SLOVENSKI STANDARD
SIST EN 13160-7:2016+A1:2025

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Sistemi za kontrolo tesnosti - 7. del: Zahteve in metode za preskušanje in ocenjevanje vmesnih prostorov, zunanjih oblog in plaščev za zaznavanje netesnosti (vključno z dopolnilom A1)

Leak detection systems - Part 7: Requirements and test/assessment methods for interstitial spaces, leak detection linings and leak detection jackets

Leckanzeigesysteme - Teil 7: Anforderungen und Prüf-/Bewertungsverfahren für Überwachungsräume, Leckschutzauskleidungen und Leckschutzummantelungen

Systèmes de détection de fuites - Partie 7: Exigences et méthodes d'essai/d'évaluation pour les espaces interstitiels, les détecteurs de fuite des revêtements et les détecteurs de fuite d'enveloppes

Ta slovenski standard je istoveten z: **EN 13160-7:2016+A1:2024**

ICS:

23.020.01	Vsebniki za shranjevanje tekočin na splošno	Fluid storage devices in general
23.040.99	Drugi sestavni deli za cevovode	Other pipeline components

SIST EN 13160-7:2016+A1:2025 **en,fr,de**

EUROPEAN STANDARD

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Leak detection systems - Part 7: Requirements and test/assessment methods for interstitial spaces, leak detection linings and leak detection jackets

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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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CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

This document (EN 13160-7:2016+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of an identical text or by endorsement, at the latest by May 2025, and conflicting national standards shall be withdrawn at the latest by August 2026.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 13160-7:2016 ⟨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 tests for permeation added;

— material properties revised;

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

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 lining kits and leak detection jacket kits. Leak detection lining kits and leak detection jackets kits intended to be used to create an interstitial space or leakage containment in single skin underground or above ground, non-pressurized, tanks designed for water polluting liquids. The kit has to be used only in conjunction with leak detection kits covered by EN 13160-2 to EN 13160-4.

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 228, *Automotive fuels — Unleaded petrol — Requirements and test methods*

EN 495–5, *Flexible sheets for waterproofing — Determination of foldability at low temperature — Part 5: Plastic and rubber sheets for roof waterproofing*

EN 1107-2, *Flexible sheets for waterproofing — Determination of dimensional stability — Part 2: Plastic and rubber sheets for roof waterproofing*

EN 1849-2, *Flexible sheets for waterproofing — Determination of thickness and mass per unit area — Part 2: Plastic and rubber sheets*

EN 10300:2005, *Steel tubes and fittings for onshore and offshore pipelines — Bituminous hot applied materials for external coating*

EN 13121-1, *GRP tanks and vessels for use above ground — Part 1: Raw materials — Specification conditions and acceptance conditions*

EN 13121-2:2003, *GRP tanks and vessels for use above ground — Part 2: Composite materials — Chemical resistance*

EN 13160-1:2016, *Leak detection systems — Part 1: General principles*

〉A1〈 EN 13160-2:2016+A1:2024 〉A1〈, *Leak detection systems — Part 2: Requirements and test/assessment methods for pressure and vacuum systems*

〉A1〈 EN 13160-3 〉A1〈, *Leak detection systems — Part 3: Requirements and test/assessment methods for liquid systems for tanks*

〉A1〈 EN 13160-4 〉A1〈, *Leak detection systems — Part 4: Requirements and test/assessment methods for sensor based leak detection systems*

EN 14879-4:2007, *Organic coating systems and linings for protection of industrial apparatus and plants against corrosion caused by aggressive media — Part 4: Linings on metallic components*

EN ISO 62, *Plastics — Determination of water absorption (ISO 62)*

EN ISO 75-1, *Plastics — Determination of temperature of deflection under load — Part 1: General test method (ISO 75-1)*

EN ISO 75-2, *Plastics — Determination of temperature of deflection under load — Part 2: Plastics and ebonite (ISO 75-2)*

EN ISO 75-3, *Plastics — Determination of temperature of deflection under load — Part 3: High-strength thermosetting laminates and long-fibre-reinforced plastics (ISO 75-3)*

