SVENSK STANDARD SS-EN 50402

Fastställd	Utgåva	Sida	Ansvarig kommitté
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Elektrisk utrustning för detektering och mätning av syre eller brännbara eller giftiga gaser och ångor – Funktionssäkerhet hos fast monterade system för detektering

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

Som svensk standard gäller europastandarden EN 50402:2005. Den svenska standarden innehåller den officiella engelska språkversionen av EN 50402:2005.

ICS 13.320

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EUROPEAN STANDARD **EN 50402**

NORME EUROPÉENNE

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ICS 13.320

English version

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

Matériel électrique pour la détection et la mesure des gaz ou vapeurs combustibles ou toxiques, ou de l'oxygène – Exigences relatives à la fonction de sécurité des systèmes fixes de détection de gaz

Elektrische Geräte für die Detektion und Messung von brennbaren oder toxischen Gasen und Dämpfen oder Sauerstoff – Anforderungen an die funktionale Sicherheit von ortsfesten Gaswarnsystemen

CENELEC

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

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Foreword

This European Standard was prepared by SC 31-9, Electrical apparatus for the detection and measurement of combustible gases to be used in industrial and commercial potentially explosive atmospheres, of Technical Committee CENELEC TC 31, Electrical apparatus for explosive atmospheres and by the Technical Committee CENELEC TC 216, Gas detectors.

The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 50402 on 2005–07-01.

The following dates were fixed:

– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2006-07-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2008-07-01

Contents

Clause *Page*

Introduction **5**

1 Scope **6**

2 Normative references **7**

3 Definitions **8**

4 General requirements **12**

4.1 Introduction 12
4.2 Functional safety characteristics of modules 13

5 Modules and elements - Characterisation and requirements **15**

5.1 General requirements 19
5.2 Gas sampling 21
5.3 Sensor 23
5.4 Signal-transmission 24
5.5 Input of control unit 27
5.6 Signal processing in the control unit 29
5.7 Output of the control unit 32

6 Characterisation of safety requirement **35**

6.1 General 35
6.2 Characterisation of safety function 36
6.3 Characterisation of safety integrity 37
6.4 Determination of SIL-capabilities for a safety function 38
6.5 Determination of hardware failure rates for a safety function 41
6.6 Safety performance requirements 42

7 Information requirements **42**

7.1 Information delivered by the manufacturer of the gas detection system 42
7.2 Information delivered by the user of the gas detection system 43

8 Validation **43**

Annex A (informative) **Gas detection systems as part of a safety-related system** **44**

Annex B (normative) **Transformation of the SIL-capabilities of gas detection systems** **49**

Annex C (normative) **Transformation from generic standard requirements to modules** **50**

Annex D (normative) **Management of functional safety** **53**

Annex E (informative) **Determination of SIL-capability of a safety function of the gas detection system** **55**

Table 1 - Fault tolerance for complex modules according EN 61511-1, Table 5 14
Table 2 - Fault tolerance for complex modules according EN 61508-2, Table 3 14
Table 3 - Minimum hardware fault tolerance for simple modules according EN 61511-1, Table 6 15
Table 4 - Fault tolerance for simple modules according EN 61508-2, Table 2....15
Table 5 - Diagnostic measures for program sequence monitoring from EN 61508-2 19
Table 6 - Diagnostic measures for memory from EN 61508-2 20
Table 7 - Determination of SIL-capability for a parallel chain block 40
Table B.1 - Transformation SIL-capability of EN 50402 to SIL of EN 61508 49
Table B.2 - Transformation SIL-capability of EN 50402 to Categories of EN ISO 13849-1 49
Table E.1 - Determination of SIL-capability for a parallel chain block 57

Figure 1 - Definitions of measuring point, measuring group and measuring location....10
Figure 2 - Overview of safety-related system 16
Figure 3 - Modules of a gas detection system 18
Figure 4 - Implementation of a gas detection system in the overall safety life cycle (EN 61508-1: 7.1)....36
Figure 5 - Single and parallel chains....38
Figure 6 – Handling of complex modules in a redundant structure 41
Figure A.1 - Functional safety of modules and systems (Proof test interval and mean time to repair (MTTR) are not shown in the figure although they have to be included into the considerations) 47
Figure E.1 - Step 1 - Linkage of modules 55
Figure E.2 - Step 2 - Identification of modules necessary for the safety function....55
Figure E.3 - Step 3 - Elimination of modules and linkages without influence on the safety function 56
Figure E.4 - Step 4 (1st loop) - Summarising of single chains 56
Figure E.5 - Step 5 (1st loop) - Summarising of parallel chains 56
Figure E.6 - Step 6 (1st loop) - Adaptation of block diagram structure....58
Figure E.7 - Step 4 (2nd loop) - Summarising of single chains....58
Figure E.8 - Step 5 (2nd loop) - Summarising of parallel chains....58
Figure E.9 - Step 6 (2nd loop) - Adaptation of block diagram structure – *No action required* 58
Figure E.10 - Step 4 (3rd loop) - Summarising of single chains 58
Figure E.11 - Step 5 (3rd loop) - Summarising of parallel chains 59
Figure E.12 - Step 6 (3rd loop) - Adaptation of block diagram structure – *No action required*....59
Figure E.13 - Step 4 (4th loop) - Summarising of single chains – *End of procedure*....59
Figure E.14 - Step 1 - Linkages between modules for the example....60
Figure E.15 - Step 2 - Identification of modules with influence on the safety function....60
Figure E.16 - Step 3 - Elimination of modules and linkages without influence on the safety function 60
Figure E.17 - Step 4 - Summarising of single chains 61
Figure E.18 - Step 5 - Summarising of parallel chains – *End of procedure*....61
Figure E.19 - Step 2 - Identification of modules with influence on the safety function....61
Figure E.20 - Step 3 - Elimination of modules and linkages without influence on the safety function 62
Figure E.21 - Step 4 (1st loop) - Summarising of single chains 62
Figure E.22 - Step 5 (1st loop) - Summarising of parallel chains 62
Figure E.23 - Step 6 (1st loop) - Adaptation of block diagram structure – *No action required* 63
Figure E.24 - Step 4 (2nd loop) - Summarising of single chains – *End of procedure* 63

