



SLOVENSKI STANDARD

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Električna oprema za peči in pomožno opremo - 2. del: Zahteve za snovanje, razvoj in odobravanje tipa varnostnih naprav in podsistemov

Electrical equipment for furnaces and ancillary equipment - Part 2: Requirements for design, development and type approval of safety devices and subsystems

Elektrische Ausrüstung von Feuerungsanlagen - Teil 2: Bestimmungen für den Entwurf, die Entwicklung und die Baumusterprüfung von Sicherheitsbauteilen und Teilsystemen

Equipements électriques d'installation de chaudière - Partie 2: Règles pour la dessin, développement et essai de type d'élément sécurité et sous-système

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Electrical equipment for furnaces and ancillary equipment - Part 2: Requirements for design, development and type approval of safety devices and subsystems

Equipements électriques d'installation de chaudière - Partie 2: Règles pour la dessin, développement et essai de type d'élément sécurité et sous-système

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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European foreword

This document (EN 50156-2:2015) has been prepared by CLC/BTTF 132-2 "Revision of EN 50156 'Electrical equipment for furnaces and ancillary equipment'".

The following dates are fixed:

- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2016-01-26
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2018-01-26

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

This standard covers the Principle Elements of the Safety Objectives for Electrical Equipment Designed for Use within Certain Voltage Limits (LVD - 2006/95/EC).

This European Standard is the second part of a series of European Standards that specify the requirements for equipment of safety functions for furnaces, especially safety related systems to protect personnel, the furnace with ancillary equipment against hazards related to heat generation, the heated system and to operate reliably during normal conditions, and abnormal conditions that can be foreseen.

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EN 50156, *Electrical equipment for furnaces and ancillary equipment*, consists of the following parts:

- Part 1: Requirements for application design and installation;
- Part 2: Requirements for design, development and type approval of safety devices and subsystems;
- Part 3: Requirements for plant-specific tests of safety-related equipment ¹⁾.

This European Standard is based on EN 61508:2010, *Functional safety – Safety-related systems*, Parts 1 to 7 as a basic safety standard.

1) In preparation.

EN 50156-2:2015 (E)**Introduction**

This part of EN 50156 sets out the requirements and recommendations for design, development and type approval of safety devices and subsystems to be applied to protect personnel, property and environment against the hazards of furnaces with ancillary equipment and the systems heated by the thermal energy released in the furnace. The operating conditions of the furnace, the hazards of combustion and the safety of the heated system are considered.

The safety requirements for all stages of the life-cycle of a particular plant, proof of fulfilment of the plant-specific safety-requirements, are defined in Part 1 of EN 50156. The requirements for plant specific tests during implementation, operation and maintenance are defined in Part 3 of EN 50156.

The requirements for the application of safety-related systems are specified in EN 50156-1:2015, Clause 10. The rating of necessary safety integrity levels, as specified in EN 50156-1:2015, 10.4, is based on EN 61508-1.

For the plant-specific implementation of safety-related systems, it is necessary to organize management of functional safety and to satisfy safety life-cycle requirements.

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1 Scope

This part of EN 50156 applies to the requirements for design, development and approval of safety-relevant equipment for the safety related system for furnaces that are operated with solid, liquid or gaseous fuels and their ancillary equipment.

This part of EN 50156 specifies the requirements for safety-related equipment that is necessary to meet the safety conditions of furnaces, to reduce the hazards of combustion and to protect the heated systems from damage e.g. by overheating. Subsystems and devices of other technologies, which are part of the safety-related system (see EN 50156-1:2015, 3.38), are covered by this part of EN 50156.

This part of EN 50156 sets out special requirements for design, development and approval of safety devices and subsystems to satisfy the requirements of EN 50156-1:2015, Clause 10 "Additional requirements for the application of a safety-related system".

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.

