

**Tööstuslikud termotöötlusseadmed. Osa 1:
Tööstuslike termotöötlusseadmete üldised
ohutusnõuded**

Industrial thermoprocessing equipment - Part 1:
Common safety requirements for industrial
thermoprocessing equipment

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN 746-1:1999 sisaldab Euroopa standardi EN 746-1:1997 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 23.11.1999 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN 746-1:1999 consists of the English text of the European standard EN 746-1:1997.</p> <p>This document is endorsed on 23.11.1999 with the notification being published in the official publication of the Estonian national standardisation organisation.</p> <p>The standard is available from Estonian standardisation organisation.</p>
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<p>Käsitlusala:</p> <p>Käesolev EN 746 osa määrab kindlaks üldised ohutusnõuded tööstuslike termotöötlusseadmete (nt tööstuslikud ahjud ning kütteseadmed) jaoks, mis vastavad standardis EN 292-1 esitatud seadmete määratlusele. Seda EN 746 osa rakendatakse tööstuslikele termotöötlusseadmetele, mida kasutatakse nt järgmistes valdkondades: - metallurgia ja metallitöötlus, - klaasitööstus, - keraamikatööstus, - tsemendi, lubja ja kipsi tootmine, - keemiatööstus, - jäätmete põletamine.</p>	<p>Scope:</p>
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Võtmesõnad: eristuskiri, info, ohtlikud seadmed, ohud, ohutusmõõtmised, ohutusnõuded, seadmestiku ohutus, tööstuslikud ahjud, tööstustooted, õnnetuste vältimine, ära kasutamine

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Descriptors: Thermoprocessing equipment, safety requirements.

English version

Industrial thermoprocessing equipment

**Part 1: Common safety requirements for industrial
thermoprocessing equipment**

Équipements thermiques industriels –
Partie 1: Prescriptions générales de secu-
rité pour les équipements thermiques
industriels

Industrielle Thermoprozeßanlagen – Teil 1:
Allgemeine Sicherheitsanforderungen an
industrielle Thermoprozeßanlagen

This European Standard was approved by CEN on 1997-02-15.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

The European Standards exist in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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CEN

European Committee for Standardization
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Europäisches Komitee für Normung

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FOREWORD

This European Standard has been prepared by Technical Committee CEN/TC 186 "Industrial thermoprocessing - Safety", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 1997, and conflicting national standards shall be withdrawn at the latest by September 1997.

The working group that drafted this Part of EN 746 comprised experts from the following countries: France, Germany, Italy, Sweden, United Kingdom.

This standard forms one part of safety standards covering Industrial Thermoprocessing Equipment.

The full list of parts of EN 746 is given below:

EN 746 Industrial Thermoprocessing Equipment

- Part 1: Common Safety Requirements for Industrial Thermoprocessing Equipment
- Part 2: Safety Requirements for Combustion and Fuel Handling Systems
- Part 3: Safety Requirements for the Generation and Use of Atmosphere Gases
- Part 4: Particular Safety Requirements for Hot Dip Galvanising Thermoprocessing Equipment
- Part 5: Particular Safety Requirements for Salt Bath Thermoprocessing Equipment
- Part 6: Particular Safety Requirements for Material Melting, Remelting and Liquid Phase Maintaining Thermoprocessing Equipment
- Part 7: Particular Safety Requirements for Vacuum Thermoprocessing Equipment
- Part 8: Particular Safety Requirements for Quenching Equipment

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this standard.

An assessment of the foreseeable risks arising from the use of the equipment was carried out when this standard was prepared.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

0 INTRODUCTION

This standard has been prepared to be a harmonised standard to provide one means of conforming with the essential requirements of the Machinery Directive and associated EFTA Regulations.

The extent to which hazards are covered is indicated in the scope of this standard. In addition, machinery shall comply as appropriate with EN 292 for hazards which are not covered by this standard.

This European Standard is a type C-standard as defined in EN 292.

Where for clarity an example of a preventative measure is given in the text, this should not be considered as the only possible solution. Any other solution leading to the same risk reduction is permissible if an equivalent level of safety is achieved.

This part of EN 746 assumes that the installations are operated and maintained by trained personnel.

1 SCOPE

1.1 This part of EN 746 specifies common safety requirements for industrial thermo-processing equipment (for example industrial furnaces and industrial heating equipment), which meets the definition for machinery given in EN 292-1:1991.

It details the anticipated significant hazards associated with industrial thermoprocessing equipment and specifies the appropriate preventative measures for reduction or elimination of these hazards.

This standard gives general principles and common requirements for the reduction of risks for equipments covered by the scope.

The common requirements apply to all of the subsequent parts of this EN 746 dealing with specific equipment unless an exception is stated in the relevant Part. The general principles (subclauses are pointed out) will be used to establish the specific technical measures in the subsequent Parts(s) dealing with safety requirements for particular equipment.

