



SLOVENSKI STANDARD

oSIST prEN 13160-3:2010

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Sistemi za kontrolo tesnosti - 3. del: Sistemi s tekočino za rezervoarje

Leak detection systems - Part 3: Liquid systems for tanks

Leckanzeigesysteme - Teil 3: Flüssigkeitssysteme für Tanks

Systèmes de détection de fuites - Partie 3: Systèmes à liquide pour des citernes

Ta slovenski standard je istoveten z: **prEN 13160-3 rev**

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ICS:

23.020.10	Nepremične posode in rezervoarji	Stationary containers and tanks
23.040.99	Drugi sestavni deli za cevovode	Other pipeline components

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Leak detection systems - Part 3: Liquid systems for tanks

Systèmes de détection de fuites - Partie 3: Systèmes à
liquide pour des citernes

Leckanzeigesysteme - Teil 3: Flüssigkeitssysteme für
Tanks

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 393.

If this draft becomes a European Standard, 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.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

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Contents

	page
Foreword.....	4
1 Scope	5
2 Normative references	5
3 Terms and definitions	5
4 General.....	6
5 Interstitial space.....	6
6 Leak detector for liquid systems.....	6
6.1 Leak detector liquid tanks	6
6.2 Leak detection liquids	7
6.3 Liquid sensors	8
6.4 Connection lines between leak detectors liquid tanks and interstitial space	8
7 Type test	8
7.1 Test of components.....	8
7.2 Test equipment	8
7.3 Function test	9
7.3.1 Test objective	9
7.3.2 Preparation	9
7.3.3 Evaluation	9
7.3.4 Test method for the durability	9
7.3.5 Test method for the reliability test	9
7.4 Type test of leak detection liquids for use in class II leak detection systems	11
7.4.1 Test objective	11
7.4.2 Evaluation	11
7.4.3 Test equipment	11
7.4.4 Determination of the freezing point and of the viscosity	11
7.4.5 Determination of the coefficient of thermal expansion	11
7.4.6 Determination of the flash point.....	11
7.4.7 Determination of the fungicidal properties	11
7.4.8 Determination of the segregation	12
7.4.9 Determination of the compatibility with metallic materials	12
7.4.10 Tests for harmful effects on contact with groundwater	12
8 Environmental aspects	13
9 Marking	13
Annex A (normative) Test of the fungicidal properties of leak detection liquids.....	14
A.1 Test equipment	14
A.2 Test method.....	14
A.3 Test results.....	14
A.4 Evaluation of the test result.....	14
Annex B (normative) Test of the compatibility of leak detection liquids with metals	16
B.1 Test equipment	16
B.2 Test specimen	16
B.3 Preparation of the test liquid	17
B.4 Test method.....	17
B.5 Test results	18
B.5.1 Visual inspection	18

B.5.2	Determination of the change of mass	18
B.5.3	Computation of the rate of uniform corrosion	18
B.5.4	Evaluation of the test results	19
Annex C	(informative) Environmental aspects	20
Bibliography	22

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[oSIST prEN 13160-3:2010](https://standards.iteh.ai/catalog/standards/sist/2221c321-dfbf-4744-9feb-ab675161f997/osist-pren-13160-3-2010)

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prEN 13160-3:2010 (E)**Foreword**

This document (prEN 13160-3:2010) has been prepared by Technical Committee CEN/TC 393 “Equipment for storage tanks and for filling stations”, the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

Annexes A and B are normative. Annex C is informative.

This document includes a Bibliography.

Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

This document will supersede EN 13160-3:2003.

According to EN 13160-3:2003 the following fundamental changes are given:

- electrical conductivity for the leak detection liquid changed;
- tests for the leak detection liquid concerning harmful effects on contact with groundwater revised;
- information concerning environmental aspects included;
- referred standards updated.

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This European Standard consists of 7 parts:

Leak detection systems —

Part 1: General principles

Part 2: Pressure and vacuum systems

Part 3: Liquid systems for tanks

Part 4: Liquid and/or vapour sensor systems for use in leakage containments or interstitial spaces

Part 5: Tank gauge leak detection systems

Part 6: Sensors in monitoring wells

Part 7: General requirements and test methods for interstitial spaces, leak protecting linings and leak protecting jackets

1 Scope

This European Standard specifies the requirements for leak detection systems – class II for use with double-skin tanks designed for water polluting fluids.