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

EN ISO 178, *Plastics — Determination of flexural properties (ISO 178)*

EN ISO 179-1, *Plastics — Determination of Charpy impact properties — Part 1: Non-instrumented impact test (ISO 179-1)*

EN ISO 179-2, *Plastics — Determination of Charpy impact properties — Part 2: Instrumented impact test (ISO 179-2)*

EN ISO 527-1, *Plastics — Determination of tensile properties — Part 1: General principles (ISO 527-1)*

EN ISO 527-3, *Plastics — Determination of tensile properties — Part 3: Test conditions for films and sheets (ISO 527-3)*

EN ISO 604, *Plastics — Determination of compressive properties (ISO 604)*

EN ISO 1183-1, *Plastics — Methods for determining the density of non-cellular plastics — Part 1: Immersion method, liquid pyknometer method and titration method (ISO 1183-1)*

EN ISO 24345, *Resilient floor coverings — Determination of peel resistance (ISO 24345)*

ISO 2528, *Sheet materials — Determination of water vapour transmission rate — Gravimetric (dish) method*

ISO 6133, *Rubber and plastics — Analysis of multi-peak traces obtained in determinations of tear strength and adhesion strength*

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 of leak detection lining kits and leak detection jacket kits

4.1.1 Tightness against liquid and vapour

The integrity of the leak detection linings and leak detection jackets shall be maintained under all operating pressures.

4.1.2 Permeability of leak detection linings and leak detection jackets

The permeation shall be according to Table 1 and Table 2.

No condensation of vapour of the stored product in the interstitial space should occur.

Table 1 — Permeation of leak detection linings

Property	Required value
Passage of stored products at installation of the leak protecting lining in metal tanks with a passage of stored product of 0 g/m² · d	max 100 g/m² · day
Passage of stored products at installation of the leak protecting lining in tanks with a passage of stored product > 0 g/m² · d	max 0,1 g/m² · day
Passage of deionized water	max 4 g/m² · day
NOTE By permeation rates > 0 g/m² · d the exhaust line of the leak detector should be connected to the vapour space of the stored tank.	

Table 2 — Permeation of leak detection jackets

Property	Required value
Passage of stored product	max 2 g/m² · day
Passage of deionized water	max 4 g/m² · day

4.1.3 Free passage of liquid in the interstitial space

The quantity of liquid, calculated according to [A1] EN 13160-2:2016+A1:2024 [A1], Formula (4) and the specific volume V_{sp} according to Annex A shall enter the interstitial space by a vacuum change from (60 ± 5) kPa (p_{PA}) to (30 ± 5) kPa (p_{PE}).

Additional for leak detection systems class II according to EN 13160-3 the flow rate at the test nozzles shall be > 0,5 l/min.

4.1.4 Free passage of air

4.1.4.1 Free passage of air through intermediate layer

The back pressure of the intermediate layer shall not be higher than 1 kPa at a volume flow of (85 ± 5) l/h of air.

4.1.4.2 Free passage of air through double skin tanks and pipes

An opening of the interstitial space shall result in a pressure change in the interstitial space.

4.1.5 Flow resistance after impact of stored media

The flow resistance shall not exceed the value of 1 kPa at an air volume flow of (85 ± 5) l/h.

4.1.6 Mechanical resistance against the imposed load by the stored medium

4.1.6.1 Influence of the mechanical resistance to the free passage in the interstitial space

The flow resistance of the intermediate layer shall not be higher than 1 kPa at a volume flow of (85 ± 5) l/h of air under load.

4.1.6.2 Mechanical properties

Mechanical properties for polyvinylchloride (PVC) shall be according to Table 3.

