IEC 60519-21

Edition 2.0 2008-09

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Safety in electroheat installations –
Part 21: Particular requirements for resistance heating equipment – Heating and melting glass equipment

Sécurité dans les installations électrothermiques –
Partie 21: Exigences particulières pour les installations de chauffage par résistance – Installations électrothermiques de fusion de verre

IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland
Email: inmail@iec.ch
Web: www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

- Catalogue of IEC publications: www.iec.ch/searchpub
The IEC on-line Catalogue enables you to search by a variety of criteria (reference number, text, technical committee,…). It also gives information on projects, withdrawn and replaced publications.
- IEC Just Published: www.iec.ch/online_news/justpub
Stay up to date on all new IEC publications. Just Published details twice a month all new publications released. Available on-line and also by email.
- Electropedia: www.electropedia.org
The world's leading online dictionary of electronic and electrical terms containing more than 20 000 terms and definitions in English and French, with equivalent terms in additional languages. Also known as the International Electrotechnical Vocabulary online.
- Customer Service Centre: www.iec.ch/webstore/custserv
If you wish to give us your feedback on this publication or need further assistance, please visit the Customer Service Centre FAQ or contact us:
Email: csc@iec.ch
Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00

A propos de la CEI

La Commission Electrotechnique Internationale (CEI) est la première organisation mondiale qui élabore et publie des normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications CEI

Le contenu technique des publications de la CEI est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

- Catalogue des publications de la CEI: www.iec.ch/searchpub/cur_fut-f.htm
Le Catalogue en-ligne de la CEI vous permet d'effectuer des recherches en utilisant différents critères (numéro de référence, texte, comité d'études,…). Il donne aussi des informations sur les projets et les publications retirées ou remplacées.
- Just Published CEI: www.iec.ch/online_news/justpub
Restez informé sur les nouvelles publications de la CEI. Just Published détaille deux fois par mois les nouvelles publications parues. Disponible en-ligne et aussi par email.
- Electropedia: www.electropedia.org
Le premier dictionnaire en ligne au monde de termes électroniques et électriques. Il contient plus de 20 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans les langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International en ligne.
- Service Clients: www.iec.ch/webstore/custserv/custserv_entry-f.htm
Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions, visitez le FAQ du Service clients ou contactez-nous:
Email: csc@iec.ch
Tél.: +41 22 919 02 11
Fax: +41 22 919 03 00

IEC 60519-21

Edition 2.0 2008-09

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Safety in electroheat installations –
Part 21: Particular requirements for resistance heating equipment – Heating and melting glass equipment

Sécurité dans les installations électrothermiques –
Partie 21: Exigences particulières pour les installations de chauffage par résistance – Installations électrothermiques de fusion de verre

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

PRICE CODE
CODE PRIX H

ICS 25.180.10

ISBN 978-2-88910-206-8

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

SAFETY IN ELECTROHEAT INSTALLATIONS –

Part 21: Particular requirements for resistance heating equipment – Heating and melting glass equipment

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). 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. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60519-21 has been prepared by IEC technical committee 27: Industrial electroheating equipment.

This second edition cancels and replaces the first edition published in 1998 and constitutes a technical revision. The significant changes with respect to the previous edition are as follows:

– The latest editions of IEC 60519-1:2003 and IEC 60519-2:2006 have been taken into account.
– Definitions have been brought into line with the second edition of IEC 60050-841:2004.

This standard is to be used in conjunction with IEC 60519-2:2006. It is intended to specify particular requirements for resistance heating and melting glass equipment. This Part 21 supplements or modifies the corresponding clauses of IEC 60519-2, so as to convert it into an IEC standard.

Where a particular subclause of Part 2 is not mentioned in this Part 21, that subclause applies as far as is reasonable. Where this standard states "addition", "modification" or "replacement", the relevant text of Part 2 is to be adapted accordingly.

NOTE Subclauses and notes which are additional to those in Part 2 are numbered starting from 101.

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

CDV	Report on voting
27/630/CDV	27/649/RVC

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts of IEC 60519 series, under the general title *Safety in electroheat installations*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

SAFETY IN ELECTROHEAT INSTALLATIONS –

Part 21: Particular requirements for resistance heating equipment – Heating and melting glass equipment

1 Scope and object

Replacement:

This part of IEC 60519 is applicable to indirect resistance heating equipment for the heating and melting of glass, operating in voltage bands 1 and 2. These particular requirements also apply to equipment for direct resistance heating and melting of glass by means of current introduced by electrodes passing through the charge to be heated.

The object of this standard is the determination of safety requirements for both indirect and direct resistance heating equipment for the heating and melting of glass.

