SLOVENSKI STANDARD
SIST EN 13160-3:2016+A1:2025

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Nadomešča:
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Sistemi za kontrolo tesnosti - 3. del: Zahteve in metode za preskušanje in ocenjevanje sistemov s tekočino za rezervoarje (vključno z dopolnilom A1)

Leak detection systems - Part 3: Requirements and test/assessment methods for liquid systems for tanks

Leckanzeigesysteme - Teil 3: Anforderungen und Prüf-/Bewertungsmethoden für Flüssigkeitssysteme für Tanks

Systèmes de détection de fuites - Partie 3: Exigences et méthodes d'essai/d'évaluation des systèmes à liquide pour des réservoirs

Ta slovenski standard je istoveten z: **EN 13160-3:2016+A1:2024**

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: Requirements and test/assessment methods for liquid systems for tanks

Systèmes de détection de fuites - Partie 3: Exigences et méthodes d'essai/d'évaluation des systèmes à liquide pour des réservoirs

Leckanzeigesysteme - Teil 3: Anforderungen und Prüf-/Bewertungsmethoden für Flüssigkeitssysteme für Tanks

This European Standard was approved by CEN on 8 April 2016 and includes Amendment 1 approved by CEN on 11 September 2024.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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European foreword

This document (EN 13160-3:2016+A1:2024) 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 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of an identical text or by endorsement, at the latest by May 2025, and conflicting national standards shall be withdrawn at the latest by August 2026.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document includes Amendment 1 approved by CEN on 11 September 2024.

This document supersedes [A1] EN 13160-3:2016 [A1].

The start and finish of text introduced or altered by amendment is indicated in the text by tags [A1] [A1].

[A1] *deleted text* [A1]

According to edition 2003 the following fundamental changes are given:

— requirements and test methods for the leak detection liquids revised;

— consideration of the Construction Product Regulation 305/2011/EU;

— new structure — technical requirements for the system provided consisting of sensing device, evaluation device, alarm device;);

— including of environmental aspects;

— requirements from EN 13160-1:2003 included, which are no longer contained in EN 13160-1:2016;

— requirements for software included;

— reference to REACH — Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH), establishing a European Chemicals Agency and GHS — Globally Harmonized System of Classification and Labelling of Chemicals (GHS)

— using of temperature types;

— crevice test pieces and test method changed.

This European Standard *Leak detection systems* consists of 7 parts:

— *Part 1: General principles*

— *Part 2: Requirements and test/assessment methods for pressure and vacuum systems*

— *Part 3: Requirements and test/assessment methods for liquid systems for tanks*

— *Part 4: Requirements and test/assessment methods for sensor based leak detection systems*

— *Part 5: Requirements and test/assessment methods for in-tank gauge systems and pressurized pipework systems*

— *Part 6: Sensors in monitoring wells*

— *Part 7: Requirements and test/assessment methods for interstitial spaces, leak detection linings and leak detection jackets*

Any feedback and questions on this document should be directed to the users' national standards body. A complete listing of these bodies can be found on the CEN website.

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

1 Scope

This European Standard gives requirements and the corresponding test/assessment methods applicable to leak detection kits based on the drop of the liquid level in the leak detection liquid reservoir. Leak detection kits are intended to be used with double skin, underground or above ground, non-pressurized, tanks designed for water polluting liquids.

The liquid leak detection kits are usually composed of:

— sensing device (liquid sensor);

— evaluation device;

— alarm device.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 981:1996+A1:2008, *Safety of machinery — System of auditory and visual danger and information signals*

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 steels — Part 1: Steel names*

EN 12285-1, *Workshop fabricated steel tanks — Part 1: Horizontal cylindrical single skin and double skin tanks for the underground storage of flammable and non-flammable water polluting liquids*

EN 12285-2, *Workshop fabricated steel tanks — Part 2: Horizontal cylindrical single skin and double skin tanks for the aboveground storage of flammable and non-flammable water polluting liquids*

