

**SLOVENSKI  
STANDARD**

**SIST HD 470 S1:2003**

april 2003

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Test methods for electro-slag remelting furnaces

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ICS 25.180.10

Referenčna številka  
SIST HD 470 S1:2003(en)

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UDC: 621.365:621.745.3:620.1

KEY WORDS: Electric furnaces; remelting furnaces; test methods;  
electro-slag

### TEST METHODS FOR ELECTRO-SLAG REMELTING FURNACES

Méthodes d'essai des fours de  
refusion sous laitier  
électroconducteur

Prüfverfahren für  
Elektro-Schlacke-Umschmelzöfen

#### BODY OF THE HD

The Harmonization Document consists of:

- IEC 779 (1983) ed 1; IEC/TC 27, not appended

This Harmonization Document was approved by CENELEC on 1986-02-27.

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

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

to announce the existence of this Harmonization Document at national level  
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to publish their new harmonized national standard  
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COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE  
NORME DE LA CEI

INTERNATIONAL ELECTROTECHNICAL COMMISSION  
IEC STANDARD

**Publication 779**

Première édition — First edition  
1983

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**Méthodes d'essai des fours de refusion sous laitier  
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Bureau Central de la Commission Electrotechnique Internationale

3, rue de Varembé  
Genève, Suisse

Prix  
Price Fr.s. **22.—**

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## TEST METHODS FOR ELECTRO-SLAG REMELTING FURNACES

## FOREWORD

- 1) The formal decisions or agreements of the IEC 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 IEC expresses the wish that all National Committees should adopt the text of the IEC recommendation for their national rules in so far as national conditions will permit. Any divergence between the IEC recommendation and the corresponding national rules should, as far as possible, be clearly indicated in the latter.

## PREFACE

This standard has been prepared by IEC Technical Committee No. 27: Industrial Electroheating Equipment.

A first draft was discussed at the meeting held in Madrid in 1978. As a result of this meeting, a draft was circulated under the Accelerated Procedure in 1979, and was then submitted to the National Committees for approval under the Six Months' Rule as Document 27(Central Office)60 in August 1980.

Amendments, Document 27(Central Office)70, were submitted to the National Committees under the Two Months' Procedure in May 1982.

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

Australia	Netherlands
Austria	New Zealand
Belgium	Poland
Brazil	Romania
Canada	South Africa (Republic of)
Egypt	Sweden
France	Switzerland
Germany	Turkey
Italy	Union of Soviet Socialist Republics
Japan	United Kingdom
Korea (Republic of)	

*Other IEC publication quoted in this standard:*

Publication No. 50(841): International Electrotechnical Vocabulary (IEV), Chapter 841: Industrial Electroheating.

# TEST METHODS FOR ELECTRO-SLAG REMELTING FURNACES

## SECTION ONE — GENERAL

### 1. Scope

This standard applies to electroheating installations for the remelting and, in some cases, for the refining processes of metals through direct resistance heating of a conductive slag.

### 2. Object

The object of this standard is to specify test methods to permit the determination of the essential parameters and technical characteristics of electroheating installations comprising the furnaces indicated above.

This standard does not contain a mandatory list of tests and is not restrictive. Tests required for the characterization and evaluation of a furnace may be selected from the proposed tests as necessary. If necessary, additional tests may be carried out in agreement between the manufacturer and the user.

### 3. Terminology

The following definitions apply for the purpose of this standard. For definitions of fundamental and general terms in the field of electroheating, the reader should refer to IEC Publication 50(841): International Electrotechnical Vocabulary (IEV), Chapter 841: Industrial Electroheating.

#### 3.1 *Electro-slag remelting furnace*

Remelting furnace in which the charge, normally a consumable electrode is remelted by direct resistance heating of an electrical conductive molten slag. The slag is contained in a mould (crucible).

#### 3.2 *Electroheating installation with electro-slag remelting furnace*

Complete assembly of an electroheating device and the electrical and mechanical equipment necessary for operation and utilization of an electro-slag remelting furnace.

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The electrical equipment comprises in particular, the conductors and switchgear in the power, control and regulating circuits, and the melting power supply(ies), when the device has its own melting power supply(ies).

#### 3.3 *Power of an electroheating installation (apparent power $S$ in kilovoltamperes or active power $P$ in kilowatts)*

The electric power measured at the input of the supply line.



### 3.4 *Power factor of an electroheating installation ( $\cos \varphi$ )*

The ratio of the active power to the apparent power, measured at the input of the supply line.

### 3.5 *Specific energy consumption $e$ (kWh/kg)*

Ratio of the total amount of electric energy (kWh) measured at the input of the supply line, which is consumed by an electroheating installation for melting the charge in normal operating conditions agreed upon between the manufacturer and the user, to the weight of the ingot produced (in kilograms).

### 3.6 *Mould (crucible) of an electro-slag remelting furnace*

Water-cooled non-consumable container which shapes the ingot to be produced by the electro-slag remelting process and which contains the molten slag.

### 3.7 *Secondary electrical circuit of an electro-slag remelting furnace*

Electrical circuit which is closed by the melting power supply may include:

- a) output terminals of melting power supply;
- b) high-current feeder (busbars and/or cables);
- c) bus switches, if required;
- d) electrode clamping;
- e) electrode stub;
- f) consumable electrode or electrodes (depending on connection system);
- g) conductive molten slag (not included in the short-circuit test);
- h) remelted ingot;
- i) base plate (depending on system of connections).

### 3.8 *Electro-slag remelting furnace electrode(s) (consumable electrode)*

Solid part(s) in contact with the molten slag which carries the electrical current necessary for the melting operation and is constituted of the material necessary for the formation of the ingot.

### 3.9 *On-load voltage of an electro-slag remelting furnace (point C in the diagram of Appendix A)*

Voltage which can be measured between the following two points:

- the base plate,
- the electrode clamping device(s) bringing the melting electrical current to the consumable electrode(s) or stub(s).

### 3.10 *Furnace rated current $I_n$ (r.m.s. value-A) at nominal frequency $f_n$*

Maximum current for continuous operation for which the furnace is designed.

### 3.11 *Rated values of an electro-slag remelting furnace*

The rated values of a furnace are those for which the furnace is designed: rated furnace current  $I_n$ , rated furnace power  $P_n$ , and rated furnace frequency  $f_n$ .