

INTERNATIONAL STANDARD

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**Safety in installations for electroheating and electromagnetic processing –
Part 4: Particular requirements for arc furnace installations**

**Sécurité dans les installations destinées au traitement électrothermique et
électromagnétique –
Partie 4: Exigences particulières pour les installations de fours à arc**



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CONTENTS

FOREWORD.....	6
INTRODUCTION.....	9
1 Scope.....	10
2 Normative references	10
3 Terms, definitions and abbreviated terms	11
3.1 General concepts.....	11
3.2 Equipment and state of equipment.....	11
3.3 Parts and accessories.....	14
3.4 Safety related concepts	14
3.5 Abbreviated terms.....	14
4 Classification and subdivision of equipment and installations.....	14
4.1 Classification by processing frequency.....	14
4.2 Classification by voltage	14
4.3 Subdivision of installation and equipment.....	14
4.4 Classification of hazards and risks	14
5 Risk assessment	15
6 General provisions.....	15
6.1 Basic considerations	15
6.2 Significant hazards	15
6.3 Physical environment and operating conditions for the installation as such and electrical equipment outside the processing equipment.....	15
6.4 Physical environment and operating conditions for electrical equipment caused by operation of the processing equipment.....	16
6.5 Power supply	16
6.6 Access.....	17
6.7 Ergonomic aspects	17
6.8 Transport and storage	17
6.9 Provisions for handling.....	17
6.10 Consumables and replaceable parts	18
7 Protection against hazards from electric shock	18
7.1 General.....	18
7.2 Fundamental rule of protection.....	18
7.3 General provisions.....	18
7.4 Basic protection	19
7.5 Provisions for protection in electric single fault condition	19
7.6 Protective equipotential bonding	19
7.7 Additional provisions for fault protection for frequencies above 200 Hz	20
7.8 Currents in protective conductors.....	20
7.9 Touch current and touch voltage.....	20
7.10 Conductors and insulations at high temperature.....	20
7.11 Non-electric faults.....	20
8 Protection against hazards from electric or magnetic fields.....	20
8.1 General.....	20
8.2 Magnetic fields.....	21
8.3 Magnetic fields below 1 Hz	21
8.4 Local electric fields	21

8.5	Requirements related to barriers and screens	21
8.6	Requirements related to objects worn, carried or held by persons	21
9	Protection against hazards from radiation	21
9.1	General.....	21
9.2	Installation or equipment generating ionizing radiation	21
9.3	Ultraviolet radiation	21
9.4	Visible and infrared radiation	21
9.5	Laser sources	22
10	Protection against hazards from thermal influences	22
10.1	General.....	22
10.2	Surface temperature limits for protection against burn	22
10.3	Hazards caused by working conditions.....	22
10.4	Temperature resistance of components.....	22
10.5	Cooling	23
10.6	Over-temperature protection	23
11	Protection against hazards from fire	23
12	Protection against hazards from fluids	23
13	Specific requirements for components and subassemblies	23
13.1	General.....	23
13.2	Electrical equipment and conductors	23
13.3	Connection to the electrical supply network and internal connections.....	24
13.4	Isolation and switching.....	24
13.5	Sensors and actuators safeguarding moving parts	26
13.6	Motors	26
13.7	Non electric-heating means.....	26
13.8	Lighting.....	26
13.9	Structural parts and stability	27
13.10	Doors, windows and other openings.....	27
13.11	Transformers, inductors, capacitors	27
13.12	Handheld applicators	27
13.13	Vacuum systems	27
13.14	Protective and reactive gas generator	27
14	Control of the installation or equipment.....	27
14.1	General.....	27
14.2	Operator control unit.....	27
14.3	Emergency stop.....	28
14.4	Control systems and their safety functions	28
14.5	Controlgear.....	28
14.6	Protective devices.....	28
14.7	Over-temperature protection devices and systems	28
14.8	Overpressure safety device.....	28
15	Protection against mechanical hazards.....	29
16	Protection against hazards resulting from use	29
16.1	Particular hazards in processing of food, feed, cosmetics and similar intended for human or animal consumption	29
16.2	Combination equipment	29
17	EMC	29
17.1	Radio frequency interference	29