NOTE: For similar equipment not covered by the particular Parts of this standard, EN 746-1 can be used to assist in the reduction of risk for the Hazards identified in clause 4 (List of Hazards).

1.2 This part of EN 746 is applicable to industrial thermoprocessing equipments for use in fields such as:

- Metallurgical and metal working plant;
- Glass making plant;
- Ceramic manufacturing plant;
- Cement, lime and gypsum manufacturing plant;

- Chemical plant;
- Waste incineration equipment;

and heated by:

- Gaseous fuels;
- Liquid fuels;
- Solid fuels;
- Mixed fuels;
- Electricity.

The thermoprocessing equipment covered by this Part of EN 746 is further specified in clause 3.

A more detailed list of thermoprocessing equipment within these categories is given in Annex A.

In the remainder of this standard the expression "equipment" will be used.

This Part of EN 746 is not applicable to blast furnaces, converters (in steel plants), boilers, welding machines or food processing equipment.

1.3 This Part of EN 746 specifies the requirements to be met by the manufacturer to ensure the safety of persons and property during commissioning, start-up, operation, shut-down, maintenance periods and dismantling, as well as in the event of foreseeable faults or malfunctions which can occur in the equipment.

It specifies the safety requirements at stages in the life of the equipment, and its design, ordering, construction, use and disposal.

It specifies safety requirements for:

protection against:

- mechanical hazards, movement of machinery and material, ejection of parts or material or liquids and gases, implosion, structural failure;
- electrical hazards;
- thermal hazards: explosion, fire, scalds, contact with hot parts, gases and flames;
- noise and vibration;
- thermal, optical and ionising and non-ionising radiation;
- harmful by-products and hazardous substances, poisoning, biological and micro-biological contamination, pollution and environmental discomfort;
- other hazards such as listed in clause 4;

maintenance, provision for indicators, and inspection.

This part of EN 746 applies to equipment which is placed on the market after the date of issue of this standard.

2 NORMATIVE REFERENCES

This European standard incorporates by dated and undated references provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references subsequent amendments to or revisions of any of these publications apply to this European standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

2.1 Basic Standards

EN 292-1:1991	Safety of machinery - Basic concepts, general principles for design - Part 1: Basic terminology, methodology
EN 292-2:1991	Safety of machinery - Basic concepts, general principles for design - Part 2: Technical principles and specifications
EN 60204-1	Safety of machinery - Electrical equipment of machines - Part 1: General requirements (IEC 204-1:1992, modified)
IEC 364-4-41	Electrical installations of buildings; Part 4: Protection for safety; Chapter 41: Protection against electrical shock
IEC 364-4-43	Electrical installations of buildings; Part 4: Protection for safety; Chapter 43: Protection against overcurrent
IEC 364-4-47	Electrical installations of buildings; Part 4: Protection for safety; Chapter 47: Application of protective measures for safety. Section 470 - General. Section 471 - Measures of protection against electric shock
IEC 364-4-442	Electrical installations of buildings; Part 4: Protection for safety; Chapter 44: Protection against overvoltages, Section 442 - Protection of low-voltage installations against faults between high-voltage systems and earth
IEC 364-4-443	Electrical installations of buildings; Part 4: Protection for safety; Chapter 44: Protection against overvoltages, Section 443 - Protection against overvoltages of atmospheric origin or due to switching

IEC 364-4-473	Electrical installations of buildings. Part 4: Protection for safety; Chapter 47: Application of protective measures for safety. Section 473 - Measures of protection against overcurrent
IEC 364-4-45	Electrical installations of buildings. Part 4: Protection for safety; Chapter 45: Protection against undervoltage
IEC 364-4-46	Electrical installations of buildings. Part 4: Protection for safety; Chapter 46: Isolation and switching

2.2 Group Safety Standards

EN 294	Safety of machinery - Safety distances to prevent danger zones being reached by the upper limbs
EN 349	Safety of machinery - Minimum gaps to avoid crushing of parts of the human body
EN 418	Safety of machinery - Emergency stop equipment, functional aspects - Principles for design
EN 457	Safety of machinery - Auditory danger signals - General requirements, design and testing (ISO 7731:1986 modified)
EN 547-1	Safety of machinery - Human body measurements - Part 1: Principles for determining the dimensions required for openings for whole body access into machinery
EN 547-2	Safety of machinery - Human body measurements - Part 2: Principles for determining the dimensions required for access openings
EN 563	Safety of machinery - Temperatures of touchable surfaces - Ergonomics data to establish temperature limit values for hot surfaces
EN 614-1	Safety of machinery - Ergonomic design principles - Part 1: Terminology and general principles
EN 626-1	Safety of machinery - Reduction of risks to health from hazardous substances emitted by machinery Part 1: Principles and specifications for machinery manufacturers
EN 811	Safety of machinery - Safety distances to prevent danger zones being reached by the lower limbs