Table 3 — Mechanical properties for polyvinylchloride (PVC)

No.	Property	Test method	Dimension	Required value
1	Tensile strength, Lengthwise and across	EN ISO 527-1 and EN ISO 527-3; Test speed: 200 mm/min ± 10 % Specimen: Type 2	N/mm	≥ 15
2	Tensile elongation, Lengthwise and across	EN ISO 527-1 and EN ISO 527-3; Test speed: 200 mm/min ± 10 % Specimen: Type 2	%	> 200
3	Reaction of joint to shear test	EN ISO 527-1 and EN ISO 527-3; Test speed: 200 mm/min ± 10 % Specimen: Type 2	—	Off-joint fracture, joint factor ≥ 0,65
4	Adhesion of multilayered sheet material	In conformity with EN ISO 24345, ISO 6133, EN ISO 527-1 and EN ISO 527-3; Test speed: 100 mm/min ± 10 % Specimen: Type 2	N/mm	≥ 2,0
5	Variation in dimension in either direction after storage at 80 °C	EN 1107-2; in a hot cabinet 2 h in air of (80 ± 2) °C and then 30 min at normal climate on a cover, which shall not affect the dimensions	%	≤ 2,0
6	Reaction in either direction to folding at a temperature of −20 °C	EN 495-5	—	No fissures may occur on either top or bottom surface
7	Thickness	EN 1849-2	%	Middle deviation ± 10 Deviation of single value ≤ 12
8	Density	EN ISO 1183-1	%	Middle deviation ± 2

Effects of test media for polyvinylchloride (PVC) shall be according to Table 4.

Table 4 — Effects of test media for polyvinylchloride (PVC)

Property	Test method	Dimension	Required value
Change of mass after storage in deionized water and stored product or test liquids according to Annex C of EN 14879-4:2007	In conformity with EN ISO 62 at normal climate, change shall be determined after the following storage periods: 3, 14 and 56 d	%	≤ 15
Change of tensile strength and elongation, in either direction after storage in deionized water and stored product (56 d at 23 °C) or test liquids according to Annex C of EN 14879-4:2007	EN ISO 527-1 and EN ISO 527-3 Test speed: 200 mm/min ± 10 % Specimen: Type 2	%	≤ 25 for tensile elongation the measured value as per Table 3
Change of tensile strength and elongation, in either direction after storage in of folded materials in deionized water and stored product (56 d at 23 °C) or test liquids according to Annex C of EN 14879-4:2007	EN ISO 527-1 and EN ISO 527-3 Test speed: 200 mm/min ± 10 % Specimen: Type 2	%	≤ 25
Change of reaction of the joint to shear test after storage in deionized water and stored product (56 d at 23 °C) or test liquids according to Annex C of EN 14879-4:2007	EN ISO 527-1 and EN ISO 527-3 Test speed: 200 mm/min ± 10 % Specimen: Type 2	—	Off-joint fracture

Mechanical properties for thermoplastic and thermoplastic elastomers except polyvinylchloride (PVC) shall be according to Table 5.

Table 5 — Mechanical properties for thermoplastic and thermoplastic elastomers except polyvinylchloride (PVC)

No.	Property	Test method	Dimension	Required value
1	Tensile strength, Lengthwise and across	EN ISO 527-1 and EN ISO 527-3; Test speed: 200 mm/min ± 10 % Specimen: Type 2	N/mm	≥ 15
2	Tensile elongation, Lengthwise and across	EN ISO 527-1 and EN ISO 527-3; Test speed: 200 mm/min ± 10 % Specimen: Type 2	%	> 200
3	Reaction of joint to shear test	EN ISO 527-1 and EN ISO 527-3; Test speed: 200 mm/min ± 10 % Specimen: Type 2	—	Off-joint fracture, joint factor ≥ 0,5
4	Adhesion of multilayered sheet material	In conformity with EN ISO 24345, ISO 6133, EN ISO 527-1 and EN ISO 527-3; Test speed: 100 mm/min ± 10 % Specimen: Type 2	N/mm	≥ 1,0
5	Variation in dimension in either direction after storage at 80 °C	EN 1107-2; in a hot cabinet 2 h in air of (80 ± 2) °C and then 30 min at normal climate on a cover, which shall not affect the dimensions	%	≤ 10
6	Reaction in either direction to folding at a temperature of −20 °C	EN 495-5	—	No fissures may occur on either top or bottom surface
7	thickness	EN 1849-2	%	Middle deviation ± 10
8	density	EN ISO 1183-1	%	Middle deviation ± 10 %

Effects of test media for thermoplastic and thermoplastic elastomers except polyvinylchloride (PVC) shall be according to Table 6.