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Industrijska termoprocesna oprema - 2. del: Varnostne zahteve za sisteme zgorevanja in sisteme za ravnanje z gorivom

Industrial thermoprocessing equipment - Safety requirements for combustion and fuel
handling systems

Industrielle Thermoprocessinganlagen - Teil 2: Sicherheitsanforderungen an Feuerungen
und Brennstoffführungssysteme

Equipements thermiques industriels - Partie 2: Prescriptions de sécurité concernant la
combustion et la manutention des combustibles

Ta slovenski standard je istoveten z: **EN 746-2:2010**

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Industrial thermoprocessing equipment - Safety requirements for combustion and fuel handling systems

Equipements thermiques industriels - Partie 2:
Prescriptions de sécurité concernant la combustion et la
manutention des combustibles

Industrielle Thermoprossanlagen - Teil 2:
Sicherheitsanforderungen an Feuerungen und
Brennstoffführungssysteme

This European Standard was approved by CEN on 11 March 2010.

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 CEN Management Centre or to any CEN member.

This European Standard exists 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 CEN Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Contents

Page

Foreword.....	6
Introduction	7
1 Scope	8
2 Normative references	9
3 Terms and definitions	11
4 List of hazards.....	20
5 Safety requirements, measures and verification means	21
5.1 General.....	21
5.2 Gaseous fuels	21
5.2.1 Gas pipework	21
5.2.2 Required safety devices.....	24
5.2.3 Combustion air and pre-purging the combustion chamber and flue passages	30
5.2.4 Supply of pre-mixed fuel gas/air	32
5.2.5 Burners	33
5.2.6 Automatic burner control systems	37
5.3 Liquid fuels.....	39
5.3.1 Liquid fuel pipework.....	39
5.3.2 Required safety devices.....	42
5.3.3 Combustion air and pre-purging the combustion chamber and the flue passages	45
5.3.4 Liquid fuel atomisation	47
5.3.5 Burners	47
5.3.6 Automatic burner control systems	49
5.4 Solid fuels	51
5.4.1 Pulverised solid fuel pipework.....	51
5.4.2 Graded fuel pipework (applicable to grate burners and fluidised beds)	52
5.4.3 Required devices (for pulverised fuels and fluidised beds)	53
5.4.4 Combustion air and pre-purging of the combustion chamber and flue passages.....	54
5.4.5 Burners	54
5.4.6 Automatic burner control systems (pulverised fuel)	56
5.5 Multiple fuels	56
5.5.1 General.....	56
5.5.2 Fuel circuit.....	57
5.5.3 Combustion air supplies	57
5.5.4 Operation of the safety devices	57
5.5.5 Air/fuel ratio	57
5.6 Oxygen or oxygen-enriched combustion air	57
5.6.1 General.....	57
5.6.2 Suitability for oxygen service.....	57
5.6.3 Sealing materials for oxygen pipework.....	57
5.6.4 Pipework	58
5.6.5 Pipes velocities	58
5.6.6 Fittings	58
5.6.7 Blow off and venting lines	58
5.6.8 Manual torches.....	58
5.6.9 Safety devices against gas backflow.....	59
5.6.10 Safety devices against oxygen backflow in mixture with other substances	59
5.6.11 Material requirements	59
5.7 Design requirements for electrical and electronic equipment for control system and protective system	59
5.7.1 General.....	59

5.7.2	Requirements for protective systems	60
5.7.3	Fault assessment for a hardwired protective system	64
5.7.4	Electrical power failure	70
5.7.5	Reset	70
6	Verification of the safety requirements and/or measures	72
7	Information for Use	77
7.1	General	77
7.2	Marking	77
7.3	Instruction handbook	78
7.3.1	General	78
7.3.2	Description of equipment	78
7.3.3	Inspection procedures	79
7.3.4	Commissioning, start-up and operating procedures	79
7.3.5	Shut-down procedures	80
7.3.6	Maintenance procedures	80
7.3.7	Documentation	80
Annex A	(informative) Typical Examples of IThE, Fuels and Burners	81
A.1	List – Machines concerned, descriptions, functions	81
A.1.1	List of IThE	81
A.2	Classification of fuels	84
A.2.1	Gaseous fuels	84
A.2.2	Liquid fuels	84
A.2.3	Solid fuels	84
A.3	Classification of burners	85
A.3.1	Gaseous fuels	85
A.3.2	Liquid fuels	85
A.3.3	Solid fuels	85
Annex B	(informative) Technical terms	86
Annex C	(informative) Typical examples of piping and components	101
Annex D	(informative) Methods for burner start-up	111
Annex E	(normative) Maximum allowable pressure	118
Annex ZA	(informative)	123
Bibliography	124

