

Specification for

**General and safety
requirements for starting
devices (other than glow
starters)**

This European Standard EN 60926 : 1990 has the status of a
British Standard

Dispositifs d'amorçage (autres que starters à
lueur)
Prescriptions générales et prescriptions de
sécurité

Startgeräte (andere als Glimmstarter)
Allgemeine und Sicherheits-anforderungen

Cooperating organizations

The European Committee for Electrotechnical Standardization (CENELEC), under whose supervision this European Standard was prepared, comprises the National Committees of the following countries.

Austria	Italy
Belgium	Luxemburg
Denmark	Netherlands
Finland	Norway
France	Portugal
Germany	Spain
Greece	Sweden
Iceland	Switzerland
Ireland	United Kingdom

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The following BSI references relate to the work on this standard:
Committee reference LGL/21
Draft for comment 86/32516 DC

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Amendments issued since publication

Amd. No.	Date	Text affected

Amendment No. 1
published and effective from 15 December 1994
to BS EN 60926 : 1991

Specification for general and safety requirements for starting
devices (other than glow starters)

NOTE. The English language version of European Standard EN 60926 was implemented in the United Kingdom by the publication of BS EN 60926.

This amendment implements amendment 2, published in June 1994, to EN 60926, which includes Amendment No. 1 : 1992 and Amendment No. 2 : 1993 to IEC 926.

Revised text

National foreword

Delete the existing paragraphs 1 and 2 and substitute the following.

'This British Standard has been prepared under the direction of the Electrical Illumination Standards Policy Committee and is the English language version of EN 60926 'Starting devices (other than glow starters) — General and safety requirements' including amendment 2 which is identical with IEC 926 : 1990 including its amendments No. 1 : 1992 and No. 2 : 1993 published by the International Electrotechnical Commission (IEC).

The foreword of the EN makes reference to 'date of withdrawal (dow) of conflicting national standards' as '1995-03-01'. In this case the relevant national standard is BS EN 60926 but the date of withdrawal relates only to those parts of the British Standard subject to amendment A2. Certificates and marks will not be awarded after this date with respect to the British Standard not incorporating amendment A2. They will be awarded only to the amended British Standard. However, such certificates and marks already awarded with respect to the British Standard not incorporating amendment A2 may continue to apply for production until 2000-03-01.

NOTE. The CENELEC common modification to **4.6**, marked by a vertical line at the left-hand margin, has been superseded by the replacement text of this amendment.'

AMD 8429/December 1994

EN amendment title page and foreword

Insert the attached EN amendment title page (foreword on reverse).

AMD 8429/December 1994

Text of EN 60926

Amend the text of European Standard EN 60926 in accordance with the details given on the attached pages.

AMD 8429/December 1994

National appendix NA (informative)

In the list of IEC publications, insert in the correct numerical order the following.

'112 (1979) : Method for determining the comparative and the proof tracking indices of solid insulating materials under moist conditions

990 (1990) : Methods of measurement of touch-current and protective conductor current'

Delete the text headed '4. General notes on tests' entirely.

AMD 8429/December 1994

National appendix NC (informative)

Insert the following in the list of standards.

' IEC 112 : 1979	} BS 5901 : 1980 Method of test for determining the comparative and the proof tracking indices of solid insulating materials under moist conditions'
HD 214 S2 : 1980	

AMD 8429/December 1994

UDC 621.327.032.434 : 614.8 : 620.1

Descriptors: Lighting equipment, discharge lamp, tubular lamp, fluorescent lamp, starting device, safety requirement

Amendment A2 to the English version of EN 60926

Starting devices (other than glow starters) General and safety requirements

(IEC 926 : 1990/A1 : 1992 + A2 : 1993)

Despositifs d'amorçage (autres que starters à
lueur)
Prescriptions générales et prescriptions de
sécurité
(CEI 926 : 1990/A1 : 1992 + A2 : 1993)

Startgeräte (andere als Glimmstarter) —
Allgemeine und Sicherheitsanforderungen
(IEC 926 : 1990/A1 : 1992 + A2 : 1993)

This amendment A2 modifies the European Standard EN 60926 : 1990. It was approved by CENELEC on 1994-03-08. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this amendment the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This amendment exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

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

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Foreword

At the request of the CENELEC Technical Committee TC 34Z, Luminaires and associated equipment, amendments 1 : 1993 and 2 : 1993 to the international standard IEC 926 : 1990 were submitted to the CENELEC Unique Acceptance Procedure (UAP) in May 1993 for acceptance as a European Standard.

The text of the international standard was approved by CENELEC as amendment A2 to EN 60926 on 8 March 1994.

There is no amendment numbered 1 to EN 60926 : 1990.

The following dates were fixed:

- latest date of publication of
an identical national standard (dop) 1995-03-01
- latest date of withdrawal of
conflicting national standards (dow) 1995-03-01

For products which have complied with EN 60926 : 1990 before 1995-03-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 2000-03-01.

