SLOVENSKI STANDARD
oSIST prEN 1779:2025

01-januar-2025

Neporušitveno preskušanje - Preskus tesnosti - Kriteriji za izbiro metode in postopka

Non-destructive testing - Leak testing - Criteria for method and technique selection

Zerstörungsfreie Prüfung - Dichtheitsprüfung - Kriterien zur Auswahl eines Prüfverfahrens

Essais non destructifs - Contrôle d’étanchéité - Critères de choix d’une méthode et d’une technique

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Ta slovenski standard je istoveten z: **prEN 1779**

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ICS:

19.100	Neporušitveno preskušanje	Non-destructive testing

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

DRAFT
prEN 1779

November 2024

ICS 19.100

Will supersede EN 1779:1999

English Version

Non-destructive testing - Leak testing - Criteria for method and technique selection

Essais non destructifs - Contrôles d'étanchéité - Critères de choix de la méthode et de la technique

Zerstörungsfreie Prüfung - Dichtheitsprüfung - Kriterien zur Auswahl eines Prüfverfahrens

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 138.

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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European foreword

This document (prEN 1779:2024) has been prepared by Technical Committee CEN/TC 138 “Non-destructive testing”, the secretariat of which is held by DIN (Germany).

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 1779:1999.

prEN 1779:2024 includes the following significant technical changes with respect to EN 1779:1999:

a) update of the normative references;

b) Table 2 updated and figures added;

c) 8.1 added.

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1 Scope

This document specifies criteria for the selection of the most suitable method and technique for the assessment of leak tightness by indication or measurement of a gas leakage. Annex A, normative, allows a comparison of standard test methods. Leak detection using hydrostatic tests, electromagnetic methods is not included in this document.

This document can be used for equipment which can be evacuated or pressurized.

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 ISO 20484:2017, *Non-destructive testing — Leak testing — Vocabulary (ISO 20484:2017)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 20484:2017, and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp

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4 Personnel qualification

It is assumed that leak testing is performed by qualified and capable personnel. In order to prove this qualification, it is recommended to certify the personnel in accordance with EN ISO 9712:2022.

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5 Units

The leakage rate is defined as the *pV*-throughput of a specific fluid which passes through a leak under specific conditions and is expressed in pascal cubic metre per second.

In the past, the leakage rate was expressed in various units, these are given in informative Annex B, Table B.1.

6 Tightness requirements

The leak tightness of an object is usually determined by measurement of its gas leakage rate.

Leak tightness is commonly described as the flow rate of fluid into or from the test object. For a gas, leak tightness may be conveniently indicated by the variation of pressure with time under specified conditions.

For testing, however, i.e. when drafting specifications and procedures, the leak tightness shall be expressed as leakage rate in units of gas throughput ($Pa{\cdot}m^3/s$) for a specific gas at specified temperature and at specified pressure conditions.

Zero leakage rate shall not be specified. The required leak tightness shall be related to the function of the object under consideration.

EXAMPLE 1 Leakage rates in the order of 5×10^{-4} Pa·m^3/s are acceptable for compressed air cylinders. This corresponds to a pressure variation of 5000 Pa in a 10 l volume in 24 h or 0,5 l loss measured at atmospheric pressure.

EXAMPLE 2 A leakage rate of 10^{-10} Pa·m^3/s is typical for cardiac pacemakers. This corresponds to a loss of 1 cm^3 every 30 years approximately.

The total tightness of a system can be considered in terms of tightness for all components of that system. To meet requirements the sum of the leakage rates for each component plus the sum of the leakage rates at each connecting point shall be less than the overall allowable leakage rate of the system.

The tightness of component or system shall be specified under normal operating conditions.

NOTE 1 The most significant influence on tightness is given by the nature and pressure of the gas, and by the operating temperature.

The suitability of the system for a given task is indicated by the functional tightness.

NOTE 2 To take into account factors that are unquantifiable, it might be advisable to adopt leak tightness values lower than this by a factor from three to ten.

7 Leak testing methods and techniques

7.1 General

The leak tightness of an object is usually determined by measurement of its gas leakage rate.

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Leak tightness is commonly described as the flow rate of fluid into or from the test object. For a gas, leak tightness may be conveniently indicated by the variation of pressure with time under specified conditions.

The actual gas flow through the leaks of the test object, which has been determined in a leak test, shall be converted to the leakage rate with that under operating conditions.

The following considerations shall be applied to all methods by which leakage rates are determined. A review of the methods and techniques is given in Table 1.

