

**Seadmete plahvatusohtu arvestavaks ohutuks
talitluseks nõutavad ohutusseadmed**

Safety devices required for the safe functioning of equipment
with respect to explosion risks

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

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**Safety devices required for the safe functioning of equipment
with respect to explosion risks**

Dispositifs de sécurité nécessaires
pour le fonctionnement sûr d'un matériel
vis-à-vis des risques d'explosion

Sicherheitseinrichtungen
für den sicheren Betrieb von Geräten
im Hinblick auf Explosionsgefahren

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CENELEC

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

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Foreword

This European Standard was prepared by the Technical Committee CENELEC TC 31, Electrical apparatus for potentially explosive atmospheres. The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 50495 on 2009-12-01.

This European Standard is to be read in conjunction with the European Standards for the specific types of protection listed in EN 60079 or EN 61241 series of standards.

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

The following dates were fixed:

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|--|-------|------------|
| – latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement | (dop) | 2010-12-01 |
| – latest date by which the national standards conflicting with the EN have to be withdrawn | (dow) | 2012-12-01 |

This European Standard has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association and covers essential requirements of EC Directive 94/9/EC. See Annex ZZ.

Contents

Introduction	4
1 Scope	5
2 Normative references	6
3 Terms and definitions	7
4 Ignition prevention by safety devices	10
4.1 General concept of ignition risk reduction	10
4.2 Selection of a safety device	11
5 Functional requirements for a safety device	11
5.1 General requirements	11
5.2 Special requirements for safety components	13
5.3 Requirements for achieving the Safety Integrity Level (SIL)	13
6 Tests	15
6.1 Type tests	15
6.2 Routine tests	16
6.3 Regular functional proof tests	16
7 Marking	16
8 Safety instructions	17
Annex A (informative) Example of an assessment procedure for a simple safety device	18
Annex B (informative) Example of an assessment procedure for the hardware safety integrity of a safety device	19
Annex C (informative) Example of determining the hardware safety integrity level	24
Annex D (informative) Examples for safety devices	33
Annex E (informative) Basic concept for safety devices	34
Annex ZZ (informative) Coverage of Essential Requirements of EC Directives	36
Bibliography	37

Tables

Table 1 – Requirements for Safety Integrity Level and Fault Tolerance of a safety device	11
Table B.1 – Failure rates assuming a series failure model	20
Table B.2 – Safety Integrity Levels: Target failure measures for a safety function	22
Table B.3 – Hardware safety integrity: Architectural constraints on Type A or B safety-related subsystems	23
Table C.1 – Total hardware failure rates	31
Table E.1 – Increase of the failure tolerance of equipment by the control of a safety device	34
Table E.2 – Classified area, in which the ignition probability of controlled equipment would lead to a tolerable risk	35
Table E.3 – Required SIL and HFT of a safety device for the control of equipment	35

Introduction

Safety devices, controlling devices and regulating devices which are used for the protection concept of equipment for explosive atmospheres, shall function reliably for the intended purpose. This shall be expressed in terms of some measure of confidence that the devices will be able to maintain a required level of safety at all times. This measure of confidence needs to be in conformity with [1], CENELEC standards of the series EN 60079 and EN 61241 for apparatus for use in explosive atmospheres and relevant control standards.

CENELEC identified the need for research to determine whether existing and proposed standards in the field of safety-related control systems were suitable for this purpose. Research proposals on this topic were invited under the Standardisation, Measurement and Testing (SMT) Programme of the EU-commission and the SAFEC project was selected for funding (contract SMT4-CT98-2255). The project was a 12 month project which began in January 1999. The SAFEC partners were the Health and Safety Laboratory (HSL) of the Health and Safety Executive in the UK (the project coordinator), the Deutsche Montan Technologie (DMT) in Germany, the National Institute for Industrial Environment and Risks (INERIS) in France and the Laboratorio Oficial J.M. Madariaga (LOM) in Spain. The result of this project is summarised in [2] and recommends the application of Safety Integrity Levels as specified in EN 61508-1 for safety devices. A short description of the basic concept is provided in Annex E of this standard.

