

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

The European Standard EN 1779:1999, with the incorporation of amendment A1:2003, has the status of a British Standard

ICS 19.100

Confirmed December 2008

National foreword

This British Standard is the English language version of EN 1779:1999, including amendment A1:2003.

The UK participation in its preparation was entrusted to Technical Committee WEE/46, Non-destructive testing, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the *BSI Catalogue* under the section entitled “International Standards Correspondence Index”, or by using the “Search” facility of the *BSI Electronic Catalogue* or of British Standards Online.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 18, an inside back cover and a back cover.

The BSI copyright notice displayed in this document indicates when the document was last issued.

Amendments issued since publication

Amd. No.	Date	Comments
14968	10 February 2004	Revision to Foreword page and deletion of Annex ZA

This British Standard, having been prepared under the direction of the Engineering Sector Committee, was published under the authority of the Standards Committee and comes into effect on 15 November 1999

© BSI 10 February 2004

ISBN 0 580 32931 3

EUROPEAN STANDARD

EN 1779

August 1999

NORME EUROPÉENNE

+ A1

December 2003

EUROPÄISCHE NORM

ICS 91.040.70

English version

Non-destructive testing - Leak testing - Criteria for method and technique selection (includes amendment A1:2003)

Essais non destructifs - Contrôles d'étanchéité -
Critères de choix de la méthode et de la technique
(inclut l'amendement A1:2003)

Zerstörungsfreie Prüfung – Dichtheitsprüfung -
Kriterien zur Auswahl eines Prüfverfahrens
(enthält Änderung A1:2003)

This European Standard was approved by CEN on 10 July 1999, and amendment A1 was approved by CEN on 20 November 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 Central Secretariat 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 Central Secretariat 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.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

© 1999 All rights of exploitation in any form and by any means reserved worldwide for CEN national Members.

Ref. No. EN 1779:1999 + A1:2003 E

Contents

	Page
Foreword	3
1 Scope	4
2 Normative references	4
3 Definitions	4
4 Personnel qualification	4
5 Units	4
6 Tightness requirements	4
7 Leak testing	5
8 General principles of method and technique selection	9
Annex A (normative) Specific features of leak testing methods	12
Annex B (informative) Conversion factors for leakage rate units	18

Foreword

This European Standard has been prepared by Technical Committee CEN/TC 138 "Non-destructive testing", the Secretariat of which is held by AFNOR

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 February 2000, and conflicting national standards shall be withdrawn at the latest by February 2000.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

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, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Foreword to amendment A1

This document EN 1779:1999/A1:2003 has been prepared by Technical Committee CEN/TC 138 "Non-destructive testing", the secretariat of which is held by AFNOR.

This Amendment to the European Standard EN 1779:1999 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2004, and conflicting national standards shall be withdrawn at the latest by June 2004.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

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 describes 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, ultrasonic or electromagnetic methods is not included in this document.

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

2 Normative references

This 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 standard only when incorporated in it by amendment or revision. For undated references the latest edition of the reference applies.

EN 473 *Qualification and certification of NDT personnel - General principles*

EN 1330-8 *Non-destructive testing - Terminology -
Part 8: Terms used in leak tightness testing*

3 Definitions

For the purposes of this standard, the definitions given in EN 1330-8 apply.

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 473.

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 Pascals cubic metre per second.

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

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 ($\text{Pa}\cdot\text{m}^3/\text{s}$) 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.

NOTE 1: Examples of relationship between leakage rate and the object:

- leakage rates in the order of $5 \times 10^{-4} \text{ Pa}\cdot\text{m}^3/\text{s}$ can be acceptable for compressed air cylinders (this corresponds to a pressure variation of 5000 Pa in a 10 l volume in 24 hours or 0,5 l loss measured at atmospheric pressure);
- a leakage rate of $10^{-10} \text{ Pa}\cdot\text{m}^3/\text{s}$ 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 2 : The following factors have the most significant influence on tightness:

- the nature and pressure of the gas;
- the operating temperature.

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

NOTE 3 : To take into account factors that are unquantifiable, it may be advisable to adopt leak tightness values lower than this by a factor from three to ten.

7 Leak testing

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.