
Respiratory protective devices — Methods of test —

Part 2: Practical performance tests

The European Standard EN 13274-2:2001 has the status of a
British Standard

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National foreword

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The UK participation in its preparation was entrusted by Technical Committee PH/4, Respiratory protection, to Subcommittee PH/4/9, Test methods, 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.

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**Respiratory protective devices — Methods of test —
Part 2: Practical performance tests**

Appareils de protection respiratoire — Méthodes d'essai —
Partie 2: Essais pratiques de performance

Atemschutzgeräte — Prüfverfahren —
Teil 2: Praktische Leistungsprüfungen

This European Standard was approved by CEN on 1 January 2001.

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COMITÉ EUROPÉEN DE NORMALISATION
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Management Centre: rue de Stassart, 36 B-1050 Brussels

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 79, Respiratory protective devices, 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of an identical text or by endorsement, at the latest by July 2001, and conflicting national standards shall be withdrawn at the latest by July 2001.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s) see informative Annex ZA, which is an integral part of this standard.

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.

It is one of several parts, which are as follows:

- Part 1: Determination of inward leakage and total inward leakage;
- Part 2: Practical performance tests;
- Part 3: Determination of breathing resistance;
- Part 4: Flame tests;
- Part 5: Climatic conditions;
- Part 6: Determination of carbon dioxide content of inhalation air;
- Part 7: Determination of particle filter penetration;
- Part 8: Determination of dolomite dust clogging.

Introduction

This European Standard is intended as a supplement to the specific device standards for respiratory protective devices. Test methods are specified for complete, or parts of, devices. If deviations from the test method given in this European Standard are necessary, these deviations will be specified in the relevant device standard.

1 Scope

This European Standard specifies practical performance tests for respiratory protective devices, except for diving apparatus. The purpose of these tests is to subjectively assess certain properties, characteristics and functions of the device, when worn by test subjects in simulated practical use, which cannot be assessed by tests described in other standards.

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 132, *Respiratory protective devices — Definitions of terms and pictograms.*

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in EN 132 apply.

4 Prerequisites

In order to implement this part of EN 13274, at least the following parameters need to be specified in the relevant device standard:

- the number of samples;
- device preparation;
- any prior conditioning or testing;
- the number and selection of test subjects;
- activity sequence, if relevant;
- deviations;
- pass/fail criteria;
- identification of activities (by number in Table 1), and specification of relevant times including the total time;

5 General test requirements

Unless otherwise specified, the values stated in this European Standard are expressed as nominal values. Except for temperature limits, values which are not stated as maxima or minima shall be subject to a tolerance of $\pm 5\%$. Unless otherwise specified, the ambient temperature for testing shall be between 16 °C and 32 °C and the temperature limits shall be subject to an accuracy of ± 1 °C.

6 Test methods

6.1 Principle

Test subjects donning and wearing the device in accordance with the information supplied by the manufacturer perform activities in simulation of practical use. They are then asked to assess the device subjectively and comment accordingly.

6.2 Test subjects

Before performing any tests involving human subjects, account shall be taken of any national regulations concerning the medical history, examination or supervision of the test subjects.

Test subjects who are experienced in wearing the type of respiratory protective device being tested shall be used. The medical condition of the subjects shall be satisfactory for the tasks involved. The necessity for a medical examination before the tests and for medical supervision during them is at the discretion of the appropriate responsible person of the test house.

Prior to the tests the following data shall be recorded, but not reported, for each test subject:

- name;
- age; -
sex;
- height;
- weight.

6.3 Preparation of test samples

Before testing, examine the device to see that it is in good working condition and that it can be used without hazard. Practical performance tests shall only be performed following satisfactory testing against the laboratory tests specified in the relevant European Standard for the respiratory protective device.

6.4 Ambient conditions

The test shall be performed in a normally lit area with a temperature from 16 °C to 32 °C and relative humidity from 30 % to 80 %. The actual conditions of temperature and humidity and noise level shall be recorded.

6.5 Low temperature conditions

The test shall be carried out at either -6 °C to -9 °C or -15 °C to -20 °C. The actual temperature shall be recorded.

6.6 Assessments

During the tests the device shall be subjectively assessed by each wearer, and after the test, comments on the following shall be recorded individually and in private:

- a) ease of donning and doffing;
- b) head harness (if fitted) — i.e. donning and doffing, adjustability, security and comfort;