EN 842	Safety of machinery; Visual danger signals; General requirements, design and testing
prEN 953	Safety of machinery; General requirements for the design and construction of guards (fixed, movable)
EN 954-1	Safety of machinery; Safety-related parts of control systems - Part 1: General principles for design
EN 981	Safety of machinery - System of auditory and visual danger and information signals
EN 982	Safety of machinery - Safety requirements for fluid power systems and their components - Hydraulics
EN 983	Safety of machinery - Safety requirements for fluid power systems and their components - Pneumatics
EN 1037	Safety of machinery - Prevention of unexpected start-up
EN 1088	Safety of machinery - Interlocking devices associated with guards - Principles for design and selection
prEN 1127-1	Safety of machinery - Fire and explosions - Part 1: Explosion prevention and protection
prEN 1299	Vibration isolation of machines - Information for the application of source isolation
EN ISO 11690-2	Acoustics - Recommended practice for the design of low-noise workplaces containing machinery - Part 2: Noise control measures (ISO 11690-2:1996)
EN 60825-1	Safety of laser products - Part 1: Equipment classification, requirements and user's guide (IEC 825-1:1993)
EN 61310-1	Safety of machinery - Indication, marking and actuation - Part 1: Requirements for visual, auditory and tactile signals (IEC 1310- 1:1995)
EN 61310-2	Safety of machinery - Indication, marking and actuation - Part 2: Requirements for marking (IEC 1310-2:1995)
IEC 405	Nuclear instruments: Constructional requirements to afford personal protection against ionizing radiations
IEC 417	Graphical symbols for use on equipment - Index, survey and compilation of the single sheets

ISO 7000	Graphical symbols for use on equipment - Index and synopsis
ISO 7243	Hot environments - Estimation of the heat stress on working man, based on the <i>WBGT</i> -index (wet bulb globe temperature)
ISO 7933	Hot environments - Analytical determination and interpretation of thermal stress using calculation of required sweat rate

2.3 Product Safety Standards

EN 746-2:1997	Industrial thermoprocessing equipment - Part 2: Safety requirements for combustion and fuel handling systems
EN 746-3	Industrial thermoprocessing equipment - Part 3: Safety Requirements for the generation and use of atmosphere gases
prEN 746-4	Industrial thermoprocessing equipment - Part 4: Particular Safety Requirements for Hot Dip Galvanising Equipment
prEN 746-5	Industrial thermoprocessing equipment - Part 5: Particular Safety Requirements for Salt Bath Thermoprocessing Equipment
prEN 746-6	Industrial thermoprocessing equipment - Part 6: Particular Safety Requirements for Liquid Phase Treatment Equipment
prEN 746-7	Industrial thermoprocessing equipment - Part 7: Particular Safety Requirements for Vacuum Thermoprocessing Equipment
prEN 746-8	Industrial thermoprocessing equipment - Part 8: Particular Safety Requirements for Quenching Equipment
prEN 1547	Industrial thermoprocessing equipment - Noise test code for industrial thermoprocessing equipment including its ancillary handling equipment
EN 60519-1	Safety in electroheat installations - Part 1: General requirements
EN 60519-2	Safety in electroheat installations - Part 2: Particular requirements for resistance heating equipment

IEC 519-3	Safety in electroheat installations - Part 3: Particular requirements for induction and conduction heating and induction melting installations -
IEC 519-4	Safety in electroheat installations - Part 4: Particular requirements for arc furnace installations
IEC 519-5	Safety in electroheat installations - Part 5: Specifications for safety in plasma installations
IEC 519-6	Safety in electroheat installations - Part 6: Specifications for safety in industrial microwave heating heating equipment
IEC 519-7	Safety in electroheat installations - Part 7: Particular requirements for installations with electron guns
IEC 519-8	Safety in electroheat installations - Part 8: Particular requirements for electro-slag remelting furnaces
IEC 519-9	Safety in electroheat installations - Part 9: Particular requirements for high-frequency dielectric heating installations

3 DEFINITIONS

For the purposes of this standard the following definitions apply:

NOTE: An alphabetic listing of the definitions, as well as their cross-references in German, French and English are given in informative Annex D.

3.1 Metallurgical and metal working plant

Plant and/or equipment which is used for thermal production, melting or remelting of ferrous and non-ferrous metals as well as to enable the molten material to be held, heated, alloyed and restructured before recasting into predetermined shapes.

Equipment used to remelt and re-alloy selected scrap material to produce primary ingots for remelting.

Equipment used to change the structure of the solid material by heating and cooling through various temperature gradient changes before its return to ambient temperature.

Equipment used to pre-heat metal prior to mechanical working or joining.