Annexes designated 'normative' are part of the body of the standard. In this standard, annex ZA is normative.

1 Scope

Amend the fourth line of the first paragraph as follows:

... which produce starting pulses not greater than 100 kV.

Delete penultimate paragraph: Requirements 5 kV are under consideration.

2 Definitions

Insert the following new definition between the existing definitions 2.7 and 2.8:

2.8 peak voltage " U_p ": The highest value of the voltage pulses generated by an ignitor at the output terminals.

Renumber the existing definitions "2.8 to 2.13" into "2.9 to 2.14".

Add the following new definitions:

2.15 spherical spark gap: Two metal spheres of the same nominal diameter arranged at a specified distance and used under specified conditions for the measurement of peak voltages in excess of 15 kV.

4 General notes on tests

Replace on page 17 sub-clauses 4.5 and 4.6 as follows:

4.5 *The following number of specimens shall be submitted for testing:*

- 1 unit for the tests of clauses 5 to 12 and 14 to 20;
- 1 unit for the tests of clause 13, fault conditions (additional units or components, where necessary, may be required in consultation with the manufacturer).

4.6 *In general all tests are made for each type of starting device or, where range of similar starting devices is involved, for each wattage in the range or on a representative selection from the range, as agreed with the manufacturer.*

5 Classification

Add the following title to the existing text:

5.1 Method of installation

Also add the following new subclause:

5.2 Output voltage

Starting devices are classified according to output voltage categories:

- up to and including 5 kV;
- greater than 5 kV, and up to and including 10 kV;
- greater than 10 kV, and up to and including 100 kV.

Amend item 6.1 c) as follows:

- c) Marking to show the peak value of the voltage produced if the peak value exceeds 1 500 V. Connections having this voltage shall be marked; for ignitors with a pulse voltage over 5 kV, this marking shall be a flash symbol, see ISO 3864.

Add the following explanation to item 6.2 d):

This marking is not required for ignitors with pulses over 5 kV because these are mandatorily provided with a time limitation.

9 Provision for earthing

Subclause 9.1

Add the following text:

Conductors for protective earthing provided by tracks on printed circuit boards shall be tested as follows:

A current from an a.c. source of 25 A is passed for 1 min between the earthing terminal or earthing contact via the track on the printed board and each of the accessible metal parts in turn.

After the test the requirement of IEC 598-1, subclause 7.2.3 shall apply.

10 Construction

Subclause 10.4

Add the following new paragraphs:

Ignitors with pulse voltages over 10 kV shall be provided with a device for time limitation of the starting operation. This device shall, in case of the non-igniting of lamps, interrupt the generation of starting pulses within 3 s. After time limitation has interrupted the circuit, generation of starting pulses is only allowed after disconnection and reconnecting the ignitors to the supply.

Ignitors with pulse voltages over 5 kV and up to 10 kV shall be provided with a time limitation device which shall interrupt the generation of pulses within 60 s. After time limitation has interrupted the circuit, generation of starting pulses is only allowed after disconnection and reconnecting the ignitors to the supply.

Compliance is checked by inspection and by the test of subclause 14.3.

11 Moisture treatment

Subclause 11.2

Add the following note and requirements (from IEC 598-1, subclause 9.3) to complete the description of the test:

NOTE - In most cases, the sample may be brought to the specified temperature between t and $(t + 4)$ °C by keeping it in a room at this temperature for at least 4 h before the humidity treatment.

In order to achieve the specified conditions within the cabinet, it is necessary to ensure constant circulation of the air within and in general to use a cabinet which is thermally insulated.

12 Insulation resistance and electric strength

2 MΩ is considered for basic insulation and 7 MΩ for reinforced insulation between live parts and the body.

Subclause 12.1

Replace the third paragraph by the following text:

The insulation resistance is measured between live parts and outer metal parts, including fixing screws and metal foil in contact with outer insulating parts.

Before the insulation test, visible drops of water are removed by means of blotting paper.

Immediately after the moisture treatment, the insulation resistance is measured with a d.c. voltage of approximately 500 V the measurement being made 1 min after application of the voltage.

13 Fault conditions

Replace the second paragraph of this clause by the following:

The protection against accidental contact in accordance with sub-clause 7.1 shall not be impaired.

14 Heating of independent starting devices

14.3 Abnormal operation

Amend the first sentence of the third paragraph as follows:

In case of abnormal conditions, the ignitors are operated at 110 % of the rated voltage until they reach the steady temperature, or for ignitors with operating time limitation until they cut-out at or before the required time limit.

15 Pulse voltage of Ignitors

Add the following new paragraphs:

If not otherwise stated on the relevant lamp data sheets, for ignitors with pulses over 5 kV the maximum value of the pulse voltage shall not exceed $1,3 \times U_p$ declared by the manufacturer when operated at the rated supply voltage and with a load capacitance of 20 pF.