EN 161:2011+A3:2013, *Automatic shut-off valves for gas burners and gas appliances*

EN 267:2009+A1:2011, *Automatic forced draught burners for liquid fuels*

EN 298:2012, *Automatic burner control systems for burners and appliances burning gaseous or liquid fuels*

EN 676:2003+A2:2008, *Automatic forced draught burners for gaseous fuels*

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EN 1643:2014, *Safety and control devices for gas burners and gas burning appliances - Valve proving systems for automatic shut-off valves*

EN 1854:2010, *Pressure sensing devices for gas burners and gas burning appliances*

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

EN 12952-11:2007, *Water-tube boilers and auxiliary installations - Part 11: Requirements for limiting devices of the boiler and accessories*

EN 12953-9:2007, *Shell boilers - Part 9: Requirements for limiting devices of the boiler and accessories*

EN 13611:2007+A2:2011, *Safety and control devices for gas burners and gas burning appliances - General requirements*

EN 16340:2014, *Safety and control devices for burners and appliances burning gaseous or liquid fuels - Combustion product sensing devices*

EN 50156-1:2015, *Electrical equipment for furnaces and ancillary equipment – Part 1: Requirements for application design and installation*

EN 60730-1:2011, *Automatic electrical controls for household and similar use - Part 1: General requirements (IEC 60730-1:2010)*

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EN 60812:2006, *Analysis techniques for system reliability - Procedure for failure mode and effects analysis (FMEA) (IEC 60812:2006)*

EN 60947-2:2006, *Low-voltage switchgear and controlgear - Part 2: Circuit-breakers (IEC 60947-2:2006)*

EN 61010-1:2010, *Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements (IEC 61010-1:2010+corr 2011)*

EN 61131-2:2007, *Programmable controllers - Part 2: Equipment requirements and tests (IEC 61131-2:2007)*

EN 61508-1:2010, *Functional safety of electrical/electronic/programmable electronic safety-related systems - Part 1: General requirements (IEC 61508-1:2010)*

EN 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 61508-2:2010)*

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

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

EN 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 61508-5:2010)*

EN 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 61508-6:2010)*

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

EN 61800-5-2:2007, *Adjustable speed electrical power drive systems - Part 5-2: Safety requirements - Functional (IEC 61800-5-2:2007)*

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 50156-1:2015 apply.

4 Requirements for safety devices and subsystems of safety-related systems

4.1 General

The qualification and conformity for subsystems or devices as E/E/PES is defined in 4.2 and for subsystems and devices of other technology in 4.3

Safety functions of the safety related system, such as flame monitoring, pre-purge, air-gas ratio control, fuel safety shut-off-valves etc. shall fulfil the requirements of the relevant product standards (see 4.2.2 and 4.3.2). When thereof are deviations (e.g. concerning process technical reasons,

operational reasons), the safety and reliability levels shall not be reduced. The deviations have to be described in the safety manual according to EN 61508-4:2010.

For subsystems and devices in accordance to the relevant product standards a quantitative determination of SIL is not required.

4.2 Requirements for safety devices and subsystems in electrical/electronic/programmable electronic systems

4.2.1 General

If product standard exists for subsystems and devices continue according 4.2.2, if no applicable standard exists continue 4.2.3.

4.2.2 Type approval in accordance with product standards

Safety devices or subsystems shall be used which have been tested in accordance with a product standard as per the following list, if they are in the scope of these standards:

EN 298:2012, EN 1643:2014, EN 1854:2010, EN 12952-11:2007, EN 12953-9:2007,
EN 12067-2:2004, EN 13611:2007+A2:2011, EN 16340:2014 and EN 61800-5-2:2007,
EN ISO 23552-1:2014.

Products that combine several functions shall satisfy all the standards relevant for the functions. The product standards allow a range of subsystems with different level of functional safety. The requirements of the safety relevant systems according to the application standards have to be taken in account (e.g. EN 12952-8:2002, 6.3.3)

NOTE Some of the product standards are based on fault-exclusion models similar to the approach in EN 50156-1:2015, Figures 11 to 13 and Table 2. By using these safety devices or subsystems in safety-related systems this may require special measures during the design and safety validation.

4.2.3 Type approval following the requirements of EN 61508

4.2.3.1 General

Functional safety in accordance to EN 61508 (all parts) shall be proven for electrical/electronic/programmable electronic systems within the safety function.

Additionally the following requirements shall be fulfilled.

4.2.3.2 Safety requirement and functional specification: A specification describing the desired function of the device has to be provided. This specification shall describe the required safety function of the device as well the operational behaviour.

4.2.3.3 Safety management: A safety management system shall be present for all lifecycle phases during development e.g. safety plan, Verification&Validation plan.

4.2.3.4 Preventing and managing systematic faults (systematic capability): The measures for preventing and managing systematic faults shall correspond to the required SIL according to EN 61508, in particular Parts 2 and 3.

4.2.3.5 Architecture: The architectural requirements shall be satisfied in accordance with route 1H according to EN 61508-2:2010.