
Test methods for electroheating installations with electron guns

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST HD 440 S1:2003
<https://standards.iteh.ai/catalog/standards/sist/f5de634a-e71f-4d19-951e-4ef1a5b7fdd0/sist-hd-440-s1-2003>

iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST HD 440 S1:2003

<https://standards.iteh.ai/catalog/standards/sist/f5de634a-e71f-4d19-951e-4ef1a5b7fdd0/sist-hd-440-s1-2003>

ENGLISH VERSION

UDC: 621.365.91.001.2.001.4.004.12(083.71)

Key words: Electric heating - furnaces - electron beam

TEST METHODS FOR ELECTROHEATING INSTALLATIONS WITH ELECTRON GUNS

Méthodes d'essai des installations
électrothermiques comportant des
canons à électrons

Prüfverfahren für Elektrowärme-
anlagen mit Elektronenkanonen

BODY OF HD

The Harmonization Document consists of:

- IEC 703 (1981) edition 1; IEC/TC 27, not appended

This Harmonization Document was approved by CENELEC on **7 September 1983**.

The English and French versions of this HD are provided by the text of the IEC publication and the German version is the official translation of the IEC text.

According to the CENELEC Internal Regulations the CENELEC member National Committees are bound:

to announce the existence of this Harmonization Document at national level

by or before **1984-01-01**

to publish their new harmonized national standard

by or before **1985-01-01**

to withdraw all conflicting national standards

by or before **1985-01-01**.

Harmonized national standards are listed on the HD information sheet, which is available from the CENELEC National Committees or from the CENELEC General Secretariat.

The CENELEC National Committees are the national electrotechnical committees of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxemburg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom.

© Copyright reserved to all CENELEC members

iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST HD 440 S1:2003

<https://standards.iteh.ai/catalog/standards/sist/f5de634a-e71f-4d19-951e-4ef1a5b7fdd0/sist-hd-440-s1-2003>

NORME
INTERNATIONALE
INTERNATIONAL
STANDARD

CEI
IEC

60703

Première édition
First edition
1981-01

Méthodes d'essai des installations
électrothermiques comportant
des canons à électrons

iTeh STANDARD PREVIEW
Test methods for electroheating installations
with electron guns
(standards.iteh.ai)

SIST HD 440 S1:2003

<https://standards.iteh.ai/catalog/standards/sist/15de634a-e71f-4d19-951e-4ef1a5b7fdd0/sist-hd-440-s1-2003>

© IEC 1981 Droits de reproduction réservés — Copyright - all rights reserved

Aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'éditeur.

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

International Electrotechnical Commission
Telefax: +41 22 919 0300

3, rue de Varembé Geneva, Switzerland
e-mail: inmail@iec.ch IEC web site <http://www.iec.ch>



Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

CODE PRIX
PRICE CODE

H

Pour prix, voir catalogue en vigueur
For price, see current catalogue

CONTENTS

	Page
FOREWORD	5
PREFACE	5
Clause	
1. Scope	7
2. Object.	7
3. Definitions	7
4. General test requirements	9
5. Test methods	11
6. Test intervals	15

iTeh STANDARD PREVIEW
(standards.iteh.ai)

~~SIST HD 440 S1 2003~~

<https://standards.iteh.ai/catalog/standards/sist/f5de634a-e71f-4d19-951e-4ef1a5b7fdd0/sist-hd-440-s1-2003>

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**TEST METHODS FOR ELECTROHEATING
INSTALLATIONS WITH ELECTRON GUNS**

FOREWORD

- 1) The formal decisions or agreements of the I E C on technical matters, prepared by Technical Committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.
- 2) They have the form of recommendations for international use and they are accepted by the National Committees in that sense.
- 3) In order to promote international unification, the I E C expresses the wish that all National Committees should adopt the text of the I E C recommendation for their national rules in so far as national conditions will permit. Any divergence between the I E C recommendation and the corresponding national rules should, as far as possible, be clearly indicated in the latter.