1 Scope

This European Standard specifies the requirements of electrical safety devices, which are used to avoid potential ignition sources of equipment in explosive atmospheres.

This also includes safety devices, which are operated outside areas with explosive atmospheres, to guarantee the safe function of equipment with respect to explosion hazards.

NOTE 1 This European Standard can also be used to design and assess safety devices for protective systems.

Electrical equipment, which is intended for use in explosive atmospheres, may rely on the correct operation of safety devices which for example maintain certain characteristics of the equipment within acceptable limits. Examples of such safety devices are motor protection devices (to limit temperature rise during stall conditions) and controlling devices for pressurisation protection.

By means of control or monitoring devices, sources of ignition can be avoided. Therefore these devices shall execute the appropriate measures in the appropriate reaction time, for example the initiation of an alarm or an automatic shut down.

NOTE 2 Some potential ignition sources might not be controllable by safety devices, e.g. electrostatic discharges, ignition sparks caused by mechanical impact. Also some protection measures might not be controllable by safety devices, e.g. flameproof enclosures.

Safety devices, whose safety function can not adequately be specified under the existing EN 60079 or EN 61241 series of standards, shall additionally be designed according to the requirements of this standard. Generally for complex safety devices appropriate design requirements are not provided in the existing types of protection (see 3.13 for the definition of a complex device).

NOTE 3 In general the levels of safety required by this standard are considered to be equivalent to those provided by conformity to EN 60079-0 or EN 61241-0. No increase or decrease of safety is intended or required. Similarly neither increase nor decrease of safety with respect to EN 61508 series is intended.

Safety devices can be classified in 2 types:

- a) devices, which are included as component in the equipment under control (see 3.8). The combined apparatus is considered as equipment.

EXAMPLES

- thermal switch or thermistor to avoid overheating,
- temperature monitoring devices to control the surface temperature.

- b) devices, which are installed separately from the equipment under control and considered as associated apparatus exclusively for a specific type of protection or specific equipment under control. The combined apparatus is considered as a system.

EXAMPLES

- external control devices or safety related parts of a control system for type of protection pressurisation,
- overload protective device for electric motors of type of protection Ex e 'Increased Safety',
- control devices for battery charging equipment (protection against overcharging or deep discharging),
- level detectors for the control of submersible pumps.

Exclusions from this standard:

Safety devices, where the safety function is adequately covered in the existing standards of EN 60079 and EN 61241 series do not need any additional assessment according to this standard.

EXAMPLES Intrinsically safe associated apparatus, fuses, electromechanical overload protection, simple thermal protection devices (e.g. thermal fuses, thermal switches).

The standard does not include devices or systems to prevent the occurrence of explosive atmospheres, e.g. inerting systems, ventilation in workplaces and containers/vessels.

Gas detectors, which are covered under EN 61779 series, EN 50271 or EN 50402 are also excluded from the scope of this standard.

This standard does not deal with protection by control of ignition source 'b' for non-electrical equipment as defined in EN 13463-6.