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Table 1 — Leak testing — Overview of methods and techniques

Flow direction	Extent of test	Applicability	Techniques
Gas flow out of object	Local area	Location	B.1, B.2.2, B.4, C.3
		Measurement	B.2.1, B.3, D.3
	Total area	Location	C.1, C.2
		Measurement	B.3, B.5, B.6, B.7, C.1, D.1, D.3, D.4
Gas flow into object	Local area	Location	A.3
		Measurement	A.2, D.3
	Total area	Location	
		Measurement	A.1, D.2, D.3, D.4

Application of Table 1:

1) Choose the appropriate flow direction for test.
2) Define the extent of the investigation: total or local area.
3) Define the aim of test: location or measurement.
4) Choose the appropriate method (A to D, from the normative Annex A).
5) Check any practical difficulties associated with the test.

NOTE Some techniques used for location can also give an estimate of the leakage size, but they are not allowed to demonstrate the compliance with the specifications.

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7.2 Techniques for leak location and techniques for measurement

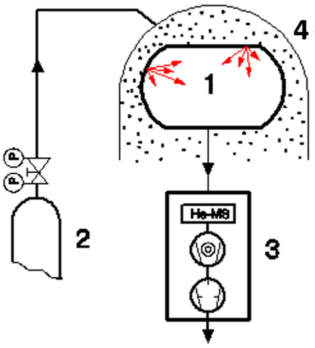
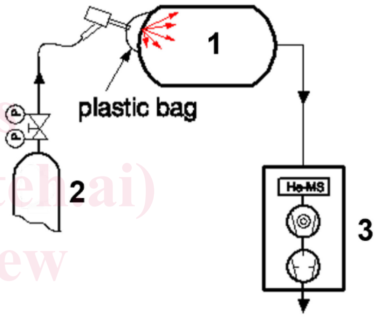
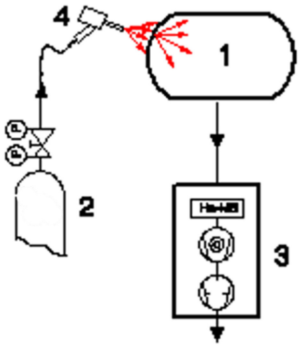
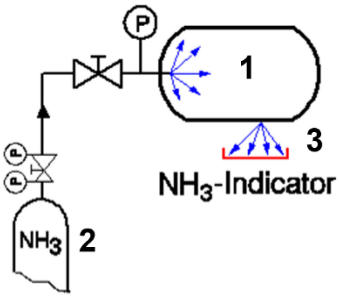
It is usually not possible to establish in one step the total leakage of a component (or a system) and the location of the leaks. Two techniques shall, therefore, be considered: measurement of the overall leakage rate or location of leaks for possible elimination.

Examples of total (or integral) techniques include the measurement of the pressure variation with time within the object and the accumulation of gas escaping from the object over a period of time.

One technique for leak location involves probing the object with a suitable tracer gas or sniffing the surface of an object filled with tracer gas.

In the selection of an appropriate technique for leak assessment, the conditions of the test (pressure, vacuum, type of gas, etc.) should be carefully considered. Some guidance is given in Clause 8.

Table 2 — Overview of methods and techniques

Techniques		**Principle**	**Diagram**
A.1	Vacuum (total)	The object (1) is evacuated and connected to the detector (3); the object is placed in a chamber (4) containing the tracer gas (2) or completely immersed in tracer gas	
A.2	Vacuum (partial)	The object (1) is evacuated and connected to the detector (3); the suspect areas are covered by a suitable, gas-tight enclosure filled with tracer gas (2)	
A.3	Vacuum (local)	The object (1) is evacuated and connected to the detector (3); the suspect points are sprayed (4) with the tracer gas (2)	
B.1	Chemical detection by ammonia	The object (1) is previously evacuated and then filled with NH_3 gas (2); the points to be checked are covered by paint or a	