PREFACE

This standard has been prepared by I E C Technical Committee No. 27: Industrial Electroheating Equipment.

A draft was discussed at the meeting held in Pittsburgh in 1977. As a result of this meeting, a draft, Document 27(Central Office)42, was submitted to the National Committees for approval under the Six Months' Rule in June 1978.

The National Committees of the following countries voted explicitly in favour of publication:

Austria
Belgium
Canada
Egypt
France
Germany
Italy
Japan

Netherlands
Poland
Romania
South Africa (Republic of)
Turkey
Union of Soviet
Socialist Republics
United Kingdom

TEST METHODS FOR ELECTROHEATING INSTALLATIONS WITH ELECTRON GUNS

1. Scope

This standard applies to electroheating installations comprising one or more electron guns as heating source.

2. Object

The object of this standard is the standardization of test methods to determine the essential parameters and the technical data and characteristics of electroheating installations comprising one or more electron guns.

The standard does not contain a mandatory list of tests and is not restrictive. Tests may be selected from the proposed list. The specification established by agreement between the user and the manufacturer of electron beam heating installations can supplement these recommendations but should not be in contradiction with them.

3. Definitions

The following definitions apply for the purposes of this standard.

For definitions of fundamental and general terms in the field of electroheating, the reader should refer to Chapter 841 of the International Electrotechnical Vocabulary (I.E.V.).

3.1 Cathode

SIST HD 440 S1:2003

<https://standards.itech.ai/catalog/standards/sist/5de634a-e71f-4d19-951e-300300000000/iec-60000-1-1980>

An electrode that is the source of the desired electron emission.

3.2 Anode

An electrode connected to the positive terminal of the source and which is usually pierced to provide a free passage for the electron beam.

3.3 Emission current

The electron current flowing from cathode.

Note. — The electron beam current arriving at the workpiece may either be lower than the emission current, or up to several orders of magnitude larger than the emission current if ion bombardment is also present.

3.4 Beam accelerating voltage (high voltage)

The potential difference between the cathode and the anode to generate an electric field for acceleration of the electrons.

3.5 Electron gun chamber

The vacuum chamber which contains the electron gun may be separated from the object to be heated by an aperture, so that between the electron gun (electron beam gun) and the compartment with the workpiece, a relatively high pressure difference can be established.

3.6 *Interlock*

A device that prevents activation of a piece of equipment when some form of hazard or danger exists.

3.7 *Mechanical interlock*

Interlock achieved by mechanical means.

3.8 *Electrical interlock*

Interlock achieved by electrical circuits.

3.9 *Vacuum chamber*

The enclosed space of a vacuum plant constructed in such a way that it can withstand a rarified atmosphere inside, and usually containing the workpiece to be treated.

3.10 *Return conductor*

The electrical interconnection between high-voltage power supply (positive pole) and anodic part of the electron gun as well as between the workpiece to be heated or the chamber surrounding the workpiece. The conductor shall be interconnected to earth or to the earthed conductor of the power supply.

4. **General test requirements**

The following tests are to be carried out for the assessment of the electroheating installation with electron guns, except otherwise stated.

4.1 *Testing of safety interlocks, mechanical and electrical (see Sub-clause 5.1)*

4.2 *Testing of return conductor and earth and protective connections (see Sub-clause 5.2)*

4.2.1 *Visual.*

4.2.2 *With ohmmeter.*

4.3 *Vacuum test (see Sub-clause 5.3)*

4.3.1 *With cathode cold.*

4.3.2 *With cathode hot.*

4.4 *Testing of cooling water installation (see Sub-clause 5.4)*

4.4.1 *Leakage test with 1.5 times the nominal pressure.*

4.4.2 *Testing of the cooling water control devices.*

4.4.3 *Measurement of final temperature of cooling water at steady state and rated power.*

4.5 *Testing of excess current control device of high-voltage power supply (see Sub-clause 5.5)*