

Safety in electroheat installations —

Part 4: Particular requirements for arc furnace installations

The European Standard EN 60519-4:1997, with the incorporation of amendment A1:2000 has the status of a British Standard

ICS 25.180.10

National foreword

This British Standard is the English language version of EN 60519-4:1997, including amendment A1:2000. It is identical with IEC 60519-4:1995 including amendment 1:2000. It supersedes BS 7699-4:1994 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PEL/27, Electroheating, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Cross-references

Attention is drawn to the fact that Annex ZA lists normative references to international publications with their corresponding European publications. The British Standards which implement these international or European publications may be found in the BSI Standards Catalogue under the section entitled “International Standards Correspondence Index”, or by using the “Find” facility of the BSI Standards Electronic Catalogue.

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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 15 and a back cover.

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Safety in electroheat installations — Part 4: Particular requirements for arc furnace installations

(includes amendment A1:2000)
(IEC 60519-4:1995 + A1:2000)

Sécurité dans les installations
électrothermiques —
Partie 4: Règles particulières pour
les installations des fours à arc
(inclut l'amendement A1:2000)
(CEI 60519-4:1995 + A1:2000)

Sicherheit in Elektrowärmeanlagen —
Teil 4: Besondere Bestimmungen für
Lichtbogenofenanlagen
(enthält Änderung A1:2000)
(IEC 60519-4:1995 + A1:2000)

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

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Foreword

The text of the International Standard IEC 519-4:1995 prepared by IEC TC 27, Industrial electroheating equipment, was submitted to the formal vote and was approved by CENELEC as EN 60519-4 on 1997-03-11 without any modification.

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) 1997-12-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 1997-12-01

For products which have complied with the relevant national standard before 1997-12-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 2002-12-01.

Annexes designated “normative” are part of the body of the standard.

In this standard, Annex A, Annex B and Annex ZA are normative.

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 519-4:1995 was approved by CENELEC as a European Standard without any modification.

Foreword to amendment A1

The text of document 27/235/FDIS, future amendment 1 to IEC 60519-4:1995, prepared by IEC TC 27, Industrial electroheating equipment, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as amendment A1 to EN 60519-4:1997 on 2000-02-01.

The following dates were fixed:

- latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2000-11-01
- latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 2003-02-01

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1 Scope

This part of IEC 519 is applicable to electroheat installations such as:

- furnaces for direct-arc heating such as direct arc furnaces, submerged arc furnaces, ladle arc heating furnaces;
- furnaces for indirect arc heating.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 519. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this part of IEC 519 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 50(841):1983, *International Electrotechnical Vocabulary (IEV) — Chapter 841: Industrial electroheating*.

IEC 73:1991, *Coding of indicating devices and actuators by colours and supplementary means*.

IEC 364-4-3:1977, *Electrical installations of buildings — Part 4: Protection for safety — Chapter 43: Protection against overcurrent*.

IEC 364-4-473:1977, *Electrical installations of buildings — Part 4: Protection for safety — Chapter 47: Application of protective measures for safety — Section 473: Measures of protection against overcurrent*.

IEC 479-1:1994, *Effects of current on human beings and livestock — Part 1: General aspects*.

IEC 519-1:1984, *Safety in electroheat installations — Part 1: General requirements*.

3 Definitions

For the purposes of this part of IEC 519, the definitions given in IEC 519-1 and in IEC 50(841) apply.

4 Classification of electroheat equipment according to voltage bands

The requirements of clause 4 of IEC 519-1 apply, except as follows:

4.1 Addition:

The voltage band is determined by the line-to-line open circuit rated supply voltage to the electrodes.

4.2.2 Addition:

Direct arc furnaces shall be classified under voltage band 2, even if their rated voltage exceeds 1 000 V a.c. (1 500 V d.c.) but does not exceed 1 500 V a.c. (2 100 V d.c.).

This is under the precondition that:

- a) the electrical power installations with a rated voltage above 1 000 V a.c. (1 500 V d.c.), which are located in enclosed operating premises, have been designed in accordance with the relevant standards;
- b) the envisaged measures and auxiliary equipment according to 15.3 fulfil the requirements of the actual nominal voltage;
- c) the insulation of the high current conductors to the ground fulfil the minimum requirements of the relevant standards.

5 Classification of electroheat equipment according to frequency bands

The requirements of clause 5 of IEC 519-1 apply, except as follows:

5.1 Addition:

DC is classified as low frequency.

6 General requirements

The requirements of clause 6 of IEC 519-1 apply, except as follows:

6.1.3 *Replacement*

Sufficient mechanical stability of the furnace shall be ensured even without a refractory lining. In case of rectangular submerged arc furnaces where refractory lining is needed to obtain mechanical stability, the design shall be such that adjustments in accordance with furnace expansion are possible.

The operating devices shall be arranged within easy and safe reach of the operator, or operators, at his or their normal positions as far as is reasonably practicable.

The operating devices shall be designed and placed to prevent their unintended activation, as far as is reasonably practicable. Operating devices designed for plug connection shall have connectors that are mechanically lockable and which do not march with supply network connectors.

6.1.5 *Replacement:*

Utility supply hoses (for water, hydraulic liquid, etc.) shall not be subjected to undue mechanical overstressing during the movements of the installations.

6.2.1 *Replacement:*

Electrical equipment installed near components with high operating temperatures shall have sufficient thermal strength and sufficient protection.

6.2.3 *Replacement:*

Precautions shall be taken to avoid any hazard to persons due to transient voltages which might occur during normal operation in circuits comprising transformers, inductors, rectifiers and capacitors, etc. The equipment shall be designed to suppress and/or withstand the very high voltages which are normal in the operation of an arc furnace.

6.2.6 *Replacement:*

The electrical equipment shall be so arranged that it does not deteriorate in normal operation due to physical and chemical effects, such as those due to heat from the environment, spatter of melted materials and salts, humidity, oil, shocks, friction or electromagnetic forces created by the operating current if necessary, suitable structural measures shall be taken for example by providing gutters, protective channels and similar means.

6.3.2 *Replacement:*

Similar precautions shall also be taken concerning the effects of electromagnetic leakage (stray fields), for example eddy currents and induced voltages, as far as it is reasonably practicable.

6.4 *Replacement:*

For d.c. arc furnaces, measures shall be taken to avoid the influence of strong d.c. magnetic field on some electrical devices, for example video display units, control units, electromagnetic valves, sensors; the magnetization of some steel-made parts shall be considered.

6.5 *Addition:*

This also applies to other water cooled elements like bottom electrodes at d.c. furnaces. See also 15.4.7.

6.5.6 *Addition:*

— minimum and maximum inlet pressure

7 Prohibition of the use of earth as part of an active circuit

This clause applies except as follows:

7.2 *Addition:*

The tilt tracks shall not be used as return circuits.