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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

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

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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**

To be completed

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

This draft European Standard is submitted to CENELEC members for CENELEC enquiry.
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If this draft becomes a European Standard, CENELEC 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.

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CENELEC

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32 Foreword

33 This document [prEN 50156-2:2012] has been prepared by CLC/BTTF 132-2 "Revision of EN 50156
34 'Electrical equipment for furnaces and ancillary equipment'" in cooperation with the National
35 Committee DKE/K 232.

36 This document is currently submitted to the Enquiry.

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

39 For the relationship with EU Directive 97/23/EC, see informative Annex ZZ, which is an integral part of
40 this document.

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

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

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

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

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

55 This European Standard will serve as a basis for requirements in relation to equipment for safety
56 functions of heated pressure equipment (e.g. boilers) to be referenced in European Standards to be
57 developed by CEN/TC 269.

58 Where applicable, essential safety requirements in the relevant standard EN 60204-1 are taken into
59 account..

1) At draft stage.

2) In preparation.

60 Introduction

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

66 Safety-related systems are applied for plant-specific protective systems consisting of particular safety
67 devices and/or subsystems for e.g.

- 68 • monitoring of flames and other safety conditions of the firing,
- 69 • interrupting of the flow of fuel to the furnace,
- 70 • ventilating the body of the furnace and the flue gas ducts,
- 71 • monitoring of the safety conditions of the heated systems (e.g. water level limiter in steam
72 boilers),

73 which may be necessary to ensure proper ignition and combustion of fuel and to avoid the
74 development, existence and/or ignition of explosive mixtures of fuel and air, and also to avoid damage
75 to the heated systems (see prEN 50156-1:2012, 3.25).

76 This part of EN 50156 describes all the activities necessary for design, development and type-
77 approval of safety devices and subsystems.

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

81 The requirements for the application of safety-related systems are specified in prEN 50156-1:2012,
82 Clause 10. The rating of necessary safety integrity levels, as specified in prEN 50156-1:2012, 10.4, is
83 based on EN 61508-1. The requirements for safety-related systems for boilers have been coordinated
84 with CEN/TC 269.

85 For the plant-specific implementation of safety-related systems, it is necessary to organise
86 management of functional safety and to satisfy safety life-cycle requirements. Clauses 4 and 5, which
87 deal with these requirements, are based on EN 61511-1.

88 Figure 1 of prEN 50156-1:2012 assists understanding of the relationship between the various
89 elements of furnaces and their ancillary equipment, the heated systems, the control system and the
90 protective system(s).

91 1 Scope

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

95 This part of EN 50156 specifies the requirements for safety-related equipment that is necessary to
96 meet the safety conditions of furnaces, to reduce the hazards of combustion and to protect the heated
97 systems from damage e.g. by overheating. Subsystems and devices of other technologies, which are
98 part of the safety-related system (see prEN 50156-1:2012, 3.38), are covered by this part of
99 EN 50156.

100 This part of EN 50156 sets out special requirements for design, development and type approval of
101 safety devices and subsystems to satisfy the requirements of prEN 50156-1:2012, Clause 10
102 “Additional requirements for the application of a safety-related system”. For devices and subsystems
103 of safety-related systems that are approved according to the European Standards cited in 4.1.2.1 and
104 4.2.2, the requirements of this part of EN 50156 are already satisfied.

105 2 Normative references

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

109 EN 161:2011+A2:2012, *Automatic shut-off valves for gas burners and gas appliances*

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

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

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

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

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

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

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

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

123 prEN 50156-1:2012, *Electrical equipment for furnaces and ancillary equipment – Part 1: Requirements
124 for application design and installation*

125 EN 60730 (all parts), *Automatic electrical controls for household and similar use (IEC 60730, all parts)*

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

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

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

- 131 EN 61131-2:2007, *Programmable controllers – Part 2: Equipment requirements and tests*
132 *(IEC 61131-2:2007)*
- 133 EN 61508-1:2010, *Functional safety of electrical/electronic/programmable electronic safety-related*
134 *systems – Part 1: General requirements (IEC 61508-1:2010)*
- 135 EN 61508-2:2010, *Functional safety of electrical/electronic/programmable electronic safety-related*
136 *systems – Part 2: Requirements for electrical/electronic/programmable electronic safety-related*
137 *systems (IEC 61508-2:2010)*
- 138 EN 61508-3:2010, *Functional safety of electrical/electronic/programmable electronic safety-related*
139 *systems – Part 3: Software requirements (IEC 61508-3:2010)*
- 140 EN 61508-4:2010, *Functional safety of electrical/electronic/programmable electronic safety-related*
141 *systems – Part 4: Definitions and abbreviations (IEC 61508-4:2010)*
- 142 EN 61508-5:2010, *Functional safety of electrical/electronic/programmable electronic safety-related*
143 *systems – Part 5: Examples of methods for the determination of safety integrity levels*
144 *(IEC 61508-5:2010)*
- 145 EN 61508-6:2010, *Functional safety of electrical/electronic/programmable electronic safety-related*
146 *systems – Part 6: Guidelines on the application of IEC 61508-2 and IEC 61508-3 (IEC 61508-6:2010)*
- 147 EN 61508-7:2010, *Functional safety of electrical/electronic/programmable electronic safety-related*
148 *systems – Part 7: Overview of techniques and measures (IEC 61508-7:2010)*
- 149 EN 61800-5-2:2007, *Adjustable speed electrical power drive systems – Part 5-2: Safety requirements –*
150 *Functional (IEC 61800-5-2:2007)*
- 151 EN ISO 23553-1:2009, *Safety and control devices for oil burners and oil-burning appliances –*
152 *Particular requirements – Part 1: Shut-off devices for oil burners (ISO 23553-1:2007, including*
153 *Cor.1:2009)*

154 **3 Terms and definitions**

155 For the purposes of this document, the terms and definitions given in prEN 50156-1:2012 apply.

156 **4 Requirements for safety devices and subsystems of safety-related systems**

157 **4.1 Requirements for safety devices and subsystems in electrical/electronic/** 158 **programmable electronic systems**

159 **4.1.1 General**

160 Functional safety in accordance to EN 61508 shall be proved for electrical/electronic/ programmable
161 electronic systems within the safety function.

162 **4.1.2 Requirements for qualification**

163 **4.1.2.1 Qualification by product standards**

164 The following aspects shall be taken into account in the case of proof according to EN 61508.

165 In exception to 4.1.1, safety devices or subsystems shall be used which have been tested in
166 accordance with a product standard as per the following list, if they are in the scope of these
167 standards:

168 EN 298, EN 1643, EN 1854, EN 12952-11, EN 12067-2, EN 13611 and EN 61800-5-2.

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