SLOVENSKI STANDARD
SIST EN 13922:2003

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Posode za prevoz nevarnih snovi - Obratovalna oprema za posode - Sistemi za prepreļitev prepolnitve za tekoļa goriva

Tanks for transport of dangerous goods - Service equipment for tanks - Overfill prevention systems for liquid fuels

Tanks für die Beförderung gefährlicher Güter - Bedienungsausrüstung von Tanks - Überfüllsicherungssysteme für flüssige kraft- und Brennstoffe

Citernes destinées au transport de matieres dangereuses - Equipement de service pour citernes - Dispositifs limiteurs de remplissage pour carburants pétroliers liquides

Ta slovenski standard je istoveten z: **EN 13922:2003**

ICS:

13.300	Varstvo pred nevarnimi izdelki	Protection against dangerous goods
23.020.10	Nepremiļne posode in rezervoarji	Stationary containers and tanks
43.080.10	Tovornjaki in priklopniki	Trucks and trailers

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This European Standard was approved by CEN on 13 February 2003.

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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 Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Contents

Foreword

This document (EN 13922:2003) has been prepared by Technical Committee CEN/TC 296 "Tanks for transport of dangerous goods", the secretariat of which is held by AFNOR.

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of an identical text or by endorsement, at the latest by October 2003, and conflicting national standards shall be withdrawn at the latest by October 2003.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports the objectives of the framework Directives on Transport of Dangerous Goods.

This European Standard has been submitted for reference into the RID and/or in the technical annexes of the ADR. Therefore in this context the standards listed in the normative references and covering basic requirements of the RID/ADR not addressed within the present standard are normative only when the standards themselves are referred to in the RID and/or in the technical annexes of the ADR.

Annex A is normative.

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

Introduction

The overfill prevention system prevents the maximum filling level of a compartment of a tank vehicle from being exceeded by interrupting the filling operation on the loading site.
It is not the function of an overfill prevention system to prevent volume or weight overloading. The function of the overfill prevention system is the final means of containing loaded product within a compartment and preventing a dangerous condition. It is therefore of critical importance that all components have a high degree of reliability and that all European gantries provide a compatible system with the tank trucks.
Not all the components of an overfill prevention system are necessarily supplied by one manufacturer but may include cross-compatibility parts supplied by different manufacturers/suppliers.

1 Scope

This European Standard specifies the following points regarding the minimum requirements for an overfill prevention system:

— functions;

— major components;

— characteristics;

— test methods.

This European Standard is applicable to overfill prevention systems for liquid fuels having a flash point up to but not exceeding 100 °C, excluding liquefied petroleum gas (LPG). The requirements apply to overfill prevention systems suitable for use at ambient temperatures in the range from -20 °C to +50 °C, subjected to normal operational pressure variations.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 590:1999, *Automotive fuels - Diesel - Requirements and test methods.*

EN 50014, *Electrical apparatus for potentially explosive atmospheres – General requirements.*

EN 50020, *Electrical apparatus for potentially explosive atmospheres – Intrinsic safety "i".*

EN 61000-6-2, *Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments (IEC 61000-6-2:1999, modified).*

EN 61000-6-4, *Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments (IEC 61000-6-4:1997, modified).*

3 Terms and definitions

For the purposes of this European Standard, the following terms and definitions apply.

3.1
overfill prevention system
sensors or sensor circuits, interface plug/socket, overfill prevention controller and all connecting wiring and cables

3.2
cross-compatibility
ability of one part of the overfill prevention system to be able to work safely and satisfactorily with another part of the overfill prevention system although the parts are supplied by different manufacturers

3.3
diesel
according to EN 590:1999

3.4
dry sensor
state of the sensor when not immersed in liquid

3.5
effective cycle time
time period taken for the overfill prevention system to identify a fault condition and switch to a non-permissive

3.6
fail-safe
switching to a non-permissive if any single component failure in the overfill prevention system renders the overfill prevention system unable to detect an overfill or loss of earth bond

3.7
five-wire system
uses five wire interface signals for liquid level detection

3.8
gantry control system
controls the loading of product into the transporting vehicle

3.9
gantry control system reaction time
time period commencing when the overfill prevention controller's output changes to non-permissive and ending with the cessation of all product flow after the closure of the gantry control valve

3.10
interface
ten-pin socket connection between the transporting vehicle and the gantry

3.11
inter-operable
ability of different parts of the overfill prevention system to operate together; the functional aspect of cross-compatibility

3.12
warm up time
period to switch to a permissive state after plug connection is made to a vehicle socket with no sensor immersed in liquid

3.13
non-permissive
output state of the overfill prevention controller which disables liquid delivery

3.14
overfill prevention controller
device mounted at the gantry which connects to the transporting vehicle and which provides a permissive or non-permissive to the gantry control system