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SIST EN 746-2:2010

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e46dc096d39a/sist-en-746-2-2010

EN 746-2:2010 (E)

Figures

Figure 1 — Block diagram of control/protective and heated system	60
Figure 2 a — Example for requirements of 5.7.2 a	61
Figure 2 b — Example for requirements of 5.7.2 b	62
Figure 2 c — Example for requirements of 5.7.2 c	63
Figure 2 d — Example for requirements of 5.7.2 d	63
Figure 3 — Fault assessment for the hardwired section of a protective system	65
Figure 4 — Consideration of fault tolerance time and safety time for IThE	66
Figure 5 — Examples for wiring of fuel shut-down with hardware diversity of the disconnecting devices	67
Figure 6 — Example for wiring of fuel shut-down with diverse functionality of the disconnecting devices	68
Figure C.1 — Single burner equipment	101
Figure C.2a — Multiple burner equipment – Central pipework – Example a two burners system	102
Figure C.2b — Multiple burner equipment – Central pipework – Example b	103
Figure C.2c — Multiple burner equipment – Central pipework – Example c	104
Figure C.3a — Multiple burner equipment – Zone pipework – Example a	105
Figure C.3b — Multiple burner equipment – Zone pipework – Example b	106
Figure C.3c — Multiple burner equipment – Zone pipework – Example c	107
Figure C.4 — Multiple burner equipment (burner pipework)	108
Figure C.5 — Central pipework for low cycling applications	109
Figure C.6 — Draft breaks	110
Figure D.1 — Direct main burner ignition at full rate (see Table 3, Column 2, $Q_{F \max} \leq 120 \text{ kW}$)	111
Figure D.2 — Direct main burner ignition at reduced rate with slow opening valve (see Table 3, Column 3, $Q_{F \max} \leq 360 \text{ kW}$)	111
Figures D.3 and D.4 — Direct main burner ignition at reduced rate with by-pass start gas supply (see Table 3, Column 4)	112
Figures D.5 and D.6 — Direct main burner ignition at reduced rate with limited start gas input (see Table 3, Column 4)	113
Figures D.7 and D.8 — Main burner ignition with independent pilot burner (see Table 3, Column 5, $Q_{F \max} \leq 120 \text{ kW}$)	114
Figures D.9 and D.10 — Main burner ignition with independent pilot burner (see Table 3, Column 5, $Q_{F \max} \leq 360 \text{ kW}$)	115

Figures D.11 and D.12 — Main burner ignition with independent pilot burner (see Table 3, Column 5)	116
Figures D.13 and D.14 — Main burner ignition with independent pilot burner (see Table 3, Column 5)	117
Figure E.1 — Piping referred to clause a) group 1 of Annex E.....	119
Figure E.2 — Piping referred to clause a) group 2 of Annex E.....	120
Figure E.3 — Piping referred to clause b) group 1 of Annex E.....	121
Figure E.4 — Piping referred to clause b) group 2 of Annex E.....	122
Tables	
Table 1 — Maximum safety times for natural draught burners operating in open air	34
Table 2 — Maximum safety times for natural draught burners operating in combustion chamber.....	35
Table 3 — Maximum safety times for forced and induced draught burners.....	36
Table 4 — Maximum safety times.....	48
Table 5 — Materials requirements.....	59
Table 6 — Verification of the safety requirements and/or measures.....	72
Table B.1 — English – German – French.....	86
Table B.2 — German – English – French.....	91
Table B.3 — French – English – German	96

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<https://standards.iteh.ai/catalog/standards/sist/63d61e95-2ca6-428a-93b6-e46dc096d39a/sist-en-746-2-2010>

EN 746-2:2010 (E)**Foreword**

This document (EN 746-2:2010) has been prepared by Technical Committee CEN/TC 186 "Industrial Thermoprocessing Equipment", 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 November 2010, and conflicting national standards shall be withdrawn at the latest by May 2011.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 746-2:1997.

This document 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 document.

