SLOVENSKI STANDARD
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Sistemi za odkrivanje in javljanje požara ter alarmiranje – 17. del: Kratkostični ločilniki

Fire detection and fire alarm systems - Part 17: Short-circuit isolators

Brandmeldeanlagen - Teil 17: Kurzschlussisolatoren

Systemes de détection et d'alarme incendie - Partie 17: Isolateurs de court-circuit

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13.220.20	Požarna zaščita	Fire protection
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Fire detection and fire alarm systems - Part 17: Short-circuit isolators

Systèmes de détection et d'alarme incendie - Partie 17: Isolateurs de court-circuit

Brandmeldeanlagen - Teil 17: Kurzschlussisolatoren

This European Standard was approved by CEN on 26 October 2005.

CEN 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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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Foreword

This European Standard (EN 54-17:2005) has been prepared by Technical Committee CEN/TC 72 “Fire detection and fire alarm systems”, the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2006, and conflicting national standards shall be withdrawn at the latest by December 2008.

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

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this European Standard.

This European Standard has been prepared in co-operation with the CEA (Comité Européen des Assurances) and with EURALARM (Association of European Manufacturers of Fire and Intruder Alarm Systems).

Information on the relationship between this European Standard and other standards of the EN 54 series is given in Annex A of EN 54-1:1996.

EN 54 “Fire detection and fire alarm systems” consists of the following parts:

Part 1: Introduction

Part 2: Control and indicating equipment

Part 3: Fire alarm devices – Sounders

Part 4: Power supply equipment

Part 5: Heat detectors - Point detectors

Part 7: Smoke detectors - Point detectors using scattered light, transmitted light or ionization

Part 10: Flame detectors - Point detectors

Part 11: Manual call points

Part 12: Smoke detectors - Line detectors using an optical light beam

Part 13: Compatibility assessment of system components

Part 14: Guidelines for planning, design, installation, commissioning, use and maintenance

Part 15: Point type multi-sensor fire detectors

Part 16: Voice alarm control and indicating equipment

Part 17: Short-circuit isolators

Part 18: Input/output devices

Part 20: Aspirating smoke detectors

Part 21: Alarm transmission and fault warning routing equipment

Part 22: Line-type heat detectors

Part 23: Fire alarm devices - Visual alarms

Part 24: Components of voice alarm systems – Loudspeakers

Part 25: Components using radio links and system requirements

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Introduction

The purpose of short-circuit isolators is to limit the consequences of low parallel resistance faults between the lines of a transmission path of a fire detection and fire alarm system. This is normally achieved by connecting the transmission path in a loop configuration, separating sections of the loop with short-circuit isolators and introducing a means of detecting the presence of a fault, if its consequences (e.g. reduction in the line voltage) jeopardises the correct operation of components on the transmission path. The faulty section of the loop can then be switched out, between a pair of short-circuit isolators, allowing the rest of the loop to continue to function correctly.

It is recognised that it is not possible for this component standard to specify all of the requirements for the function of a short-circuit isolator in a system. The requirements for the functioning of a short-circuit isolator are dependent on the system operation, the other components associated with the transmission path (e.g. the control and indicating equipment and detectors.) and the transmission path parameters (e.g. line impedance and line loads) and will have to be verified in a system test.

However, this component standard includes:

— a requirement that the manufacturer shall give all of the specifications, for the short-circuit isolator, needed by system designers to use the device correctly, in accordance with the system requirements,

NOTE The system designer should ensure that only those short-circuit isolators having the necessary performance are chosen to meet the specific requirements of a given system design.

— tests to verify that the short-circuit isolator functions in accordance with these manufacturer's specifications, and

— tests to verify the stability of the short-circuit isolator with respect to environmental and electromagnetic compatibility (EMC) conditions.

Due to the many different concepts that can be used for the operation of short-circuit isolators, it is not possible to define a precise functional test procedure applicable to all types. Instead, this European Standard requires that a functional test procedure is developed to verify the manufacturer's specification and lists the most important points that have to be verified. To assist in developing such test procedures, some example procedures are given in an informative annex.