3.15
overfill prevention system response time
period commencing when a sensor becomes wet and ending when the controller output switches to non-permissive

3.16
permissive
output state of the overfill prevention controller which enables liquid delivery

3.17
self-checking
automatic and continuous checking of the integrity of an overfill prevention system’s components to verify its ability to perform its minimum functions

3.18
sensor
device and any associated circuit mounted on or in a transporting vehicle’s compartment and connected to interface socket which provides the wet or dry signal to the overfill prevention controller

3.19
sensor circuit
sensor not directly wired to the interface socket but using intermediate components/electronics to transfer the sensor output to the interface socket

3.20
signal specification
electronic wave form of the signal emitted by the controller – see Figure A.1

3.21
two-wire system
uses two-wire interface signals for liquid level detection

3.22
wet sensor
state of a sensor just sufficiently submerged in liquid to initiate a change in output from permissive to non-permissive

4 Functions

4.1 To prevent overfilling of the transporting vehicle's compartment by providing a fail-safe output to a gantry control system.

4.2 To provide a fail safe monitored earth static bonding connection from the gantry to the transporting vehicle's chassis.

4.3 To provide visual indication of the status of the overfill prevention system.

5 Major components

5.1 Vehicle mounted equipment

The following equipment shall be installed on the vehicle as a minimum:

— one sensor or sensor circuit per compartment;

— vapour recovery hose interlock switch;

— one 10 pin socket;

— wiring to the sensors;

— static earth bonding provision.

5.2 Equipment fitted at the gantry

The following equipment shall be installed at the loading gantry as a minimum:

— overfill prevention controller;

— one 10 pin plug and cable for connection to vehicle socket.

6 Characteristics

6.1 Overfill prevention system working characteristics

6.1.1 Overfill

The overfill prevention system shall be an electronic system, gantry based and gantry operated. The interface wiring shall be suitable for a two-wire or a five-wire overfill prevention system and the gantry based controller shall automatically detect the difference between either overfill prevention system through a standardized 10 pin plug and socket – see Figures A.2 and A.3 – and perform its functions.
Electrical specifications for the interface are included in annex A.
If no wet sensor or system fault is detected, the controller shall give a permissive to permit loading to begin. Upon an overfill condition or the detection of any overfill prevention system or controller fault, the controller shall switch to non-permissive.

The overfill prevention system shall be fail safe and shall be self-checking. The effective cycle time between self-checks shall be less than the overfill response time.
The overfill prevention response time shall not exceed 700 ms.
The overfill prevention system shall be capable of handling up to and including the following number of compartments for each type of installation:

— two-wire system 8 compartments;

— five-wire system 12 compartments.

6.1.2 Bonding

The overfill prevention system shall provide an earth static bonding connection from the gantry to the vehicle chassis via the cable and connection plug and socket and shall continuously verify this connection throughout the loading operation.
Should any fault be detected or the electrical resistance of the connection exceed a maximum of 10 kΩ, the gantry controller shall switch to non-permissive.

6.1.3 Severe environmental condition

Where the overfill prevention system is subjected to temperatures outside the specified temperature range all applicable temperature values shall be extended. All other requirements shall remain unchanged.

6.2 Sensors

6.2.1 General

Any of the following types of sensors may be used:

— NTC thermistor, two-wire optic or other compatible device;

— five-wire optic or other compatible device;

— sensor circuit.

6.2.2 NTC thermistor, two-wire optic or other compatible sensor

Thermistor sensors shall have a negative temperature coefficient (NTC) and shall work at any temperature in the range from –20 °C to +50 °C.
Thermistor sensors have a warm up time which shall not exceed 75 s with the thermistor sensor at an ambient temperature of –20 °C.

NOTE Optic sensors have a negligible warm up time.

Two-wire sensors can be used on vehicles with no more than 8 compartments. The overfill prevention controller shall always monitor 8 sensors and stop all loading if any sensor detects an overfill. Vehicles equipped with two-wire sensors with less than 8 compartments shall employ an electronic dummy sensor for the unused channels of the controller.
The electronic dummy sensor shall generate a permissive signal when it is connected to a controller. The signal shall correspond to a wave form as shown in Figure A.1 with the values according to Table A.4.
A two-wire optic or other compatible sensors shall work at any temperature in the range from –20 °C to +50 °C. When connected to a gantry controller, a dry sensor shall generate a permissive signal, which shall correspond to a wave form as shown in Figure A.1 with the values according to Table A.4.

6.2.3 A five-wire optic or compatible sensor

A five-wire optic sensor or other compatible sensors shall work at any temperature in the range from –20 °C to +50 °C. When connected to a gantry controller, a dry sensor shall generate a permissive signal, which shall correspond to a wave form as shown in Figure A.1 with the values according to Table A.1.

