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Industrijske peči in pripadajoča procesna oprema - Varnost - 2. del: Sistemi zgorevanja in ravnanja z gorivom

Industrial furnaces and associated processing equipment - Safety - Part 2: Combustion and fuel handling systems

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Fours industriels et équipements associés - Sécurité - Partie 2: Équipement de combustion et demanutention des combustibles

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DRAFT INTERNATIONAL STANDARD

ISO/DIS 13577-2

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Industrial furnaces and associated processing equipment — Safety —

Part 2:
Combustion and fuel handling systems

Fours industriels et équipements associés — Sécurité —

Partie 2: Équipement de combustion et de manutention des combustibles

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oSIST prEN ISO 13577-2:2021

Contents

iTeh STANDARD PREVIEW
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oSIST prEN ISO 13577-2:2021
https://standards.iteh.ai/catalog/standards/sist/dba22695-ac51-4bc1-ba43-da7551235852/osist-pren-iso-13577-2-2021

oSIST prEN ISO 13577-2:2021

iTeh STANDARD PREVIEW
(standards.iteh.ai)
oSIST prEN ISO 13577-2:2021
https://standards.iteh.ai/catalog/standards/sist/dba22695-ac11-4bc1-ba43-da7551235852/osist-pren-iso-13577-2-2021

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https://standards.iteh.ai/catalog/standards/sist/dba22695-acf1-4bc1-ba43-da7551235852/osist-pren-iso-13577-2-2021

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https://standards.iteh.ai/catalog/standards/sist/dba22695-acf1-4bc1-ba43-da7551235852/osist-pren-iso-13577-2-2021

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

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The committee responsible for this document is ISO/TC 244, *Industrial furnaces and associated processing equipment*.

ISO 13577 consists of the following parts, under the general title *Industrial furnaces and associated processing equipment — Safety*:

— *Part 1: General requirements*

— *Part 2: Combustion and fuel handling systems*

— *Part 3: Generation and use of protective and reactive atmosphere gases*

— *Part 4: Protective systems*

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Introduction

This document is a type-C standard as defined in ISO 12100:2010.

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

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

This part of ISO 13577 assumes that the equipment built according to this standard is installed in a ventilated area and not creating any potentially explosive atmosphere. The installation of a TPE in accordance with the requirements of this standard will not by itself require a change to the classification of the TPE location according to IEC 60079-10-1:2020.

Compliance with product standards e.g. ISO 22967:2010 or ISO 22968:2010 is not sufficient to ensure the minimum safety requirements for industrial furnaces and associated processing equipment (TPE). This part of ISO 13577 shall always have priority for TPE.

Industrial furnaces and associated processing equipment (TPE) generally consist of the following components:

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— processing chamber (e.g. steel construction with lining and/or refractory);

— heating systems;

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https://standards.iteh.ai/catalog/standards/sist/dba22695-acf1-4bc1-ba43-da7551235852/osist-pren-iso-13577-2-2021

— protective system;

— control and instrumentation system / operator-control level.

ISO 13577-1:2016 provides the general safety requirements common to TPE. This part of ISO 13577 details in addition specific safety requirements for combustion and fuel handling systems that are part of TPE as listed in the Scope.

The requirements for protective systems are specified in ISO 13577-4:2022.

If a general requirement of ISO 13577-1:2016 counters requirements in this part of ISO 13577, the requirements of this part of ISO 13577 take precedence.

The requirements for reducing hazards from noise are given in ISO 13577-1:2016.

It is assumed that TPE will only be operated and maintained by trained personnel.

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Industrial furnaces and associated processing equipment — Safety — Part 2: Combustion and fuel handling systems

1 Scope

This part of ISO 13577 specifies the safety requirements for combustion and fuel handling systems that are part of industrial furnaces and associated processing equipment (TPE), including single and multiple burner systems in thermoprocessing equipment and machines.

NOTE The general safety requirements common to TPE are provided in ISO 13577 1:2016 (See introduction). Annex B of ISO 13577-1:2016 also includes a list of processes for which industrial furnaces and heating systems covered by ISO 13577 may be used.

This part of ISO 13577 deals with significant hazards, hazardous situations and events relevant to combustion and fuel handling systems as listed in Annex A, when used as intended and under the conditions for use as described in the instruction handbook.

This part of ISO 13577 covers:

- fuel pipework downstream of and including the manual isolating valve;
- combustion air supply (including oxygen and oxygen enriched combustion air) and flue gas system;
- burner(s), burner system and ignition device;
- functional requirements for safety related control system.

iTeh STANDARD PREVIEW
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oSIST prEN ISO 13577-2:2021
https://standards.iteh.ai/catalog/standards/sist/d9a22095-acf1-4bc1-ba43-da7551235852/osist-pren-iso-13577-2-2021

This part of ISO 13577 applies to any oxidation with air or other gases containing free oxygen of gaseous and liquid fuels or any combustion of them to release thermal energy in TPE. Annex B includes examples of gaseous and liquid fuels.

NOTE When other fuels like e.g. hydrogen are used additional risk assessment is conducted to prove suitability of components etc.