EN 13160–1:2016, *Leak detection systems — Part 1: General Principles*

EN 13160–7, *Leak detection systems — Part 7: Requirements and test/assessment methods for interstitial spaces, leak detection linings and leak detection jackets*

EN 13341:2005+A1:2011, *Static thermoplastic tanks for above ground storage of domestic heating oils, kerosene and diesel fuels — Blow moulded and rotationally moulded polyethylene tanks and rotationally moulded tanks made of anionically polymerized polyamide 6 — Requirements and test methods*

EN 27888, *Water quality — Determination of electrical conductivity (ISO 7888)*

EN 60079-0:2012, *Explosive atmospheres — Part 0: Equipment — General requirements (IEC 60079-0:2011, modified + Cor.:2012)*

EN 61672-1, *Electroacoustics — Sound level meters — Part 1: Specifications (IEC 61672-1)*

EN ISO 175:2010, *Plastics — Methods of test for the determination of the effects of immersion in liquid chemicals (ISO 175:2010)*

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

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

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

ISO 431, *Copper refinery shapes*

ISO 7619-1, *Rubber, vulcanized or thermoplastic — Determination of indentation hardness — Part 1: Durometer method (Shore hardness)*

ASTM D 1177, *Standard Test Method for Freezing Point of Aqueous Engine Coolants*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 13160-1:2016 apply.

4 Requirements

4.1 Effectiveness

4.1.1 General

This type of leak detection kit is classified according to EN 13160-1:2016 as class II.

The general requirements on leak detection systems according to Clause 5 of EN 13160-1:2016 shall be met.

The interstitial space shall fulfil the requirements according to EN 13160-7, EN 12285-1 or EN 12285-2.

NOTE To ensure the effectiveness of the system a liquid leak detection kit can only serve one tank.

A complete documentation shall be provided by the manufacturer. The documentation shall contain the technical values according to 4.1.3 to 4.1.4 and 4.2 as well as a statement about the reaction of the leak detection kit by over and under power supply voltage and current.

4.1.2 Leak detection kit

The leak detection kit shall consist of:

— sensing device (liquid sensor);

— evaluation device;

— alarm device.

4.1.3 Measure the level change (Sensing device)

4.1.3.1 Leak detection liquid reservoir

The leak detection liquid reservoir shall have a useable volume of:

— at least 1 l/100 l of leak detection liquid in the interstitial space of tanks with at least 0,3 m earth cover;

— at least 1 l/35 l of leak detection liquid in the interstitial space for all other tanks.

Leak detection liquid reservoir shall have a vent hole of minimum 20 mm^2 open cross-section.

The useable volume of the leak detection liquid reservoir 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 leak detection liquid reservoir or the air vent (if the latter is located at a lower level).

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 detection liquid reservoir and/or the vent hole in two.

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

The leak detection liquid reservoirs shall be positioned so that the hydrostatic pressure of the leak detection liquid at the lowest point of the interstitial space 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 detection liquid reservoir shall be positioned so that the pressure in the interstitial space shall not exceed 92 % of p_{t2}.

NOTE p_{t2} is defined in EN 13160-2.

For leak detection liquid reservoir installed in a potentially explosive atmosphere the electrical surface resistance of polymer materials shall be less than 1 GΩ, if the greatest projected surface is > 100 cm^2. For further information see 7.4.2 of EN 60079-0:2012.

Polymer materials for leak detection liquid reservoirs shall be weather resistant according to Table 1 of EN 13341:2005+A1:2011.

4.1.3.2 Leak detection liquid

4.1.3.2.1 General

The manufacturer shall specify which leak detection liquids are suitable for the leak detection system and which leak detection liquids can be mixed.

NOTE 1 If the term “leak detection liquid” is used in the standard the concentrate of leak detection liquid diluted with water according to the ratio specified by the manufacturer is meant.

NOTE 2 Leak detection liquid can only be mixed if its compatibility is approved.

Leak detection liquids shall have the properties according to 4.1.3.2.2 to 4.1.3.2.9.

4.1.3.2.2 Electrical conductivity

The leak detection liquid shall have an electrical conductivity greater than 10 mS m^{-1}, if required.