In view of the above, it is important that, in addition to meeting the requirements of this European Standard, short-circuit isolators are shown to operate correctly within the types of systems with which they are intended to be used.

1 Scope

This European Standard specifies requirements, test methods and performance criteria for short-circuit isolators, for use in fire detection and fire alarm systems for buildings (see EN 54-1).

Means of isolation or protection incorporated within control and indicating equipment (item B in Figure 1 of EN 54-1:1996) are not covered by this European Standard.

2 Normative references

The following referenced documents are indispensable for the application of this European Standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 54-1:1996, *Fire detection and fire alarm systems — Part 1: Introduction*

EN 50130-4:1995, *Alarm systems — Part 4: Electromagnetic compatibility - Product family standard: Immunity requirements for components of fire, intruder and social alarm systems*

EN 60068-1, *Environmental testing — Part 1: General and guidance (IEC 60068-1:1988 + Corrigendum 1988 + A1:1992)*

EN 60068-2-1, *Environmental testing — Part 2: Tests — Tests A: Cold (IEC 60068-2-1:1990)*

EN 60068-2-2, *Basic environmental testing procedures — Part 2: Tests — Tests B: Dry heat (IEC 60068-2-2:1974 + IEC 60068-2-2A:1976)*

EN 60068-2-6, *Environmental testing — Part 2: Tests — Test Fc: Vibration (sinusoidal) (IEC 60068-2-6:1995 + Corrigendum 1995)*

EN 60068-2-27, *Basic environmental testing procedures — Part 2: Tests — Test Ea and guidance: Shock (IEC 60068-2-27:1987)*

EN 60068-2-30, *Environmental testing — Part 2: Tests — Test Db and guidance: Damp heat, cyclic (12 + 12 hour cycle) (IEC 60068-2-30:1980 + A1:1985)*

EN 60068-2-42, *Environmental testing — Part 2-42: Tests — Test Kc: Sulphur dioxide test for contacts and connections (IEC 60068-2-42:2003)*

EN 60068-2-78, *Environmental testing — Part 2-78: Tests — Test Cab: Damp heat, steady state (IEC 60068-2-78:2001)*

ISO 209-1:1989, *Wrought aluminium and aluminium alloys — Chemical composition and forms of products — Part 1: Chemical composition*

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in EN 54-1:1996 and the following apply.

3.1
short-circuit isolator
device, which may be connected into a transmission path of a fire detection and fire alarm system, to limit the consequences of low parallel resistance faults between the lines of this transmission path

NOTE A short circuit isolating device may be a physically separate device or it may be incorporated into another device apart from the control and indicating equipment (e.g. integrated into a smoke detector or detector base).

3.2
closed condition
condition of the short-circuit isolator which allows the normal signals and supply currents to pass through the short-circuit isolator (i.e. the correct condition for the short-circuit isolator when there is no short circuit)

3.3
open condition
condition of the short-circuit isolator which prevents the passage of short circuit currents through the short-circuit isolator. (i.e. the correct condition for the short-circuit isolator when it is protecting part of a circuit from the effects of a short circuit)

4 Requirements

4.1 Compliance

In order to comply with this European Standard the short-circuit isolator shall meet the requirements of this clause, which shall be verified by visual inspection or engineering assessment, shall be tested as described in Clause 5 and shall meet the requirements of the tests. However, for short circuit isolating devices which are integrated into other devices already covered by an existing European Standard (EN), the environmental conditioning shall be performed in accordance with that EN.

4.2 Integral status indication

If the short-circuit isolator incorporates an integral visual indication of its status, then this indication shall not be red.

4.3 Connection of ancillary devices

Where the short-circuit isolator provides for connections to ancillary devices (e.g. remote indicators), open- or short-circuit failures of these connections shall not prevent the correct operation of the short-circuit isolator.

4.4 Monitoring of detachable short-circuit isolators

If a short circuit isolating device is detachable (i.e. it is attached to a mounting base), then a means shall be provided for a remote monitoring system (e.g. the control and indicating equipment) to detect the removal of the device from the base, in order to give a fault signal.