Following a request from CEN/TC 186, CEN has agreed to defer the date of withdrawal of EN 746-2:1997 for a transitional period of 12 months.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

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Introduction

This European Standard is a Type C standard as defined in EN ISO 12100-1.

The machinery concerned and the extent to which hazards, hazardous situations and events are covered, is indicated in the scope of this document.

When provisions of this type C standard are different from those which are stated in type A or B standards, the provisions of this type C standard take precedence over the provisions of the other standards, for machines that have been designed and built according to the provisions of this type C standard.

This Part of EN 746 assumes that the equipment is not creating any potentially explosive atmosphere and is located in a normally ventilated area.

This European Standard forms one part of a series of safety standards covering Industrial Thermoprocessing Equipment (IThE). The full list of these standards 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, re-melting and liquid phase maintaining thermoprocessing equipment
- Part 7: Particular safety requirements for vacuum thermoprocessing equipment
- Part 8: Particular safety requirements for quenching equipment

Compliance with European product standards e.g. EN 267, EN 12952-8, EN 12953-7 or EN 676 is not sufficient to ensure the minimum safety requirement for industrial thermoprocessing equipment. This part 2 of EN 746 shall always have priority for IThE.

An IThE generally consists of the following components:

- processing chamber (e.g. steel construction with lining);
- heating system;
- protective system;
- control and instrumentation system/operator-control level.

It is assumed that (IThE) will only be operated and maintained by trained personnel.

EN 746-2:2010 (E)**1 Scope**

This part of EN 746 together with EN 746-1 specifies safety requirements for single and multiple burners that are part of Industrial Thermoprocessing Equipment. (In this standard referred to as IThE).

This document deals with significant hazards, hazardous situations and events relevant to combustion and fuel handling systems that are part of IThE as listed in Clause 4, when used as intended and under the conditions foreseen by the manufacturer.

This European Standard covers:

- fuel pipework downstream of and including the manual isolating valve;
- burner(s), burner system and ignition device;
- safety related control system (protective system).

This European Standard applies to any oxidation with air or other gases containing free oxygen of gaseous, liquid and solid fuels or any combustion of them to release thermal energy.

For thermal or catalytic post combustion and waste incineration, this European Standard applies only to auxiliary burners designed to start-up and/or support the process.

The pressure hazard of the piping and components covered by this standard is within the limits of maximum pressure/size relationship as described in normative Annex E.

This European Standard also gives the necessary requirements for the information for use.

This European Standard does not cover hazards from heating generated by electricity.

This European Standard does not deal with the hazards created by the release of flammable substances from the products processed in the IThE.

NOTE EN 1539, *Dryers and ovens, in which flammable substances are released — Safety requirements*

This European Standard is not applicable to combustion and fuel handling systems

- of welding and soldering machines;
- up-stream of the IThE manual isolating valve.

This European Standard is not applicable to electricity cabling and power cabling upstream of the IThE control panel/protective system.

Noise can be a significant hazard for combustion and fuel handling systems. It is not dealt with in this standard.

This European Standard is not applicable to combustion and fuel handling systems as part of IThE which is manufactured before the date of its publication as EN.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 88-1:2007, *Pressure regulators and associated safety devices for gas appliances — Part 1: Pressure regulators for inlet pressures up to and including 500 mbar*

EN 88-2:2007, *Pressure regulators and associated safety devices for gas appliances — Part 2: Pressure regulators for inlet pressures above 500 mbar up to and including 5 bar*

EN 125:1991, *Flame supervision devices for gas burning appliances — Thermo-electric flame supervision devices*

EN 161:2007, *Automatic shut-off valves for gas burners and gas appliances*

EN 230:2005, *Automatic burner control systems for oil burners*

EN 264:1991, *Safety shut-off devices for combustion plants using liquid fuels — Safety requirements and testing*

EN 298:2003, *Automatic gas burner control systems for gas burners and gas burning appliances with or without fans*

EN 331:1998, *Manually operated ball valves and closed bottom taper plug valves for gas installations for buildings*

EN 334:2005, *Gas pressure regulators for inlet pressures up to 100 bar*

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EN 751-1:1996, *Sealing materials for metallic threaded joints in contact with 1st, 2nd and 3rd family gases and hot water — Part 1: Anaerobic jointing compounds*

