



SLOVENSKI STANDARD

SIST EN 13160-3:2004

01-junij-2004

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

Systemes indicateurs de fuites - Partie 3: Systemes a liquide pour des citernes

Ta slovenski standard je istoveten z: **EN 13160-3:2003**

[SIST EN 13160-3:2004](https://standards.iteh.ai/catalog/standards/sist/45B01b3-3ae0-49da-9edc-a797c870328d/sist-en-13160-3-2004)

<https://standards.iteh.ai/catalog/standards/sist/45B01b3-3ae0-49da-9edc-a797c870328d/sist-en-13160-3-2004>

ICS:

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

SIST EN 13160-3:2004

en

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 13160-3:2004](#)

<https://standards.iteh.ai/catalog/standards/sist/45b01b3-3ae0-49da-9edc-a797c870328d/sist-en-13160-3-2004>

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 13160-3

July 2003

ICS 23.020.01; 23.040.99; 29.060.20

English version

Leak detection systems - Part 3: Liquid systems for tanks

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

Leckanzeigesysteme - Teil 3: Flüssigkeitssysteme für
Tanks

This European Standard was approved by CEN on 10 March 2003.

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 Management Centre 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 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.

STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 13160-3:2004

<https://standards.iteh.ai/catalog/standards/sist/45B01b3-3ae0-49da-9edc-a797c870328d/sist-en-13160-3-2004>



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

Management Centre: rue de Stassart, 36 B-1050 Brussels

Contents

	page
Foreword.....	3
1 Scope	3
2 Normative references	3
3 Terms and definitions.....	4
4 General.....	4
5 Interstitial space.....	4
6 Leak detector for liquid systems.....	4
6.1 Leak detector liquid tanks.....	4
6.2 Leak detection liquids	5
6.3 Liquid sensors.....	6
6.4 Connection lines between leak detectors liquid tanks and interstitial space	6
7 Type test	7
7.1 Test of components.....	7
7.2 Test equipment	7
7.3 Function test.....	7
7.4 Type test of leak detection liquids for use in class II leak detection systems	9
8 Marking	10
Annex A (normative) Test of the fungicidal properties of leak detection liquids.....	11
A.1 Test equipment	11
A.2 Test method.....	11
A.3 Test results	11
A.4 Evaluation of the test result.....	12
Annex B (normative) Test of the compatibility of leak detection liquids with metals.....	13
B.1 Test equipment	13
B.2 Test specimen	13
B.3 Preparation of the test liquid	14
B.4 Test method.....	14
B.5 Test results	15
Bibliography	17

Foreword

This document (EN 13160-3:2003) has been prepared by Technical Committee CEN /TC 221, "Shop fabricated metallic tanks and equipment for storage tanks and for service stations", the secretariat of which is held by DIN.

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 November 2003, and conflicting national standards shall be withdrawn at the latest by November 2003.

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

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.

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

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 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 13160-3:2003 (E)

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

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

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 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.*

ISO 11266, *Soil quality Guidance on laboratory testing for biodegradation of organic chemicals in soil under aerobic conditions.*

3 Terms and definitions

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

iTeh STANDARD PREVIEW
(standards.iteh.ai)

4 General

General principles according to EN 13160-1.

[SIST EN 13160-3:2004](https://standards.iteh.ai/catalog/standards/sist/45B01b3-3ae0-49da-9edc-a797c870328d/sist-en-13160-3-2004)

Additionally the type of leak detection liquid shall be given.

<https://standards.iteh.ai/catalog/standards/sist/45B01b3-3ae0-49da-9edc-a797c870328d/sist-en-13160-3-2004>

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.

6 Leak detector for liquid systems**6.1 Leak detector liquid tanks**

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.

6.2 Leak detection liquids

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 10 mS/m;
- viscosity at - 20 °C [- 40 °C] not greater than 100 mm² 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;

EN 13160-3:2003 (E)

- 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.

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 50014
- or
- the outer diameter of the connection lines is ≤ 20 mm for potentially explosive atmospheres of group II C according to EN 50014
- 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 50014 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 50014 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 $-25 \text{ }^\circ\text{C}$ to $+70 \text{ }^\circ\text{C}$ within an accuracy of 2 K;

for the test in a temperature range from $-40 \text{ }^\circ\text{C}$ to $+40 \text{ }^\circ\text{C}$ an environmental chamber the temperature of which can be varied over the range from $-50 \text{ }^\circ\text{C}$ to $+40 \text{ }^\circ\text{C}$ 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

iTeh STANDARD PREVIEW
(standards.iteh.ai)

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

SIST EN 13160-3:2004

7.3.2 Preparation

<https://standards.iteh.ai/catalog/standards/sist/45B01b3-3ae0-49da-9edc-a797c870328d/sist-en-13160-3-2004>

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 $(20 \pm 5) \text{ }^\circ\text{C}$. 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 $(20 \pm 5) \text{ }^\circ\text{C}$ over a period of 200 h;
- at a temperature range of $-25 \text{ }^\circ\text{C}$ to $+25 \text{ }^\circ\text{C}$ [$-40 \text{ }^\circ\text{C}$ to $+40 \text{ }^\circ\text{C}$] over a period of 120 h. The starting temperature for this test is $-25 \text{ }^\circ\text{C}$ [$-40 \text{ }^\circ\text{C}$]. 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.