For thermal or catalytic post combustion and waste incineration, this part of ISO 13577 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 part of ISO 13577 is within the maximum pressure/size relationship of category I as specified in Annex C.

This part of ISO 13577 also gives the necessary requirements regarding information for use.

This part of ISO 13577 does not cover hazards from heating generated by electricity.

This part of ISO 13577 does not deal with the hazards created by the release of flammable substances from the products processed in the TPE.

This part of ISO 13577 is not applicable to combustion and fuel handling systems:

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– of gas welding and allied processes;

– up-stream of the TPE manual isolating valve.

This part of ISO 13577 is not applicable to blast furnaces, converters (in steel plants), boilers, fired heaters (including reformer furnaces) in the petrochemical and chemical industries.

This part of ISO 13577 is not applicable to electrical cabling and power cabling upstream of the TPE control panel/protective system.

This document is not applicable to combustion and fuel handling systems manufactured before the date of its publication.

2 Normative references

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

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

ISO 49:1994, *Malleable cast iron fittings threaded to ISO 7-1*

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

oSIST prEN ISO 13577-2:2021
https://standards.iteh.ai/catalog/standards/sist/dba22695-acff-48cf-8a43-da7551235852/osist-pren-iso-13577-2-2021

ISO 5817:2014, *Welding — Fusion-welded joints in steel, nickel, titanium and their alloys (beam welding excluded) — Quality levels for imperfections*

ISO 7005 1:2011, *Pipe flanges — Part 1: Steel flanges for industrial and general service piping systems*

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 1:2018, *Metallic tube connections for fluid power and general use — Part 1: 24° cone connectors*

ISO 8434 2:2007, *Metallic tube connections for fluid power and general use — Part 2: 37° flared connectors*

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

ISO 12100:2010, *Safety of machinery — General principles for design — Risk assessment and risk reduction*

ISO 13574:2015, *Industrial furnaces and associated processing equipment — Vocabulary*

ISO 13577 1:2016, *Industrial furnaces and associated processing equipment — Safety — Part 1: General requirements*

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oSIST prEN ISO 13577-2:2021

ISO 13577 4:2022, *Industrial furnace and associated processing equipment — Safety — Part 4: Protective systems*[1]

ISO 13849-1:— , *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design*[2]

ISO 19879:2010, *Metallic tube connections for fluid power and general use — Test methods for hydraulic fluid power connections*

ISO 22967:2010, *Forced draught gas burners*

ISO 22968:2010, *Forced draught oil burners*

ISO/DIS 23551-1:2020, *Safety and control devices for gas burners and gas-burning appliances — Particular requirements — Part 1: Automatic and semi-automatic valves*

ISO 23551-2:2018, *Safety and control devices for gas burners and gas-burning appliances - Particular requirements - Part 2: Pressure regulators*

ISO 23551 3:2005, *Safety and control devices for gas burners and gas-burning appliances — Particular requirements — Part 3: Gas/air ratio controls, pneumatic type*

ISO 23551-4:2018, *Safety and control devices for gas burners and gas-burning appliances — Particular requirements — Part 4: Valve-proving systems for automatic shut-off valves*

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(standards.iteh.ai)

ISO 23551-5:2014, *Safety and control devices for gas burners and gas-burning appliances — Particular requirements — Part 5: Manual gas valves*

oSIST prEN ISO 13577-2:2021

ISO 23551-6:2014, *Safety and control devices for gas burners and gas-burning appliances – Particular requirements – Part 6: Thermoelectric flame supervision controls*

oSIST prEN ISO 13577-2:2021

ISO/DIS 23551-11:2020, *Safety and control devices for gas burners and gas-burning appliances — Particular requirements — Part 11: Automatic shut-off valves for operating pressure greater than 500°kPa*

ISO 23552-1:2007+AMD 1:2010: *Safety and control devices for gas and/or oil burners and gas and/or oil appliances — Particular requirements — Part 1: Fuel/air ratio controls, electronic type*

ISO 23553-1:2014, *Safety and control devices for oil burners and oil-burning appliances - Particular requirements - Part 1: Automatic and semi-automatic valves*

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[1] ISO 13577-4 is under revision and expected to be released in 2022.

[2] The edition 4 of ISO 13849-1 is under development and is to be issued in 2022.