4.1.3.2.3 Viscosity

The leak detection liquid shall have a viscosity not greater than 200 mm^2 s^{-1} for the temperature range according to 4.2.1.

4.1.3.2.4 Freezing point

The leak detection liquid shall have a freezing point below the minimum temperature of the appropriate temperature range according to 4.2.1.

4.1.3.2.5 Flash point

The leak detection liquid shall have a flash point not below +80 °C.

4.1.3.2.6 Thermal expansion

The leak detection liquid shall have a coefficient of thermal expansion not exceeding $5 \times 10^{-4}\ K^{-1}$ at a temperature of +20 °C.

4.1.3.2.7 Segregation and formation of colloidal or solid deposition

The deposit volume of the leak detection liquid shall not be greater than 0,5 cm^3/l and the solid materials of the deposit shall have a maximum grain size of 0,125 mm diameter.

4.1.3.2.8 Compatibility with metallic materials

The leak detection liquid shall have no deleterious corrosion effects on the materials with which they may be expected to come into contact.

4.1.3.2.9 Reaction with the stored product

The leak detection liquid shall have no reaction with the stored product which causes an exothermic reaction, volumetric expansion or the generation of vapour

4.1.3.3 Connection line between leak detection liquid reservoir and interstitial space

If a separate leak detection liquid reservoir is used the free passage of leak detection liquid is given when the connection line has an internal diameter of minimum 13 mm. The connection lines shall ensure the internal diameter over the life time given by the manufacturer. The minimum allowed bend radius of the hose given by the manufacturer shall not be fallen below.

The Shore hardness of hoses tested according to ISO 7619-1 shall be minimum 65 Shore A at a temperature of (20 ± 5) °C.

The leak detection liquid reservoir shall have the possibility to be complete emptied in case of a leak in the interstitial space.

The connection line between leak detection liquid reservoir and interstitial space installed in potentially explosive atmosphere of zone 1 shall have an electrical surface resistance less than 1 GΩ. This requirement concerning conductive connection lines of polymer materials 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.

For further information see 7.4.2 of EN 60079-0:2012.

Polymer materials for connection lines shall be weather resistant according to Table 1 of EN 13341:2005+A1:2011.

4.1.3.4 Liquid sensor

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

The sensor shall give a signal within 30 s after the leak detection liquid is no longer in contact with the sensor.

The sensor shall have a measurable recovery time of max 30 s after immersing into the leak detection liquid.

The system shall remain in the alarm condition until the sensor has recovered and the alarm has been reset.

4.1.3.5 Alarm device

The alarm device shall generate an audible and visible alarm. The audible alarm shall have a sound level of ≥ 70 dB (A) in a distance of minimum 1 m with a signal according to Table 1 of EN 981:1996+A1:2008 which shall be maintained for a minimum period of 36 h.

The visible alarm shall be clearly indicated i.e. by a “red” light. The visible alarm shall have no switch off option.

A test possibility shall be provided to test the functionality of the audible and visible alarm.

The alarm device should be designed for connecting an additional alarm device, e.g. signal horn. The output parameter shall be stated.

4.1.4 Requirements for software (only if provided)

The software, where provided, shall have a facility for self-checking by fulfilling the following requirements:

— a self-diagnostic mode to test the integrity of the system at start up and periodically during use. A negative result of self-diagnostic mode shall result in an alarm condition;

— a facility to check the consistency of the input and output data, malfunction shall result in an alarm condition.

4.2 Durability of effectiveness

4.2.1 Durability of effectiveness against temperature

At a temperature of (20 ± 5) °C the leak detection kit shall be work proper after 1×10^4 alarm cycles.

The temperature ranges for leak detection kits shall be as follows:

— Type 1: −20 °C to +60 °C;

— Type 2: 0 °C to +40 °C;

— Type 3: −40 °C to +40 °C.

4.2.2 Durability of effectiveness against chemical attack

4.2.2.1 Polymer materials

Plastic parts of liquid leak detection kits that can get into contact with the leak detection liquid or its vapour shall be resistant.