

Graphite electrodes for electric arc furnaces — Dimensions and designation

The European Standard EN 60239:2005 has the status of a
British Standard

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National foreword

This British Standard is the official English language version of EN 60239:2005. It is identical with IEC 60239:2005. It supersedes BS EN 60239:1997 which will be withdrawn on 1 July 2008.

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

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- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep UK interests informed;
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Summary of pages

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English version

**Graphite electrodes for electric arc furnaces —
Dimensions and designation
(IEC 60239:2005)**

Electrodes en graphite pour les fours
à arc — Dimensions et dénomination
(CEI 60239:2005)

Graphitelektroden für Lichtbogenöfen —
Maße und Kennzeichnung
(IEC 60239:2005)

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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

The text of document 27/464/FDIS, future edition 4 of IEC 60239, prepared by IEC TC 27, Industrial electroheating equipment, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60239 on 2005-07-01.

This European Standard supersedes EN 60239:1997.

Significant technical changes with respect to EN 60239:1997 are as follows:

- addition of 750 mm nominal diameter electrodes;
- revision of electrode diameter and length tolerances;
- revision of nominal lengths and diameters;
- introduction of socket and pin tolerances;
- revision of Annex A on male-female electrodes;
- addition of Annex B on handling and jointing.

This new edition also aims at a better compatibility between EN 60239 and other technical standards that cover the same subject, as well as better compliance with standards for figures, tables and symbols – in that respect, and in addition to the content, the format and the title of this standard have been modified.

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) | 2006-04-01 |
| – latest date by which the national standards conflicting with the EN have to be withdrawn | (dow) | 2008-07-01 |

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60239:2005 was approved by CENELEC as a European Standard without any modification.

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GRAPHITE ELECTRODES FOR ELECTRIC ARC FURNACES – DIMENSIONS AND DESIGNATION

1 Scope and object

This International Standard specifies the dimensions of turned and threaded cylindrical graphite arc furnace electrodes and graphite electrode pins for use as full graphite electrode columns on arc furnaces.

This standard covers

- the dimensions and tolerances on length and diameter of electrodes;
- the dimensions, tolerances and thread details for electrode sockets and pins of tapered shape, used with the electrodes.

The standardization of the above dimensional features is essential for the interchangeability of electrodes from different sources, and is a minimum standard.

NOTE 1 The standardization ensures that any supplier's electrode at ambient temperature can accept any other supplier's pin of appropriate dimensions.

However, the variety of raw materials and production techniques may lead to different thermal behaviour of finished products. It is, therefore recommended that electrodes and pins from different sources should not be mixed in use.

Annex A contains information on male-female electrodes used in some countries.

Annex B contains recommendations for electrode handling and jointing procedures.

The metric system is adopted as the standard of measurement.

NOTE 2 The use of decimals has been deliberately limited to two digits after the decimal point.

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 60050-841:2004, *International Electrotechnical Vocabulary (IEV) – Part 841: Industrial electroheat*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-841 and the following apply.

NOTE Figure 1, Figure 2, Figure 3 and Figure 4 provide alternative explanation for all terms related to dimensions.

3.1

arc furnace electrode

element of high-current line inserted through the electrode port inside the furnace body, enabling the ignition and maintenance of an arc between the electrode tip and charge, or the tip of another electrode

[IEV 841-26-38]

3.2

(graphite) (arc furnace) electrode

arc furnace electrode made of graphite, turned to a cylinder and machined with threaded areas at each end so as to permit assembly as a column using an electrode pin

NOTE Electrodes are machined as cylinders to permit holding in the electrode clamp.

3.3

male-female electrode

arc furnace electrode made of graphite where the assembly is made possible without electrode pins but through the machining of one end of the electrode as an external (male) thread and the other end as an internal (female) thread

3.4

electrode column

assembly of several arc furnace electrodes

NOTE Electrode columns are also called continuous electrodes.

3.5

(electrode) pin

electrode nipple

part made of graphite, in the shape of truncated cones with common base, threaded both sides, joining two arc furnace electrodes of the same diameter

[IEV 841-26-47, modified]

3.6

socket (of an electrode)

internal taper-threaded area located at each end of an electrode that can be equipped with a corresponding electrode pin

3.7

joint

assembly of two threaded electrode sockets and their matching pin

3.8

taper

full angle of the cone represented by the pitch line of the threads

NOTE The taper (see Figures 3 and 4) can be referenced to using the actual angle or its tangent.

3.9**slope**

angle between the thread pitch line and axis of thread

NOTE The slope angle is half of the taper angle. It can be referenced by using the actual angle or its tangent.

3.10**pitch diameter of the pin**

diameter of the circle, intersection of the plane perpendicular to the axis of the pin at the half length of the pin with the cone that comprises the pitch lines of the pin threads

NOTE See d_2 in Figures 3 and 4.

3.11**major diameter of the pin**

diameter of the circle, intersection of the plane perpendicular to the axis of the pin at the half length of the pin with the cone that comprises the lines connecting the crests of the pin threads

NOTE See d_1 in Figures 3 and 4.

3.12**nominal diameter of the pin**

major diameter of the pin truncated to zero decimal place

3.13**pitch diameter of the socket**

diameter of the circle, intersection of the plane perpendicular to the axis of the socket, which matches the extremity of the electrode cylinder, with the cone that comprises the pitch lines of the socket thread

NOTE See d_4 in Figures 3 and 4.

3.14**minor diameter of the socket**

diameter of the circle, intersection of the plane perpendicular to the axis of the socket, which matches the extremity of the electrode cylinder, with the cone that comprises the lines connecting the crest of the of the socket thread

NOTE See d_3 in Figures 3 and 4.

3.15**low spot**

part of the cylinder untouched by the tool when machining the electrode

4 Electrodes**4.1 Description of product**

Figure 1 shows a graphite arc furnace electrode with its pin in place, ready to be assembled into an electrode column. Electrodes may be shipped as shown in Figure 1, with pins already assembled in sockets or with pins separately packaged.