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 13237	<i>Potentially explosive atmospheres – Terms and definitions for equipment and protective systems intended for use in potentially explosive atmospheres</i>
EN 13463-6	<i>Non-electrical equipment for use in potentially explosive atmospheres – Part 6: Protection by control of ignition source 'b'</i>
EN 50271	<i>Electrical apparatus for the detection and measurement of combustible gases, toxic gases or oxygen – Requirements and tests for apparatus using software and/or digital technologies</i>
EN 50402 + A1	<i>Electrical apparatus for the detection and measurement of combustible or toxic gases or vapours or of oxygen – Requirements on the functional safety of fixed gas detection systems</i>
EN 60079 series	<i>Explosive atmospheres</i> (IEC 60079 series)
EN 60079-0	<i>Electrical apparatus for explosive gas atmospheres – Part 0: General requirements</i> (IEC 60079-0, mod.)
EN 60079-10-1	<i>Explosive atmospheres – Part 10-1: Classification of areas – Explosive gas atmospheres</i> (IEC 60079-10-1)
EN 60079-30-1	<i>Explosive atmospheres – Part 30-1: Electrical resistance trace heating – General and testing requirements</i> (IEC 60079-30-1)
EN 60079-30-2	<i>Explosive atmospheres – Part 30-2: Electrical resistance trace heating – Application guide for design, installation and maintenance</i> (IEC 60079-30-2)
EN 60812	<i>Analysis techniques for system reliability – Procedure for failure mode and effects analysis (FMEA)</i> (IEC 60812)
EN 61010-1	<i>Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements</i> (IEC 61010-1)
EN 61025	<i>Fault tree analysis (FTA)</i> (IEC 61025)
EN 61165	<i>Application of Markov techniques</i> (IEC 61165)
EN 61241 series	<i>Electrical apparatus for use in the presence of combustible dust</i> (IEC 61241 series)
EN 61241-0	<i>Electrical apparatus for use in the presence of combustible dust – Part 0: General requirements</i> (IEC 61241-0, mod.)
EN 61496-1	<i>Safety of machinery – Electro-sensitive protective equipment – Part 1: General requirements and tests</i> (IEC 61496-1, mod.)
EN 61508 series	<i>Functional safety of electrical/electronic/programmable electronic safety-related systems</i> (IEC 61508 series)

EN 61508-1	<i>Functional safety of electrical/electronic/programmable electronic safety-related systems – Part 1: General requirements (IEC 61508-1)</i>
EN 61508-2:2001	<i>Functional safety of electrical/electronic/programmable electronic safety-related systems – Part 2: Requirements for electrical/electronic/programmable electronic safety-related systems (IEC 61508-2:2000)</i>
EN 61508-3	<i>Functional safety of electrical/electronic/programmable electronic safety-related systems – Part 3: Software requirements (IEC 61508-3)</i>
EN 61508-4	<i>Functional safety of electrical/electronic/programmable electronic safety-related systems – Part 4: Definitions and abbreviations (IEC 61508-4)</i>
EN 61508-7:2001	<i>Functional safety of electrical/electronic/programmable electronic safety-related systems – Part 7: Overview of techniques and measures (IEC 61508-7:2000)</i>
EN 61511 series	<i>Functional safety – Safety instrumented systems for the process industry sector (IEC 61511 series)</i>
EN 61511-1:2004	<i>Functional safety – Safety instrumented systems for the process industry sector – Part 1: Framework, definitions, system, hardware and software requirements (IEC 61511-1:2003)</i>
EN 61779 series	<i>Electrical apparatus for the detection and measurement of flammable gases (IEC 61779 series, mod.)</i>
EN 62061	<i>Safety of machinery – Functional safety of safety-related electrical, electronic and programmable electronic control systems (IEC 62061)</i>
EN ISO 13849-1	<i>Safety of machinery – Safety-related parts of control systems – Part 1: General principles for design (ISO 13849-1)</i>
EN ISO 13849-2	<i>Safety of machinery – Safety-related parts of control systems – Part 2: Validation (ISO 13849-2)</i>

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 60079-0 and the following apply.

3.1

types of protection

the types of protection, as referred to in this standard, are the explosion protection measures for electrical equipment

NOTE The protection measures are defined in EN 60079-0 or EN 61241-0.

3.2

equipment category

classification of equipment into different levels of safety with respect to the ignition risk

[EN 13237, EN 60079-0, [1]]

NOTE The equipment category is equivalent to the appropriate Equipment Protection Levels (EPLs), defined in the EN 60079-0. This standard may be applied for EPLs correspondingly.

3.3

functional safety

part of the overall safety relating to the EUC and the EUC control system which depends on the correct functioning of the safety-related systems and external risk reduction facilities

[EN 61508-4]