4.5 Manufacturer's adjustments

It shall not be possible to change the manufacturer's settings except by special means (e.g. the use of a special code or tool) or by breaking or removing a seal.

4.6 On-site adjustments

If there is provision for on-site adjustment of the short-circuit isolator, then for each setting the short-circuit isolator shall comply with the requirements of this European Standard. Access to the means of adjustment shall only be possible by the use of a code or special tool.

4.7 Marking

Each short-circuit isolator shall be clearly marked with the following information:

a) number and date of this European Standard (i.e. EN 54-17:2005);

b) name or trademark of the manufacturer or supplier;

c) model designation (type or number);

d) wiring terminal designations;

e) some mark(s) or code(s) (e.g. serial number or batch code), by which the manufacturer can identify, at least, the date or batch and place of manufacture, and the version number(s) of any software, contained within the short-circuit isolator.

For detachable short-circuit isolators, the detachable part shall be marked with a), b), c) and e), and the base shall be marked with, at least c) (i.e. its own model designation) and d).

Where any marking on the device uses symbols or abbreviations not in common use then these shall be explained in the data supplied with the device.

The marking shall be visible during installation of the short-circuit isolator and shall be accessible during maintenance.

The markings shall not be placed on screws or other easily removable parts.

NOTE Where ZA.3 covers the same information as required by this subclause, the requirements of this subclause are met.

4.8 Data

Short-circuit isolators shall either be supplied with sufficient technical, installation and maintenance data to enable their correct installation and operation[1)] or, if all of these data are not supplied with each isolator, reference to the appropriate data sheet shall be given on, or with, each short-circuit isolator.

At least the following data are required to conduct the tests specified in this European Standard:

a) maximum line voltage (V_{max});

b) minimum line voltage (V_{min}) (i.e. without a short circuit or partial short circuit fault);

c) maximum rated continuous current with the switch closed (I_C max);

d) maximum rated switching current (e.g. under short circuit conditions) (I_S max);

e) maximum leakage current (I_L max) with the switch open (isolated state);

f) maximum series impedance with the switch closed (Z_C max);

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1) To enable correct operation of the short-circuit isolators, these data should describe the requirements for the correct processing of the signals from the short-circuit isolator. This may be in the form of a full technical specification of these signals, a reference to the appropriate signalling protocol or a reference to suitable types of control and indicating equipment etc.

g) ranges of parameters for each stimulus, which the manufacturer claims will cause the short-circuit isolator to change from the closed to the open condition;

h) ranges of parameters for each stimulus, which the manufacturer claims will cause the short-circuit isolator to change from the open to the closed condition.

NOTE Additional information may be required, depending on the product design and function, to demonstrate conformity with the requirements of this European Standard.

4.9 Additional requirements for software controlled short-circuit isolators

4.9.1 General

For short-circuit isolators which rely on software control in order to fulfil the requirements of this European Standard, the requirements of 4.9.2, 4.9.3 and 4.9.4 shall be met.

4.9.2 Software documentation

4.9.2.1 The manufacturer shall submit documentation, which gives an overview of the software design. This documentation shall be in sufficient detail for the design to be inspected for compliance with this European Standard and shall include at least the following:

— a functional description of the main program flow (e.g. as a flow diagram or structogram) including:

a) a brief description of the modules and the functions that they perform;

b) the way in which the modules interact;

c) the overall hierarchy of the program;

d) the way in which the software interacts with the hardware of the short-circuit isolator;

e) the way in which the modules are called, including any interrupt processing.

f) a description of which areas of memory are used for the various purposes (e.g. the program, site specific data and running data);

g) a designation, by which the software and its version can be uniquely identified.