Measurements are made by oscilloscope or static voltmeters for peak pulses up to 100 kV. Above 15 kV a spherical spark gap can be used, using the procedures based on those given in IEC 52, and taking note of annex C.

18 Creepage distances and clearances

Replace the text of this clause by the following:

Creepage distances and clearances shall be not less than the values given in tables II and III, as appropriate, unless otherwise specified in clause 13.

The contribution to the creepage distance of any groove less than 1 mm wide shall be limited to its width.

Any air-gap of less than 1 mm shall be ignored in computing the total air path.

NOTE - Creepage distances are distances in air, measured along the surface of insulation.

A metal enclosure shall have an insulating lining if, in the absence of such a lining, the creepage distance or clearance between live parts and the enclosure would be smaller than the value prescribed below.

Starting devices, where the components are so encapsulated in a self-hardening compound bonded to the relevant surfaces that no clearances exist, are not checked.

Printed boards are exempt from the requirements of this clause because they are tested according to clause 13.

Table II – Minimum distances for a.c. (50 Hz/60 Hz) sinusoidal voltages

RMS working voltage not exceeding (V)	50	150	250	500	750	1 000
Minimum distances (mm)						
1. Between live parts of different polarity and						
2. Between live parts and accessible metal parts which are permanently fixed to the starting device, including screws or devices for fixing covers or fixing the starting device to its support						
– Creepage distances						
insulation PTI ≥ 600	0,6	1,4	1,7	3	4	5,5
< 600	1,2	1,6	2,5	5	8	10
– Clearances	0,2	1,4	1,7	3	4	5,5
3. Between live parts and a flat supporting surface or a loose metal cover, if any, if the construction does not ensure that the values under 2 above are maintained under the most unfavourable circumstances						
– Clearances	2	3,2	3,6	4,8	6	8

NOTES

- 1 PTI (proof tracking index) in accordance with IEC 112.
- 2 In the case of creepage distances to parts not energized or not intended to be earthed where tracking cannot occur, the values specified for material with $PTI \geq 600$ apply for all materials (in spite of the real PTI).
- For creepage distances subjected to working voltages of less than 60 s duration the values specified for materials with $PTI \geq 600$ apply for all materials.
- 3 For creepage distances not liable to contamination by dust or moisture the values specified for material with $PTI \geq 600$ apply (independent of the real PTI).
- 4 Accessible metal parts are rigidly placed in relation to live parts.
- 5 The creepage distances and clearances specified in this clause do not apply to starting devices which comply with the dimensions specified in IEC Publication 155. In such instances the requirements of sub-clause 6.6.2 of that standard apply.

Table III – Minimum distances for non-sinusoidal pulse voltages

Rated pulse voltage (peak kV)	2,0	2,5	3,0	4,0	5,0	6,0	8,0
Minimum distances (mm)							
Clearances	1,0	1,5	2	3	4	5,5	8

For distances subjected to both sinusoidal voltage as well as non-sinusoidal pulses, the minimum required distance shall be not less than the highest value indicated in either table.

Creepage distances shall be not less than the required minimum clearance.

Table IV – Minimum distances for non-sinusoidal pulse voltages

Rated peak pulse Voltage U_p (kV)	10	12	15	20	25	30	40	50	60	80	100
Minimum distances (mm)											
Clearances	11	14	18	25	33	40	60	75	90	130	170

19 Resistance to heat, fire and tracking

Add the following paragraph after 19.3

- any flame or glowing of the specimen shall extinguish within 30 s of withdrawing the glow-wire and any flaming drops shall not ignite a piece of five-layer tissue paper, specified in sub-clause 6.86 of ISO 4046 spread out horizontally 200 mm $\pm$ 5 mm below the test specimen.

Appendix A

Delete the first paragraph of sub-clause A1.1.

Add the following new paragraph at the end of A1.1.

Compliance is checked by measurement in accordance with IEC 990, figure 4 and sub-clause 7.1.

Add the following new annex, after annex B:

Annex C

Precautions to be observed when measuring with sphere-gaps
(see clause 15)

Because many ignitors do not have outputs where one pole is at earth potential, the direct application of IEC 52 cannot apply.

In all cases the following subclauses shall be observed together with those requirements of IEC 52 which are applicable.

C.1 The sphere gap shall be greater than the anticipated breakdown distance and shall be progressively reduced until breakdown occurs (i.e. too small a gap opening up to non-sparking distance is not a valid method of determining the correct voltage value).

C.2 The breakdown gap distance shall be recorded and the 50 % peak voltage value determined from table II in IEC 52.

C.3 The duty cycle of the ignitor shall be observed to ensure that overheating/failure of the components is not induced.

C.4 All safety precautions shall be observed and all voltages shall be discharged at the end of the test.