6.2.4 Sensor circuit

A sensor circuit shall comply with the requirements according to 6.2.2 and 6.2.3 as applicable.

6.2.5 Response time

The reaction time from sensor going wet to the change of state of the signal at the interface socket shall not exceed 250 ms.

6.2.6 Materials of construction

The manufacturer shall provide with the equipment a full material specification for those parts that may come into contact with the liquid.

6.2.7 Electrical requirements

At the interface each sensor or sensor circuit shall be suited for controller´s intrinsically safe parameters. The electrical connections of the 10-pin-socket shall comply with Figure A.4 for a two-wire-system and Figure A.5 for a five-wire-system. The socket shall comply with Figure A.2.

6.3 Overfill prevention controller characteristics

6.3.1 Interface

The controller shall be fitted with the 10 pin plug (Figure A.3) and cable.
The controller shall be able to be connected to and communicate with both two-wire or five-wire circuits. The controller shall generate the specified wave forms (annex A, Figure A.1, Table A.2 and A.5) as applicable to the type of circuit to which it is connected.

6.3.2 Outputs

The normal output condition shall be non-permissive. The output(s) shall switch to permissive only when all correct input conditions (earth static bond made, all sensors dry and no overfill prevention system malfunction) are satisfied.
At least one "volt-free" normally open output contact shall be provided. Other types of outputs may be provided.

6.3.3 Response time

The response delay time from the change of state of the signal at the interface to the overfill prevention controller's output going non-permissive shall not exceed 450 ms.

6.3.4 Status indicators

The controller shall provide, as a minimum, separate visual status indicators:

— output non-permissive, colour RED;

— output permissive, colour GREEN;

— earth static bond status;

— wet sensor identification.

6.3.5 Materials of construction

The materials of the controller shall be suitable for the installed location.

6.3.6 Temperature range

The design operating temperature of the controller shall be –20 °C to +50 °C.

6.3.7 Electrical requirements

The overfill prevention controller's intrinsically safe parameters per output at the interface shall not exceed:

U_{max} :	13 V	maximum external capacitance :	10 µF
I_{max} :	250 mA	maximum external inductance :	80 µH
P_{max}:	0,7 W		

Minimum requirements for explosion protection per output at the interface shall be:
EEx ia IIA according to EN 50014 and EN 50020

6.4 Cable and plug interface characteristics

6.4.1 Plug

The dimension of the plug shall be in accordance with Figure A.3. To provide easy identification the plug colour shall be black. The electrical specification of the plug connection shall be in accordance with Table A.10.

6.4.2 Cable

6.4.2.1 Controller cable

The cable from the monitor to the plug shall meet the specifications of Table A.8. Flexible interconnection cable shall be made up of 10 individually screened cores.
The minimum cross-section area of each core shall be 1 mm². The core screens shall be connected together and taken to a common zero volt (Intrinsically Safe Earth) terminal at the controller.
Core colours and pin assignments shall be according to Table A.16.
The colour of the cable's outer sheath shall be blue.

6.4.2.2 Sensor cable

The cable on the vehicle from the sensor(s) to the socket shall meet the specifications of Table A.9.

6.4.3 Temperature range

The design operating temperature of the cable shall be –20 °C to +50 °C. The cable shall remain flexible throughout this temperature range.

7 Testing

7.1 General

Two different forms of tests shall be performed on overfill prevention systems. The type tests which are carried-out on two sample production units, and the production tests which shall be performed upon all production items by the manufacturer.
To ensure cross-compatibility, each part of a overfill prevention system shall be tested. When testing sensor/sensor circuits, the test shall be performed with the specified maximum number of sensing devices connected.
Calibrated standard test devices shall be used to provide the specified interface signals.
Type tests shall additionally prove the operation of the overfill prevention system at the specified tolerance limits.
Test liquid shall be diesel according to EN 590.

7.2 Type tests

7.2.1 General

Type tests shall include:

— performance testing;

— electromagnetic compatibility (EMC) tests;

— fail safe testing.

7.2.2 Performance tests

Performance tests shall be conducted as outlined in annex A (Tables A.11 to A.15).

7.2.3 Electromagnetic compatibility (EMC) test

According to EN 61000-6-4 and EN 61000-6-2.

7.2.4 Fail safe testing

The fail safe operation of the overfill prevention system shall be verified as follows:

— failure of any single component, in short circuit or open circuit state, in the controller or in the sensor shall result in non-permissive or correct operation of the overfill prevention system. This may be verified by conducting a test or by conducting a circuit analysis;

— any opens or shorts in wiring to the sensors shall result in non-permissive or correct operation;

— power supply failure shall result in a non-permissive;