NOTE Extraction of liquid glass or a similar material at the extraction point is part of the production process and does not constitute part of the operation of the electroheat equipment.

This standard covers the safety aspects of electrical parts also in the case when electrical heating is combined with other means of heating, for example liquid fuel heating.

These requirements do not apply to equipment for direct resistance heating, where, owing to the technology used, IEC 60519-3, IEC 60519-4 and IEC 60519-8 are applicable.

2 Normative references

This Clause of part 2 is applicable.

3 Terms and definitions

This Clause of part 2 applies except as follows:

Addition:

3.101
glass-melting furnace (indirect resistance heating)
furnace in which glass is melted by means of indirect resistance heating

3.102
pot furnace
melting equipment in which the batch is melted by means of indirect electrical heating in vessels called “pots” made of a fire-proof material and placed in the furnace

3.103
filling machine
machine which feeds the batch into the glass furnaces

3.104
extraction machine
machine which extracts molten glass from the glass furnaces

3.105
extraction point
opening in the glass furnace through which molten glass is drawn off

NOTE Molten glass is drawn off for example, manually by means of glassmakers' tools or by means of extraction machines. In the case of pot furnaces, the extraction points also serve as openings for the feeding or extraction of samples.

3.106
earthing electrode
electrode that is installed in the glass melt and is connected to the equipotential system

4 Classification of electroheat equipment according to voltage bands

This Clause of part 2 is applicable.

5 Classification of electroheat equipment according to frequency bands

This Clause of part 2 is applicable.

6 General requirements

This Clause of part 2 is applicable.

7 Isolation and switching

This Clause of part 2 is applicable.

8 Connection to the supply network and internal connections

This Clause of part 2 is applicable.

9 Protection against electric shock

This Clause of part 2 applies except as follows:

Addition:

9.2.101 Measures shall be taken in the case of directly or indirectly heated melting equipment, which provides protection against electric shock when glassmakers' tools or extraction machines are submerged in the conductive glass melt, or when the batch mixture is being fed into the glass melt.

Measures of this type are for example:

– installation of an earthing electrode for personnel safety at the extraction point. The electrode function shall be constantly monitored. When the monitoring device shows a reaction, the glass furnace shall automatically be shut down, possibly in partial areas, or by means of appropriate measures, further extraction shall be prevented;

NOTE The earthing electrode should be constructed and set in such a manner that, even under the most unfavourable circumstances, for example a change in the conduction and filling level of the melt in the region of the extraction point, effectiveness is not impaired.

- measures against contact with live parts (electrodes, heating elements) by appropriate construction-design when using glassmakers' tools, e.g. covers or barriers;
- insulation of the working platform at the place of operation;

In addition, in the case of indirectly heated glass furnaces (pot furnaces):

- automatic shut-off of heating when leakage current measurement indicates a dangerous situation.

9.2.102 Filling machines, extraction machines and the whole of the steel construction of the melting plant shall be connected to an equipotential system.

Earthing electrodes for safety of personnel shall be installed in the glass melt and be connected to the equipotential system.

If an underground equipotential system is installed, the requirements of IEC 60364-4-41 shall be fulfilled.

10 Protection against overcurrent

This Clause of part 2 is applicable.

11 Equipotential bonding

This Clause of part 2 is applicable.

12 Control circuits and control functions

This Clause of part 2 is applicable.

13 Protection against thermal influences

This Clause of part 2 is applicable.

14 Risk of fire and danger of explosion

This Clause of part 2 is applicable.

15 Marking, labelling and technical documentation

This Clause of part 2 is applicable.

16 Information on inspection and commissioning and instructions for utilization and maintenance of electroheat installations

This Clause of part 2 applies except as follows:

Replacement:

16.3.4 For directly or indirectly heated melting equipment, when glassmakers' tools or extraction machines are submerged in the conductive glass melt, or when the batch mixture is being fed into the glass melt, the following shall be applied (in compliance with local safety at work regulations):

- use of protective equipment (e.g. clothes, shoes, gloves),
- use of insulated tools.

These measures are to be provided in addition to the measures described in 9.2.101, to provide protection against electric shock.

Addition:

16.3.101 Compliance with the requirements for the avoidance of contact with live parts of the equipment (which are above earth potential), including the necessary shut-down systems, shall be checked at the time of setting up the equipment and periodically thereafter.

Addition:

16.4.101 During maintenance work, for replacing electrodes the following shall be applied (in compliance with local safety at work regulations):

- use of protective equipment (e.g. clothes, shoes, gloves),
- use of insulated tools,
- use of protective extra low voltage (PELV).