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 1412, *Copper and copper alloys — European numbering system*

EN 1652, *Copper and copper alloys — Plate, sheet, strip and circles for general purposes*

EN 10027–1, *Designation systems for steel — Part 1: Steel names, principal symbols*

EN 13160–1:2003, *Leak detection systems — Part 1: General principles*

EN 13160–7, *Leak detection systems — Part 7: General requirements and test methods for interstitial spaces, leak protecting linings and leak protecting jackets*

EN 60079-0, *Electrical apparatus for explosive gas atmospheres — Part 0: General requirements (IEC 60079-0:2004, modified)*

EN ISO 2719, *Determination of flash point — Pensky-Martens closed cup method (ISO 2719:2002)*

EN ISO 3104, *Petroleum products — Transparent and opaque liquids — Determination of kinematic viscosity and calculation of dynamic viscosity (ISO 3104:1994)*

EN ISO 7346-1, *Water quality — Determination of the acute lethal toxicity of substances to a freshwater fish [Brachydanio rerio Hamilton-Buchanan (Teleostei, Cyprinidae)] — Part 1: Static method (ISO 7346-1:1996)*

EN ISO 7346-2, *Water quality — Determination of the acute lethal toxicity of substances to a freshwater fish [Brachydanio rerio Hamilton-Buchanan (Teleostei, Cyprinidae)] — Part 2: Semi-static method (ISO 7346-2:1996)*

EN ISO 7346-3, *Water quality — Determination of the acute lethal toxicity of substances to a freshwater fish [Brachydanio rerio Hamilton-Buchanan (Teleostei, Cyprinidae)] — Part 3: Flow-through method (ISO 7346-3:1996)*

EN ISO 9888, *Water quality — Evaluation of ultimate aerobic biodegradability of organic compounds in aqueous medium — Static test (Zahn-Wellens method) (ISO 9888:1999)*

EN ISO 12185, *Crude petroleum and petroleum products — Determination of density — Oscillating U-tube method (ISO 12185:1996)*

ISO 431, *Copper refinery shapes*

ISO 3013, *Petroleum products — Determination of the freezing point of aviation fuels*

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in EN 13160–1:2003 apply.

prEN 13160-3:2010 (E)

4 General

General principles according to EN 13160-1.

Additionally the type of leak detection liquid shall be given.

Where the requirement is for low temperature performance the alternative test temperature is shown in brackets [...].

5 Interstitial space

General requirements concerning the interstitial space according to EN 13160-7.

The interstitial space shall be constructed such that the entire volume can be filled with the leak detection liquid and it shall be liquid tight.

The walls of the interstitial space shall withstand the pressure due to the head of liquid in the system.

For a tank the system shall be designed so that there are no connections to the inner tank through the interstitial space below the maximum filling level.

Access into the interstitial space of tanks shall only be allowed through the outer skin above the maximum filling level.

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6 Leak detector for liquid systems (standards.iteh.ai)

6.1 Leak detector liquid tanks

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The leak detector liquid tanks - being expansion tanks shall have a useable volume of:

- at least 1 l/100 l of leak detector liquid in the interstitial space of tanks with at least 0,3 m earth cover;
- at least 1 l/35 l of leak detector liquid in the interstitial space for all other tanks.

NOTE A leak detector liquid tank having a useable volume of less than 1 l/35 l of total liquid volume should not be used with tanks buried to a depth of less than 0,3 m earth cover due to the risk of variations in ground temperature causing excessive variations in the volume of leak detection liquid.

The useable volume is considered to be 50 % of the volume between the liquid level existing just before the visual or audible alarm is issued and the top edge of the liquid tank or the air vent (if the latter is located at a lower level).

A leak detector liquid tank shall not be connected to more than one storage tank.

Several leak detector liquid tanks may be connected in series at the same height, to achieve the required useable volume of the leak detection liquid.

Pipe unions for the interconnecting lines to the interstitial space shall have an internal diameter of 13 mm minimum. They shall be located at the lowest point of the leak detector liquid tank and be designed and secured such that ≥ 14 mm outer diameter interconnecting lines cannot be introduced into the leak detector liquid tank.

Leak detector liquid tanks shall have a minimum 25 mm internal diameter sealable charging hole.

Leak detector liquid tanks shall have a vent hole of minimum 20 mm² open cross-section. The latter shall be arranged and/or protected such that no clogging by deposits of dirt need be expected. Installation of the vent hole in the charging hole cap is disallowed.

Leak detector liquid tanks shall be equipped with suitable mounting fixtures.

A facility for checking the tank level (inspection window or level plug) shall be provided. The latter shall divide the volume between the liquid level at alarm indication and the top edge of the leak detector liquid tank and/or the vent hole in two.

Leak detector liquid tanks that are simultaneously intended as a visual indicator shall be adequately transparent or be equipped with a level indicator.

The leak detector liquid tanks shall be positioned so that the hydrostatic pressure of the leak detection liquid at the lowest point of the tank is at least 3 kPa higher than both the maximum pressure of stored product at the lowest point of the tank (including any operating pressure) and the maximum pressure of the groundwater at the lowest point of the tank.

The leak detector liquid tank shall be positioned so that the pressure in the interstitial space shall not exceed the rated pressure of the interstitial space.

For leak detector liquid tanks installed in a potentially explosive atmosphere the electrical surface resistance shall be less than $1 \times 10^9 \Omega$, if the greatest projected surface is $> 100 \text{ cm}^2$. For further information see 7.4 of EN 13463-1:2001.

The pipe connection shall be designed so that it is not possible for the interconnecting pipe to protrude above the lower inside surface of the leak detector liquid tank.