- c) comfort of facepiece;
- d) compatibility with skin;
- e) comfort of body harness, belt and breathing bag (if fitted);
- f) comfort of wearing and balance of the device;
- g) clarity of vision through the visor of the facepiece (if fitted), including misting, for example the visibility of a sign (e.g. an 'Exit' sign) consisting of letters 150 mm in height at a distance of 6 m;
- h) field of vision, to be determined with the component normally to be used with the facepiece fitted to it;
- i) speech transmission;
- j) security of fastenings and couplings(if fitted);
- k) accessibility of controls and pressure gauge (if fitted);
- l) ease of operation and ease of interpretation of the checking facility for the manufacturer's minimum design flow rate (if fitted);
- m) inadvertent operation of the on-off switch or of any means of changing flow rate or classification of the device (if fitted);
- n) operation and effectiveness of warning device (if fitted);
- o) maneuverability/kinking of breathing hose, air supply hose or compressed air supply tube (if fitted);
- p) freedom of head movement with respect to breathing hose (if fitted);
- q) comfort of breathing (e.g. temperature, pressure, quantity);
- r) any stress or discomfort caused by the flow rate or distribution of the air;
- s) ease of operation of supplementary air supply (if fitted);
- t) ease of obtaining ambient air or the use of any emergency system provided (if applicable);
- u) effectiveness of saliva trap (if fitted);
- v) any other comments regarding the design of the device or the materials used in its construction;
- w) any comments regarding other characteristics specified within the device standard;
- x) any other comments reported by the wearer.

6.7 Activities

Each subject shall wear either clothing specified by the manufacturer's instructions for use with the device under test, or clothing appropriate to the conditions in the test house and the activities to be performed.

Ask the test subjects to read the manufacturer's fitting instructions and if necessary show them how to fit the device correctly in accordance with the fitting instructions. Ask the test subject to fit the device, selecting the correct size if appropriate.

Ask each test subject "Does the device fit?" If the answer is "Yes", continue the test. If the answer is "No", take the test subject off the panel and report the fact.

Before starting the test check visually whether the device has been fitted correctly.

Inform the test subjects that if they wish to adjust the device during the test they may do so. However, if this is done the relevant section of the test will be repeated having allowed the system to re-settle.

The sequence of activities shall be at the discretion of the appropriate responsible person from the test house, unless otherwise specified in the relevant device standard. The activities themselves are selected from those given in Table 1. The activities shall be continuous, without removal of the device.

NOTE: Due regard should be given to ergonomic good practice and manual handling statutory requirements

Table 1 — Activities for practical performance tests

Number	Activity	Conditions
1	Test at rest, without performing any work. During the test the subject shall sit comfortably. The apparatus may be placed such that the test subject is not impeded by the mass.	Ambient temperature only
2	Walking on the level with full headroom at a regular rate of 6 km/h for 10 min.	Ambient and low temperature
3	Walking on the level with a headroom of $(1,3 \pm 0,2)$ m for 5 min (approximate total distance of 140 m).	Ambient temperature only
4	Walking on the level with full headroom, total distance of 125 m.	Ambient temperature only
5	Walking on the level with full headroom at a regular rate of 3 km/h for 5 min.	Ambient and low temperature
6	Walking on the level with full headroom at a regular rate of 6 km/h for a period equal to the working duration of the apparatus or 30 min, whichever is the less.	Ambient temperature only
7	1 min walking, jogging or running on a level treadmill at a speed of 8,0 km/h (total distance 133 m).	Ambient temperature only

Table 1 — Activities for practical performance tests (continued)

Number	Activity	Conditions
8	2 min walking on a treadmill at a speed of 2,4 km/h (total distance 80 m) and 20 % incline.	Ambient temperature only
9	4 min walking on a level treadmill at a speed of 4,0 km/h (total distance 267 m).	Ambient and low temperature
10	Crawling on the level with a headroom of $(0,7 \pm 0,05)$ m for 5 min (approximate total distance 70 m).	Ambient temperature only
11	Crawling through a narrow section $(0,7 \pm 0,05)$ m wide and 4 m long, which is so low that the subject has to doff the apparatus and push it in front of him or pull it behind him, while still breathing from it.	Ambient temperature only
12	Climbing up and down a vertical ladder and passing once in each direction through a 460 mm square opening, total vertical distance 20 m.	Ambient temperature only
13	23 min walking through the training gallery. The exercise in the training gallery includes level and rising roadways of varying heights a climb of 15 m on a vertical ladder at a rate of approximately 10 m/min. Using a fixed ladder it may be necessary to ascend and descend the ladder several times in order to cover the 15 m climb.	Ambient temperature only
14	Filling a basket (volume approximately 8 l) with "chippings" or similar, from a hopper which stands 1,5 m high and has an opening at the bottom to allow the contents to be shoveled out and a further opening at the top where the basket full of chippings shall be returned. (See Figure 1). The subject shall stoop or kneel as preferred and fill the bucket with chippings, and shall then stand and lift the basket and empty the contents into the opening at the top of the hopper. This activity shall be repeated approximately 20 times in 10 min.	Ambient and low temperature
15	30 pulls on a work machine, each pull being vertical from a height of 1,8 m towards the ground, lifting a mass of 25 kg via a rope and pulley arrangement.	Ambient temperature only
16	Carrying 20 sandbags, each weighing 12 kg, one by one over a distance of 10 m and placing them side by side on a 1,5 m high platform.	Ambient temperature only
17	Two warmly clothed subjects don the apparatus at ambient temperature (see clause 5) and enter a cold chamber with a temperature in accordance with 6.5. The test is continuous, without removal of the apparatus, for a period of 30 min. The work shall be divided equally between: a) walking; b) crawling;	Low temperature only

- c) carrying wooden blocks or the like (mass 7 kg) a distance of 6 m and building a pattern (See Figure 2);
- d) dragging a mass of 50 kg with a rope.