17.2	Immunity	29
18	Verification and testing	29
18.1	General.....	29
18.2	Performing measurements and tests	31
18.3	Verification of requirements from references.....	31
18.4	Examination of drawings or calculations.....	32
18.5	Visual inspection.....	32
18.6	Measurements	32
18.6.1	Environment and operating conditions inside the processing equipment	32
18.6.2	Impedance of protective bonding	32
18.6.3	Insulation resistance measurement.....	32
18.6.4	Measurement of electric or magnetic fields	34
18.6.5	Touch current measurement	34
18.6.6	Measurement of ionising radiation	34
18.6.7	Measurement of non-coherent optical irradiation.....	34
18.6.8	Measurement of coherent optical radiation.....	34
18.6.9	Surface temperature measurement.....	34
18.6.10	Temperature of structural components subject to heat	34
18.7	Functional tests	34
18.7.1	Protection by automatic disconnection of supply	34
18.7.2	Voltage test	34
18.7.3	Dielectric test	34
18.7.4	Accessibility of live parts	35
18.8	Numerical calculations and modelling	35
19	Information for use	35
19.1	General requirements	35
19.2	Location and nature of the information for use	35
19.3	Signalling and warning devices	35
19.4	Markings, pictograms, written warnings.....	35
19.5	Instruction handbook.....	35
Annex A (normative)	Lists of significant hazards	37
Annex B (normative)	Limits on touch currents	38
Annex C (normative)	Non-coherent optical radiation – Limits and risk classes.....	39
Annex D (normative)	Electric and magnetic fields	40
Annex E (normative)	Surface temperature limits	41
Annex F (normative)	EH, EMP and fire.....	42
Annex G (normative)	Marking and warning.....	43
Annex H (normative)	Guidelines on using this document.....	44
Annex I (informative)	Connection with ISO 13577 (all parts).....	45
Annex J (informative)	Requirements specific to the EU and associated countries.....	46
Annex AA (normative)	Systems to assure improved safety for personnel working in the vicinity of electrodes and other live parts of secondary circuit.....	47
Annex BB (normative)	Limits to touch currents.....	53
Bibliography	54

Figure AA.1 – AC furnace supply according to design arrangements "a"	49
Figure AA.2 – AC furnace supply according to design arrangements "b"	49
Figure AA.3 – AC furnace supply according to design arrangements "c"	50
Figure AA.4 – DC furnace supply according to design arrangements "d"	51
Figure AA.5 – DC furnace supply according to design arrangements "e"	51
Figure AA.6 – Six electrode AC furnace supply with current converter according to design arrangements "f"	52
Table 1 – Methods for the verification of requirements	30
Table 101 – Test voltages of the Insulation measurement	33
Table 102 – Installation progress of EAF and LF	33

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**SAFETY IN INSTALLATIONS FOR ELECTROHEATING
AND ELECTROMAGNETIC PROCESSING –****Part 4: Particular requirements for arc furnace installations**

FOREWORD

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IEC 60519-4 has been prepared by IEC technical committee 27: Industrial electroheating and electromagnetic processing. It is an International Standard.

This fifth edition cancels and replaces the fourth edition published in 2013. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) the structure has been redrafted according to IEC 60519-1:2020;
- b) the scope and object have been redrafted;
- c) the terms and definitions, normative references and bibliography have been updated and completed;
- d) the requirements have been redrafted according to IEC 60519-1:2020;
- e) all provisions have been redrafted and the text is more concise with respect to submerged arc furnace installations;

- f) the annexes have been restructured, with respect to details concerning high voltage designs and non-electrical issues, however to be aware of in those installations;
- g) the aspect of noise has been removed from the scope;
- h) the EMC requirements have been clarified;
- i) risk classification of hazards have been based on emission;
- j) the boundaries to ISO 13577 (all parts) and ISO 13578 have been clarified.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
27/1141/FDIS	27/1143/RVD

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2 and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

A list of all parts in the IEC 60519 series, published under the general title *Safety in installations for electroheating and electromagnetic processing*, can be found on the IEC website.

The clauses of this standard supplement or modify the corresponding clauses of IEC 60519-1:2020 (*General Requirements* hereinafter called "Part 1").

This part of IEC 60519 is to be read in conjunction with Part 1. It supplements or modifies the corresponding clauses of Part 1. Where the text indicates an "addition" to or a "replacement" of the relevant provision of Part 1, these changes are made to the relevant text of Part 1. Where no change is necessary, the words "This clause of Part 1 is applicable" are used. When a particular subclause of Part 1 is not mentioned in this part, that subclause applies as far as is reasonable.

Additional specific provisions to those in Part 1, given as individual clauses or subclauses, are numbered starting from 101.