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6.2 Leak detection liquids

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The manufacturer shall specify which leak detection liquids are suitable for the leak detection system. Leak detection liquids shall have the following properties:

- electrical conductivity greater than 500 $\mu\text{S}/\text{cm}^{-1}$;
- viscosity at - 20 °C [- 40 °C] not greater than 100 $\text{mm}^2 \text{ s}^{-1}$ and a freezing point below - 20 °C [- 40 °C];
- flash point not below + 80 °C;
- coefficient of thermal expansion not exceeding $5 \times 10^{-4} \text{ K}^{-1}$ at a temperature of + 20 °C;
- no segregation in accordance with the test method in 7.4.8;
- fungicidal properties;
- no harmful effects to groundwater in accordance with the test method in 7.4.10;
- no deleterious effects on the materials with which they may be expected to come into contact.
- no reaction with the stored product which causes an exothermic reaction, volumetric expansion, the generation of vapour or formation of colloided or solid deposition;
- no catalytic reaction between a mixture of the stored product and the leak detection liquid which causes an exothermic reaction, volumetric expansion or the generation of vapour;
- maintain their properties during the life time of the system.

prEN 13160-3:2010 (E)

If the leak detection liquid is topped up or replaced all the required criteria shall be satisfied by any resulting mixture.

6.3 Liquid sensors

In the event of a sensor disconnection an alarm condition shall result.

The liquid sensor in the leak detector liquid tank shall be situated so that an alarm condition occurs when the liquid level in the leak detector liquid tank drops by a volume greater than 15 % of the volume of the interstitial space or by 30 l which ever is the lower volume.

6.4 Connection lines between leak detectors liquid tanks and interstitial space

The connection lines between leak detector liquid tank and interstitial space installed in potentially explosive atmosphere of zone 1 shall have an electrical surface resistance less than $1 \times 10^9 \Omega$. This requirement concerning conductive connection lines becomes no longer necessary if

- the outer diameter of the connection lines is ≤ 30 mm for potentially explosive atmospheres of group II A and II B according to EN 60079-0

or

- the outer diameter of the connection lines is ≤ 20 mm for potentially explosive atmospheres of group II C according to EN 60079-0

or

- the wall thickness of the connection lines is < 2 mm for potentially explosive atmospheres of group II A and II B according to EN 60079-0 by using conductive leak detection liquid

or

- the wall thickness of the connection lines is $< 0,2$ mm for potentially explosive atmospheres of group II C according to EN 60079-0 by using conductive leak detection liquid.

The flow rate from the outlet of the installed system shall be $> 0,5$ l/min.

As far as possible the inlet and outlet shall be positioned at the extremities of the system to ensure adequate flow of the leak detection liquid.

For further information see 7.4 of EN 13463-1:2001.

7 Type test**7.1 Test of components**

The requirements according to clause 6 shall be tested by a comparison of a prototype of a leak detector for liquid systems with the constructional drawing.

7.2 Test equipment

- A test vessel in the form of a flat bottomed vertical cylinder, having a horizontal cross-sectional area of $(0,1 \pm 0,002) \text{ m}^2$ (i.e. a liquid depth of 0,01 m corresponds to a volume of 1 l) and a minimum depth of 0,3 m;

- environmental chamber the temperature of which can be varied over the range from - 25 °C to + 70 °C within an accuracy of 2 K;
- for the test in a temperature range from – 40 °C to + 40 °C an environmental chamber the temperature of which can be varied over the range from – 50 °C to + 40 °C with an accuracy of 2 K;
- cycle counter;
- a clock having a time indication in steps of 1 s to a total of 24 h, within an accuracy of 5 s.

7.3 Function test

7.3.1 Test objective

The test objective is to verify the suitability of the sensor for detecting a fall in liquid level in the leak detection liquid tank.

7.3.2 Preparation

The sensor shall be installed in the test vessel for the function test in such a way that it can be immersed either by changing the level of leak detection liquid or by raising and lowering of the sensor.

All equipment shall be installed in an environmental chamber for the function test. The sensor under test shall be connected to the leak indicating device.

7.3.3 Evaluation

The test shall be deemed to have been passed if the leak detector triggers an optical and audible alarm within 5 s after the leak detection liquid is no longer in contact with the sensor. The device shall function correctly throughout the test.

7.3.4 Test method for the durability

The leak detector shall be tested in a durability test at a temperature of (20 ± 5) °C. An adequate durability is confirmed when the device continues to function correctly after 1×10^4 test cycles. The sensor shall be immersed and emerged once per test cycle in the liquid and the alarm shall operate in every case.

7.3.5 Test method for the reliability test

The reliability test of the alarm transmitter and the sensors, which are intended for installation in open air, shall be carried out considering 6.1 as follows:

- at a temperature of (20 ± 5) °C over a period of 200 h;
- at a temperature range of - 25 °C to + 25 °C [- 40 °C to + 40 °C] over a period of 120 h. The starting temperature for this test is - 25 °C [- 40 °C]. The temperature profile shall be according to Figure 1 with an accuracy of 2 K for the temperature and 15 min for the time. The cycle shall be repeated every 24 h.