

Test methods for batch furnaces with metallic heating resistors

ICS 25.180.10

National foreword

This British Standard reproduces IEC 60397:1994 together with its corrigendum and implements it as the UK national standard. It supersedes BS 7749:1994 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PEL/27, Electroheat, 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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The British Standards which implement international or European publications referred to in this document 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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**Méthodes d'essai des fours à chargement
discontinu à résistances chauffantes métalliques**

**Test methods for batch furnaces
with metallic heating resistors**



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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**TEST METHODS FOR BATCH FURNACES
WITH METALLIC HEATING RESISTORS**

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international cooperation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 397 has been prepared by IEC technical committee 27: Industrial electroheating equipment.

This second edition cancels and replaces the first edition published in 1972 and its supplement (1975), and constitutes a technical revision.

The text of this standard is based on the following documents:

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

TEST METHODS FOR BATCH FURNACES WITH METALLIC HEATING RESISTORS

1 Scope and object

The present International Standard applies to industrial electric batch furnaces with indirect resistance heating (rated temperature in the range from 400 °C to 1 800 °C), provided with an automatic temperature control system, with either a natural atmosphere or a special atmosphere composed of neutral gases.

This standard applies to batch chamber, bell, elevator, shaft, carriage furnaces, or to furnaces of any similar construction. These furnaces may be constructed either with forced air circulation or not.

This standard concerns furnaces of voltage classes 1 and 2 according to 4.2.2 of IEC 519-1.

NOTE - Furnaces with controlled atmosphere or vacuum or continuous furnaces are under consideration.

The object of the present standard is the standardization of test conditions and methods to determine the essential parameters and technical data of the furnaces mentioned above.

This standard does not contain a list of mandatory tests and is not restrictive. According to need, tests necessary for the assessment of a furnace can be chosen at will from those specified in the suggested list.

When needed, supplementary tests can also be made, in compliance with the standards in use in the countries concerned and agreement between manufacturer and user.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this International Standard 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 398: 1972, *General test conditions for industrial electro-heating equipment*

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

IEC 519-2: 1992, *Safety in electroheat installations - Part 2: Particular requirements for resistance heating equipment*

3 Definitions

For the purpose of this International Standard, the following definitions apply.

For definitions of fundamental or general terms in the field of electroheating, the reader should refer to chapter 841 of IEC 50.

NOTE - In this standard, the expression "installations" (of the furnace) includes the furnace itself and the other components.

3.1 heating chamber of furnace: Inner volume of furnace containing the heating elements (it is limited by the inner surface of the thermal insulation).

3.2 working chamber of furnace: Space of dimensions determined by the manufacturer, intended for receiving the charge.

NOTE - Instead of heating or working chamber, the expression heating or working space is also used.

3.3 furnace temperature θ_i (°C): Instantaneous value of the temperature measured at a defined point of the working chamber of the furnace.

3.4 controlled temperature θ_r (°C): Instantaneous value of the temperature measured by the sensor of the temperature control system.

3.5 preset temperature θ_o (°C): Instantaneous value of the controlled temperature.

3.6 working temperature of furnace θ_t (°C): Mean value of the furnace temperature in thermal steady state (3.21), for a determined time.

3.7 rated temperature of furnace θ_n (°C): The highest value of the working temperature of the furnace for which it is designed.

3.8 rated ambient conditions of the furnace: Ambient conditions (temperature, pressure, air humidity ...) for which the furnace is designed.

3.9 ambient temperature θ_a (°C): Mean value of the temperature measured in the room where the furnace is installed at points protected against the direct radiations of the furnace.

3.10 reference ambient temperature θ_{ar} (°C): Ambient temperature to which all furnace characteristic data are referred. The reference ambient temperature is fixed at 20 °C.

3.11 heating power P_c (kW): Instantaneous value of the power absorbed by the heating elements of the furnace.

3.12 mean heating power P_{cm} (kW): Mean value of the heating power over a given time interval.

3.13 rated heating power P_{cn} (kW): Rated value of the heating power in rated conditions.