Introduction

This European Standard specifies requirements for functional safety of gas detection systems and encompasses criteria for reliability, avoidance of faults and fault tolerance. Functional safety is that part of the overall safety related to the measures within the gas detection system to avoid or to handle failures in such a manner that the safety function will be assured. This includes not only design requirements of the gas detection system but also information requirements for planning, putting into operation, maintenance and repair.

Gas detection systems will fail to function if dangerous failures occur in the equipment used. Failure to function will also occur if such systems are not installed or maintained in an appropriate manner. In some applications failures of this type will dominate the functional safety achieved. This European Standard is only targeted at reducing equipment failures to levels appropriate to the application. Users of gas detection systems will therefore need to ensure installation and maintenance of such systems is carried out according to requirements. This European Standard does not specify the physical positioning of sensors.

Gas detection systems may differ strongly in structure, complexity and performance. They may not be handled in a uniform manner like low complexity devices. A general specification of requirements is not possible on that basis.

Gas detection systems therefore need to be divided into functional modules for validation to ensure that systems which have different structures are handled by appropriate procedures. A gas detection system will not normally include all modules covered by this European Standard. Requirements are specified for each of these modules in terms of hierarchical levels which represent one of the constituents of functional safety performance. The hierarchical levels are termed as SIL-capabilities, with SIL-capability 1 representing the minimum and SIL-capability 4 the maximum levels of performance to comply with this standard. The SIL-capability of a module is related to the maximum safety integrity level that can be claimed for a safety function which uses modules of that specified SIL-capability. Modules will be characterised in terms of the SIL-capability. Information is also required on failure rate characteristics of modules or related physical components to enable the overall performance of a gas detection system to be determined. In this way both random failures of hardware components and systematic failures in hardware and software are taken account of. The standard also specifies the requirements that will enable determination of whether the gas detection system have a low enough failure rate when used in conjunction with other equipment necessary for functional safety.

This European Standard will enable the functional safety characteristics of the gas detection system to be determined from the characteristics of its modules and components (see Annex C). This will enable a gas detection system to be used as a part of an overall safety system.

The characterisation including the determination of a SIL-capability and failure rate data will only need to be carried out once for a particular design.

After characterisation of each module and component the properties of the whole gas detection system will be specified depending on the chosen safety function. The procedure for determining the SIL-capability of the safety function of a gas detection system will only need to be repeated for each new combination of modules and components. Different combination of equivalent modules may lead to gas detection systems which reach different SIL-capabilities.

A flexible adoption of the gas detection system to different applications will be possible without repeating all steps of the validation procedure for each new configuration.

This European Standard does not include requirements for availability which will need to be considered separately.

1 Scope

This European Standard is applicable to fixed gas detection systems for the detection and measurement of flammable or toxic[1)] gases or vapours or oxygen.

This European Standard supplements the requirements of the European Standards for electrical apparatus for the detection and measurement of flammable gases, vapours (e.g. EN 61779 or EN 50241), toxic gases (e.g. EN 45544) or oxygen (e.g. EN 50104).

NOTE 1 These European Standards will be mentioned in the text as "metrological standards".

NOTE 2 The examples above show the state of the standardisation for industrial applications at the time of publishing this European Standard. There may be other metrological standards covering other application fields, for which this standard is also applicable.

NOTE 3 For fixed apparatus used for safety applications with a SIL requirement up to 1 and for portable apparatus the European Standard EN 50271 may be applied instead of this European Standard.

Applying the above mentioned metrological standards will ensure the measuring performance is adequate in normal operation of a gas detection system. Additionally the requirements of this European Standard address the functional safety of gas detection systems and encompass criteria for reliability, fault tolerance and avoidance of systematic faults.

This European Standard will lead to the characterisation of the gas detection system by a SIL-capability and related hardware failure rate representing a hierarchical order of safety levels. This will allow the user to incorporate the gas detection system into an overall safety system according to the safety integrity levels of EN 61508 or the categories of EN ISO 13849-1 (see Annex B).

This European Standard is a product standard which is based on EN 61508 and includes additional requirements of EN ISO 13849-1. It covers part of the phase 9 “realisation” of the overall safety lifecycle defined in EN 61508-1.

This European Standard is applicable for gas detection systems, which may consist of the following functional units:

- gas-sampling;
- sensor;
- signal transmission;
- input to control unit;
- signal processing in control unit;
- output from control unit.

This European Standard does not specify requirements for the installation and maintenance of gas detection systems. It also does not specify the physical positioning of sensors..

This European Standard does not specify which SIL-capability is sufficient for which application.

NOTE 4 The SIL-capability required for an application will be specified by the user (see Annexes A and B).

1) For the purpose of this standard the word ‘toxic’ covers ‘very toxic’, ‘toxic’, ‘harmful’, ‘corrosive‘, ‘irritating‘, ‘sensitising‘, ‘carcinogenic‘, ‘mutagenic‘ and ‘teratogenic‘.