EN 751-2:1996, *Sealing materials for metallic threaded joints in contact with 1st, 2nd and 3rd family gases and hot water — Part 2: Non-hardening jointing compounds*

EN 1057:2006, *Copper and copper alloys — Seamless, round copper tubes for water and gas in sanitary and heating applications*

EN 1643:2000, *Valve proving systems for automatic shut-off valves for gas burners and gas appliances*

EN 1854:2006, *Pressure sensing devices for gas burners and gas burning appliances*

EN 10241:2000, *Steel threaded pipe fittings*

EN 10242:1995, *Threaded pipe fittings in malleable cast iron*

EN 12067-1:1998, *Gas/air ratio controls for gas burners and gas burning appliances — Part 1: Pneumatic types*

EN 12067-2:2004, *Gas/air ratio controls for gas burners and gas burning appliances — Part 2: Electronic types*

EN 12078:1998, *Zero governors for gas burners and gas burning appliances*

EN 14382:2005, *Safety devices for gas pressure regulating stations and installations — Gas safety shut-off devices for inlet pressure up to 100 bar*

EN 746-2:2010 (E)

EN 60204-1:2006, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements (IEC 60204-1:2005, modified)*

EN 60664 -1:2007, *Insulation coordination for equipment within low-voltage systems — Part 1: Principles, requirements and tests (IEC 60664-1:2007)*

EN 60947-4-1:2001, *Low-voltage switchgear and controlgear — Part 4-1: Contactors and motor-starters; Electromechanical contactors and motor-starters (IEC 60947-4-1:2000)*

EN 61140:2002, *Protection against electric shock - Common aspects for installation and equipment (IEC 61140:2001)*

EN 61558-1:2005, *Safety of power transformers, power supplies, reactors and similar products — Part 1: General requirements and tests (IEC 61558-1:2005)*

EN 61810-1:2008, *Electromechanical elementary relays — Part 1: General requirements (IEC 61810-1:2008)*

EN 62061:2005, *Safety of machinery — Functional safety of safety-related electrical, electronic and programmable electronic control systems (IEC 62061:2005)*

EN ISO 5817:2007, *Welding — Fusion-welded joints in steel, nickel, titanium and their alloys (beam welding excluded) — Quality levels for imperfections (ISO 5817:2003, corrected version:2005, including Technical Corrigendum 1:2006)*

EN ISO 8434-1:2007, *Metallic tube connections for fluid power and general use — Part 1: 24 degree cone connectors (ISO 8434-1:2007)*

EN ISO 8434-4:2000, *Metallic tube connections for fluid power and general use — Part 4: 24° cone connectors with O-ring weld-on nipples (ISO 8434-4:1995)*

EN ISO 12100-1, *Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology (ISO 12100-1:2003)*

EN ISO 12100-2, *Safety of machinery — Basic concepts, general principles for design — Part 2: Technical principles and specifications (ISO 12100-2:2003)*

EN ISO 13849-1:2008, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design (ISO 13849-1:2006)*

EN ISO 19879:2005, *Metallic tube connections for fluid power and general use — Part 5: Test methods for hydraulic fluid power connections (ISO 19879:2005)*

ISO 7-1:1994, *Pipe threads where pressure-tight joints are made on the threads — Part 1: Dimensions, tolerances and designation*

ISO 228-1:2000, *Pipe threads where pressure-tight joints are not made on the threads — Part 1: Dimensions, tolerances and designation*

ISO 6976:1995, *Natural gas — Calculation of caloric values, density, relative density and Wobbe index from composition*

ISO 7005-1:1992, *Metallic flanges — Part 1: Steel flanges*

ISO 7005-2:1988, *Metallic flanges — Part 2: Cast iron flanges*

ISO 7005-3:1988, *Metallic flanges — Part 3: Copper alloy and composite flanges*

ISO 8434-2:1994, *Metallic tube fittings for fluid power and general use — Part 2: 37 degree flared connectors*

ISO 8434-3:2005, *Metallic tube connections for fluid power and general use — Part 3: O-ring face seal fittings*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

NOTE 1 A classification of plant, fuels and burners is given in informative Annex A.

NOTE 2 An alphabetic listing of technical terms in German, French and English, as well as their cross-references where applicable is given in informative Annex B.

3.1

automatic burner control system

protective system comprising at least a programming unit and all the elements of a flame detector device

NOTE The various functions of an automatic burner control system can be in one or more housings (see also 3.66). It is a protective system.