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oSIST prEN ISO 13577-2:2021

ISO/DIS 23555-2:2019, *Safety and control devices for operating pressures greater than 500 kPa — Part 2: Gas pressure regulators*

IEC 60079-10-1:2020, *Explosive atmospheres – Part 10-1: Classification of areas – Explosive gas atmospheres*

IEC 60204 1:2016, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements*

IEC 60730-2-5:2013+A1:2017 CSV, *Automatic electrical controls – Part 2-5: Particular requirements for automatic electrical burner control systems*

IEC 60730-2-6:2015+A1:2019 CSV, *Automatic electrical controls – Part 2-6: Particular requirements for automatic electrical pressure sensing controls including mechanical requirements*

IEC 61511-1:2016, *Functional safety — Safety instrumented systems for the process industry sector — Part 1: Framework, definitions, system, hardware and application programming requirements*

IEC 61511-2:2016, *Functional safety — Safety instrumented systems for the process industry sector — Part 2: Guidelines for the application of IEC 61511-1:2016*

IEC 61511-3:2016, *Functional safety — Safety instrumented systems for the process industry sector — Part 3: Guidance for the determination of the required safety integrity levels*

ANSI/UL 60730-2-5:2014, *Automatic electrical controls for household and similar use — Part 2-5: Particular requirements for automatic electrical burner control systems*

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ANSI/UL 60730-2-6:2016, *Standard for automatic electrical controls – Part 2-6: Particular requirements for automatic electrical pressure sensing controls including mechanical requirements*

ISO/DIS 13577-2:2021
https://standards.iteh.ai/catalog/standards/sist/dba22695-acf1-4bc1-ba43-
IEC 61508 -1:2010, *Functional safety of electrical/electronic/programmable electronic safety-related systems — Part 1: General requirements*

IEC 61508 -2:2010, *Functional safety of electrical/electronic/programmable electronic safety-related systems — Part 2: Requirements for electrical/electronic/programmable electronic safety-related systems*

IEC 61508 -3:2010, *Functional safety of electrical/electronic/programmable electronic safety-related systems — Part 3: Software requirements*

IEC 61508 -4:2010, *Functional safety of electrical/electronic/programmable electronic safety-related systems — Part 4: Definitions and abbreviations*

IEC 61508 -5:2010, *Functional safety of electrical/electronic/programmable electronic safety-related systems — Part 5: Examples of methods for the determination of safety integrity levels*

IEC 61508 -6:2010, *Functional safety of electrical/electronic/programmable electronic safety-related systems — Part 6: Guidelines on the application of IEC 61508-2 and IEC 61508-3*

IEC 61508 -7:2010, *Functional safety of electrical/electronic/programmable electronic safety-related systems — Part 7: Overview of techniques and measures*

IEC FDIS 62061:2020, *Safety of machinery - Functional safety of safety-related control systems*

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oSIST prEN ISO 13577-2:2021

CAN/CSA-C22.2 No.199-M89:2004, *Combustion Safety Controls and Solid-State Igniters for Gas- and Oil-Burning Equipment*

CAN/CSA-C22.2 No.60730-2-5-14: 2019, *Automatic electrical controls for household and similar use - Part 2-5: Particular requirements for automatic electrical burner control systems*

CSA ANSI Z21.21/CSA 6.3: 2019, *Gas appliance pressure regulators*

CSA ANSI Z21.21/CSA 6.5:2019, *Automatic valves for gas appliances*

prEN 88-1:2020, *Pressure regulators and associated safety devices for gas appliances — Part 1: Pressure regulators for inlet pressures up to and including 50 kPa*

prEN 88-2:2020, *Safety and control devices for gas burners and gas burning appliances — Part 2: Pressure regulators for inlet pressure above 50 kPa up to and including 500 kPa and associated safety devices*

prEN 88-3:2020, *Safety and control devices for gas burners and gas burning appliances - Part 3: Pressure and/or flow rate regulators for inlet pressures up to and including 500 kPa, electronic types*

EN 125:2010+A1:2015, *Flame supervision devices for gas burning appliances – Thermoelectric flame supervision devices*

prEN 161:2020, *Automatic shut-off valves for gas burners and gas appliances*

iTeh STANDARD PREVIEW

prEN 298:2020, *Automatic burner control systems for burners and appliances burning gaseous or liquid fuels*

(standards.iteh.ai)

EN 331:2015, *Manual operated ball valves and closed bottom taper plug valves for gas installations for buildings*

oSIST prEN ISO 13577-2:2021
https://standards.iteh.ai/catalog/standards/sist/dba22695-acf1-4bc1-ba43-da7551235852/osist-pren-iso-13577-2-2021

EN 334:2019, *Gas pressure regulators for inlet pressure up to 100 bar*

EN 1643:2021, *Safety and control devices for gas burners and gas burning appliances – Valve proving systems for automatic shut-off valves*

prEN 1854:2020, *Pressure sensing devices for gas burners and gas burning appliances*

prEN 12067-2: *2019, Safety and control devices for burners and appliances burning gaseous or liquid fuels — Control functions in electronic systems — Part 2: Fuel/air ratio control/supervision of the electronic type*

EN 13774:2013, *Valves for gas distribution systems with maximum operating pressure less than or equal to 16 bar - Performance requirements*

prEN 16678:2020, *Safety and control devices for gas burners and gas burning appliances — Automatic shut-off valves for operating pressure of above 500 kPa up to and including 6.300 kPa*

EN 60730-2-5:2015+A1:2019, *Automatic electrical controls for household and similar use — Part 2-5: Particular requirements for automatic electrical burner control systems*

EN 60730-2-6:2016+A1:2020, *Standard for automatic electrical controls – Part 2-6: Particular requirements for automatic electrical pressure sensing controls including mechanical requirements*

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