
J	$15{,}342^{+0{,}254}_{0{,}000}$
K	$23{,}800^{+0{,}000}_{-0{,}787}$
L	14,554 ± 0,254
M	$15{,}443\ ^{+0{,}000}_{-0{,}381}$

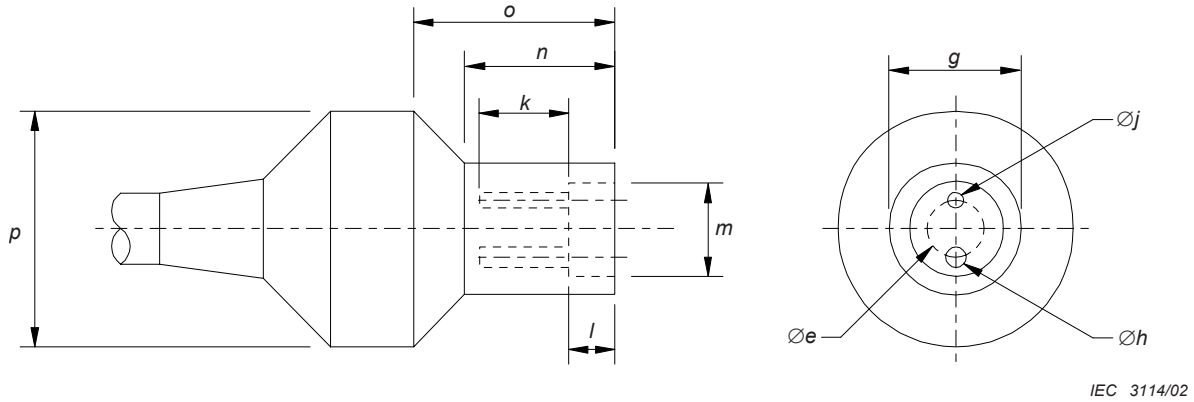

Figure A.3 – Style 8 secondary receptacle

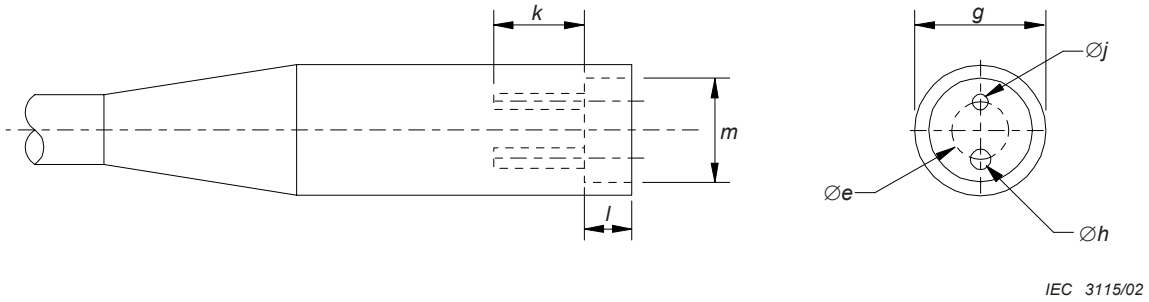

Figure A.4 – Style 7 secondary receptacle

Table A.2 – Interface dimensions for Figures A.3 and A.4

Dimension	m
e	11,049 ± 0,254
g	$25{,}40^{+0{,}000}_{-0{,}787}$
h	$3{,}988^{+0{,}0254}_{-0{,}018}$ Diameter before splitting
j	$3{,}2004^{+0{,}0254}_{-0{,}018}$
k	16,28 min. Includes 3,18 mm recess below inside face
l	$9{,}093^{+0{,}000}_{-0{,}381}$
m	17,628 ± 0,254
n	28,575 ± 0,787
o	38,10 ± 0,787
p	44,45 ± 0,787

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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 (including amendments).

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	Year	Title	EN/HD	Year
IEC 60085	- [1)]	Thermal evaluation and classification of electrical insulation	HD 566 S1	1990 [2)]
IEC 61822 (mod.)	- [1)]	Electrical installations for lighting and beaconing of aerodromes - Constant current regulators	EN 61822	2003 [2)]
ISO 48	- [1)]	Rubber, vulcanized or thermoplastic Determination of hardness (hardness between 10 IRHD and 100 IRHD)	-	-

[1)] Undated reference.

[2)] Valid edition at date of issue.

Bibliography

The following publications are not specifically cited in the text, but are companion standards concerning aeronautical ground lighting. They are listed here for convenience.

IEC/TS 61820, *Electrical installations for lighting and beaconing of aerodromes – Constant current series circuits for aeronautical ground lighting – System design and installation requirements* [1]

IEC 61821:2002, *Electrical installations for lighting and beaconing of aerodromes – Maintenance of aeronautical ground lighting constant current series circuits*

〖C〉 NOTE Harmonized as EN 61821:2003 (not modified). 〈C〗

IEC/TS 62143:2002, *Electrical installations for lighting and beaconing of aerodromes – Aeronautical ground lighting systems: Guidelines for the development of a safety lifecycle methodology*

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