3.2

air pressure detector

device for sensing the existence of air pressure

3.3

air/fuel ratio

ratio between the mass flow of combustion air and the mass flow of the fuel

3.4

burner

combustion system under the control of individual automatic shut-off valves

3.5

burner, alternating pilot

pilot burner that is extinguished at the end of the main burner ignition period and is re-ignited immediately when the main burner is shut down for control purposes

3.6

burners, cross-ignited

group of burners designed and arranged such that, by means of their proximity and relative position, ignition of all burners can be ensured if one burner is ignited

3.7

burner, forced draught

burner in which the combustion air is supplied by mechanical means, usually of a fan or blower

3.8

burner, grate

solid fuel combustion system where the burning fuel is supported by a metallic grate

3.9

burner, induced draught

burner in which the combustion air is supplied by providing suction in the combustion chamber by mechanical means, usually a fan

3.10

burner input rate

highest quantity of fuel energy used by a burner in unit time corresponding to the volumetric or mass flow rates, the calorific value used being the net calorific value

3.11

burner, manual

burner whereby all the operating sequences are performed by an operator

EN 746-2:2010 (E)**3.12****burner, natural draught**

burner in which the combustion air is entrained at atmospheric pressure, by the buoyancy of a chimney or the fuel velocity

3.13**burner, open firing**

burner not requiring an enclosed combustion chamber

EXAMPLE Torches, work station burners, equipment-integrated burners, and other burners firing in the open.

3.14**burner, permanent pilot**

pilot burner that is intended to be left on permanently

3.15**burner, pilot**

independently controlled burner designed to ignite the main burner

3.16**burner, portable**

burner designed to be capable of being transported to fire in different locations

3.17**burner, radiant tube**

burner that heats up the IThE indirectly by means of firing into a radiant tube protruding into the IThE process chamber whereby the combustion remains wholly separated from the IThE process chamber

3.18**burner, work station**

burner used at a particular work station and not requiring an enclosed combustion chamber

3.19**by-pass**

passage conveying fuel from the upstream side to the downstream side of a pipework component so as to be independent of the action of the pipework component

3.20**calorific value**

quantity of heat produced by the combustion of unit volume or mass of fuel at a constant pressure of 1 013 mbar

NOTE A distinction is made between the gross calorific value (where the water produced by combustion is assumed to be condensed) and the net calorific value.

3.21**combustion air**

ambient air, or mixture of ambient air with other gases such as water vapour, carbon dioxide, ... that is used as oxygen supply for combustion process

3.22**combustion chamber**

part of the IThE in which the combustion takes place

3.23**condensate drain**

pipe designed to collect and drain condensates from a low point in the gas circuit and to drain it from a low point

3.24**control system**

system which responds to input signals from the process and/or the operator and generates output signals which cause the process control to operate in the required way

3.25**EMC**

immunity of the IThE to Electro Magnetic disturbances

3.26**enriched air**

air with an oxygen concentration higher than 23 % (volume) obtained either by the addition of oxygen or the reduction of nitrogen content

3.27**explosion/pressure relief**

device (e.g. a flange) containing a disc which is designed to yield safely to an unsafe increase of internal pressure

3.28**fault tolerance time**

fault tolerance time is the time between the occurrence of an unsafe condition (caused by the process itself or due to equipment failure) and the point when the process changes into critical operation, which result in an hazardous event

3.29**filter/strainer, strainer/filter**

device that enables foreign elements which could otherwise cause failures in the system, to be collected

3.30**flame response time****FRT**

period of time that starts with the loss of sensed flame and ends with the de-energising of the terminals for the automatic shut-off valve

3.31**flame detector device**

device by which the presence of a flame is detected and signalled

NOTE

It can consist of a flame sensor, an amplifier and a relay for signal transmission.

3.32**flame sensor**

actual flame-sensing element, the output signal value of which is used as the input for flame detector amplifier

3.33**flame trap or flame arrestor**

device fitted to the pipe conveying gas or a gas-air mixture and whose intended function is to prevent the transmission of flame

3.34**flash back**

flame propagation from the burner in upstream direction inside the pipework

3.35**fluids**

gases, liquids and vapours in pure phase as well as mixtures thereof

NOTE

A fluid contains a suspension of solids.

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