NOTE The following numbering system is used:

- subclauses, tables and figures that are numbered starting from 101 are additional to those in Part 1;
- unless noted, are in a new subclause or involve notes in Part 1, they are numbered starting from 101, including those in a replaced clause or subclause;
- additional annexes are lettered AA, BB, etc.

In this standard, the following print types are used:

- requirements and definitions: in roman type;
- NOTES: in smaller roman type;
- terms used throughout this standard which have been defined in Clause 3: in bold type.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

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

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INTRODUCTION

This fifth edition of IEC 60519-4 is a product safety publication and is intended to:

- include all types of installations or equipment that are in the scope of IEC TC 27/MT 21 dealing with **arc furnace** installations;
- give requirements on electrical safety, **touch currents**, electric fields, magnetic fields and radiation;
- give means for verification of the requirements;
- make extensive use of the standards developed by IEC committees with horizontal or group safety functions and of relevant ISO standards, most of them being developed by ISO TC 244;
- include all material, references and requirements suitable for risk assessment and list of significant hazards.

This document addresses mainly **manufacturers** making made-to-order equipment on a single project base. The **manufacturer** is well aware that it is his responsibility to make equipment safe through adequate risk reduction and it is the responsibility of the **user** to assess **exposure** of the **operator** in line with applicable health and safety regulations. Looking at projects providing single pieces of equipment or single installations, this clear division of responsibilities tends to blur, caused by inter alia:

- development of the process (**normal operation**) through the **manufacturer** and **user**,
- shared definition of working procedures for the **operator** by the **manufacturer** and **user**,
- the scope of delivery often including all protective means,
- individual sales contracts where **users** require an assessment of **exposure** through the **manufacturer**.

Thus, this document provides information on electrical hazards and limits where relevant, despite being well aware that this is exceeding the scope of a product standard.

Annexes I and J provide orientation with respect to the application of ISO 13577-1 in combination with this document.

The rated voltage of an **arc furnace** Installation can be in the range of low voltage or high voltage; details are given in 4.2.

This document presumes that the installation or equipment is operated and maintained only by personnel consisting of **skilled** or **instructed persons**.

This document is intended for verifying whether the **arc furnace** installation meets the safety requirements of this document through design, site acceptance tests, routine tests or inspection.

SAFETY IN INSTALLATIONS FOR ELECTROHEATING AND ELECTROMAGNETIC PROCESSING –

Part 4: Particular requirements for arc furnace installations

1 Scope

This clause of Part 1 is replaced by the following.

Replacement:

This part of IEC 60519 provides particular safety requirements for arc furnace installations. This document deals with the significant hazards, hazardous situations or hazardous events relevant to industrial **arc furnace** installations, as listed in Annex A, for **normal operation** and for **single fault condition** as well as under conditions of reasonably foreseeable misuse.

This document specifies the requirements intended to be met by the **manufacturer** to ensure the safety of persons and property during the complete life cycle of the equipment from design through commissioning, operation, maintenance, inspection, to decommissioning, as well as in the event of foreseeable **single fault condition** that can occur in the equipment.

The rated voltage of **arc furnace** installation can be in the range of low voltage or high voltage, details are given in 4.2.

This standard is applicable to **arc furnace** installations such as:

- a) furnaces for direct arc heating, forming arcs between the electrode and metal such as the electric **arc furnace** using alternating current (**EAF AC**) or direct current (**EAF DC**), and the ladle furnace (**LF**);
- b) furnaces for arc-resistance heating forming arcs between the electrode and the charge material or heating the charge material by the Joule effect, such as the **submerged arc-resistance** furnace using alternating current (**SAF AC**), or direct current (**SAF DC**).

NOTE 1 In some documents, the terms "smelter" or "electrical reduction furnace" are used.

Furnace installation for unattended operation is not covered by this document.

This document does not provide requirements for type testing.

NOTE 2 Industrial equipment covered by this document is typically produced as a single unit or a very small number of units; such unit usually has a very high value and can cause severe harm at disintegration.

This document does not address data security and hazards arising from neglect of security.

With respect to noise of electrical an **arc furnace**, ISO 13578:2017, 6.1.23 applies.

EAF DC and **SAF DC** are classified as zero frequency (0 Hz) equipment types. **EAF AC**, **SAF AC** and **LF** are classified as mains frequency (50 Hz or 60 Hz) equipment types. Furnaces being operated at frequencies outside of the above-mentioned equipment types are not covered by this document.

2 Normative references

This clause of Part 1 is applicable except as follows.