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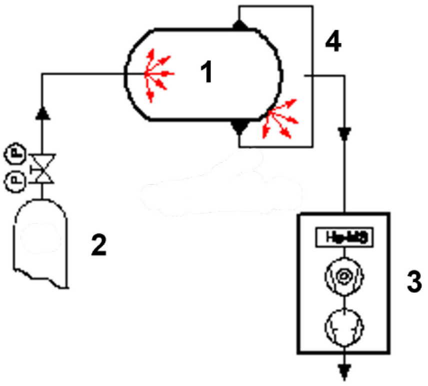
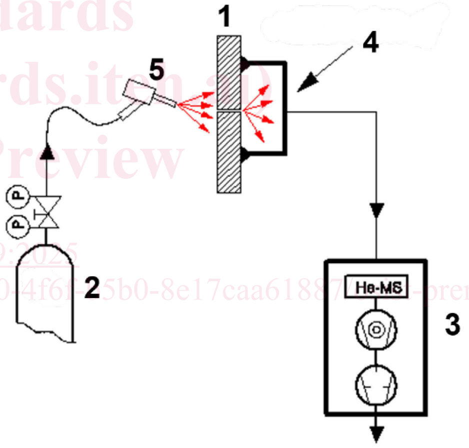
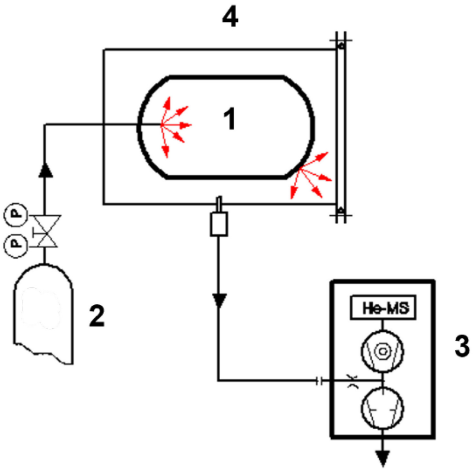
Techniques		**Principle**	**Diagram**
		strip which chemically reacts with ammonia and changes colour (3)	
B.2.1	Vacuum box with internal tracer gas pressure	The component (1) is filled with tracer gas (2); a vacuum box (4) is applied to outer surface, evacuated and connected to the detector (3)	
B.2.2	Vacuum box by spray gun on opposite side	A vacuum box (4), connected to a detector (3), is applied to one surface of the object (1) and the other wall side is sprayed (5) with the tracer gas (2)	
B.3	Pressure increase by accumulation	The object (1) is pressurized with tracer gas (2) and then placed in a chamber (4):	

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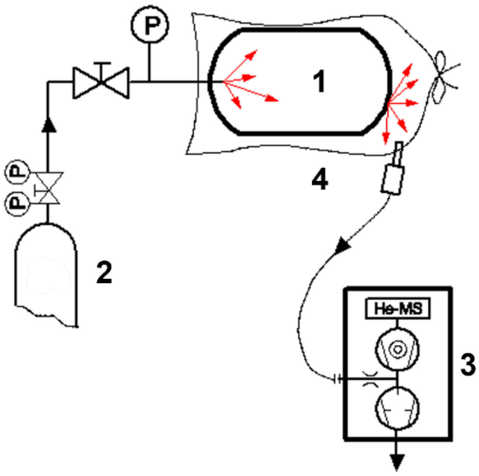
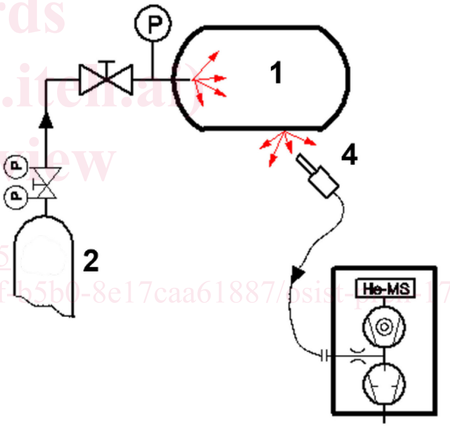
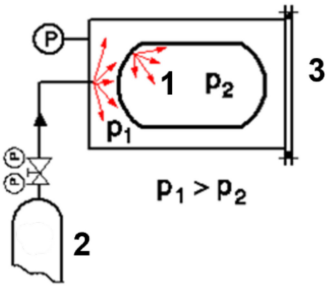
Techniques		**Principle**	**Diagram**
		or the areas to be tested are covered with gas tight bags (4): Tracer gas(2) will flow through leaks into the external volume (4), causing a concentration increase: this is measured with a tracer gas detector (3), after an accumulation period	
B.4	Sniffing	The object (1) is pressurized with tracer gas (2). The gas escaping through the leaks is detected using a sampling probe (4)	
B.5	Sealed objects by Pressurization-evacuation (bombing)	Step 1: The object (1) is placed in a chamber (3) and pressurized with tracer gas (2)	

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