4.9.2.2 The manufacturer shall have available detailed design documentation, which only needs to be provided if required by the testing authority. It shall comprise at least the following:

a) an overview of the whole configuration of the device, including all software and hardware components;

b) a description of each module of the program, containing at least:

1) the name of the module;

2) a description of the tasks performed;

3) a description of the interfaces, including the type of data transfer, the valid data range and the checking for valid data;

c) full source code listings, as hard copy or in machine-readable form (e.g. ASCII-code), including all global and local variables, constants and labels used, and sufficient comment for the program flow to be recognized;

d) details of any software tools used in the design and implementation phase (e.g. CASE-tools, compilers).

4.9.3 Software design

In order to ensure the reliability of the short-circuit isolator, the following requirements for software design shall apply:

a) the software shall have a modular structure;

b) the design of the interfaces for manually and automatically generated data shall not permit invalid data to cause error in the program operation;

c) the software shall be designed to avoid the occurrence of deadlock of the program flow.

4.9.4 The storage of programs and data

The program necessary to comply with this European Standard and any preset data, such as manufacturer's settings, shall be held in non-volatile memory. Writing to areas of memory containing this program and data shall only be possible by the use of some special tool or code and shall not be possible during normal operation of the short-circuit isolator.

Site-specific data shall be held in memory which will retain data for at least two weeks without external power to the short-circuit isolator, unless provision is made for the automatic renewal of such data, following loss of power, within 1 h of power being restored.

5 Tests

5.1 General

5.1.1 Atmospheric conditions for tests

Unless otherwise stated in a test procedure, the testing shall be carried out after the test specimen has been allowed to stabilize in the standard atmospheric conditions for testing as described in EN 60068-1 as follows:

a) temperature: (15 to 35) °C;

b) relative humidity: (25 to 75) %;

c) air pressure: (86 to 106) kPa.

NOTE If variations in these parameters have a significant effect on a measurement, then such variations should be kept to a minimum during a series of measurements carried out as part of one test on one specimen.

5.1.2 Operating conditions for tests

If a test method requires a specimen to be operational, then the specimen shall be connected to suitable supply and monitoring equipment with characteristics as required by the manufacturer's data. Unless otherwise specified in the test method, the supply parameters applied to the specimen shall be set within the manufacturer's specified range(s) and shall remain substantially constant throughout the

tests. The value chosen for each parameter shall normally be the nominal value, or the mean of the specified range. The short-circuit isolator shall be set to the closed condition and the supply and monitoring equipment shall be able to detect if the isolator changes to the open condition.

5.1.3 Mounting arrangements

The specimen shall be mounted by its normal means of attachment in accordance with the manufacturer's instructions. If these instructions describe more than one method of mounting then the method considered to be most unfavourable shall be chosen for each test.

5.1.4 Tolerances

Unless otherwise stated, the tolerances for the environmental test parameters shall be as given in the basic reference standards for the test (e.g. the relevant part of EN 60068).

If a requirement or test procedure does not specify a tolerance or deviation limits, then deviation limits of ± 5 % shall be applied.

5.1.5 Functional test

5.1.5.1 Object

To confirm the correct operation of the short-circuit isolators, in accordance with the manufacturer's specification, and to verify their stability after and, where required, during the environmental and EMC tests.

5.1.5.2 Test procedure

The functional test shall verify that the short-circuit isolator operates within the manufacturer's specification. The functional test shall verify at least the following for each side of the short-circuit isolator:

a) each stimulus, which the manufacturer claims will cause the short-circuit isolator to change from the closed to the open condition;

b) that the short-circuit isolator can switch the maximum specified switching current ($I_{S\,max}$);

c) the open condition (isolation) leakage current (I_L) when there is a direct short circuit on one side of the isolator;

d) each stimulus, which the manufacturer claims will cause the short-circuit isolator to change from the open to the closed condition;

e) the closed condition resistance (Z_C) at the maximum rated continuous current ($I_{C\,max}$) or, if Z_C can not be measured at $I_{C\,max}$, because the isolator changes to the open condition before a current of $I_{C\,max}$ is reached, then it shall be measured just before the isolator changes to the open condition;

f) the response to a direct short circuit applied to one side of the isolator.

Examples of functional tests are given in Annex A.