Table 1 — Activities for practical performance tests *(continued)*

Number	Activity	Conditions
18	For straight compressed air supply tubes, coiling as much of the tube as is practicable into a coil of approximately 750 mm diameter, followed by the subject walking away from the coil until the responsible person in the test house is able to assess how the tube unwinds and to note the <u>degree of kinking that may occur.</u>	Ambient temperature only
19	For spiral coiled compressed air supply tubes, walking in a circle of diameter approximately 2 m, 10 times clockwise and then 10 times anti-clockwise, so that the responsible person of the test house is able to assess how the tube performs and to note the <u>degree of kinking that may occur.</u>	Ambient temperature only
20	Laying out a fire hose of at least 15 m length and recoiling it.	Ambient temperature only

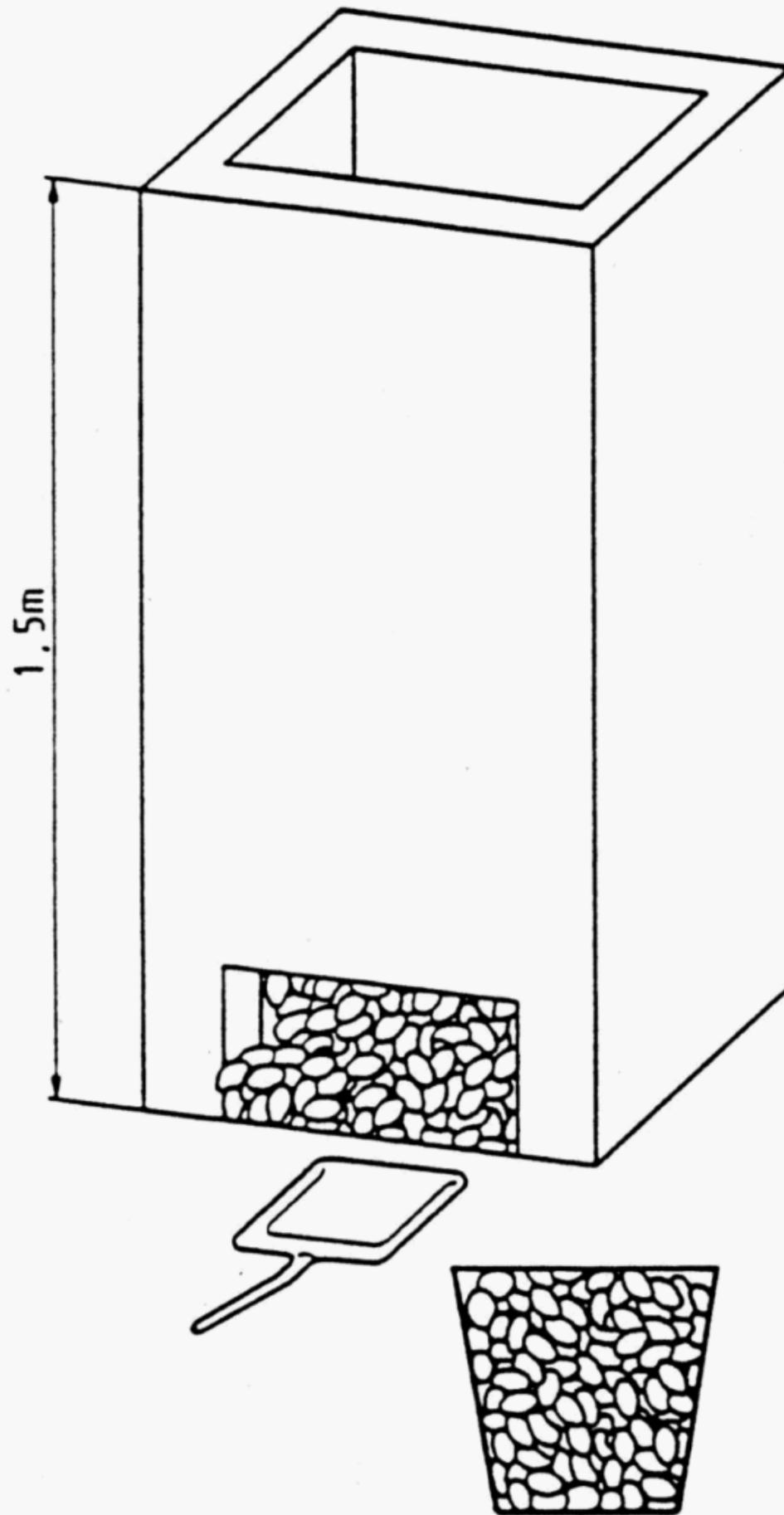


Figure 1 — Basket and chippings

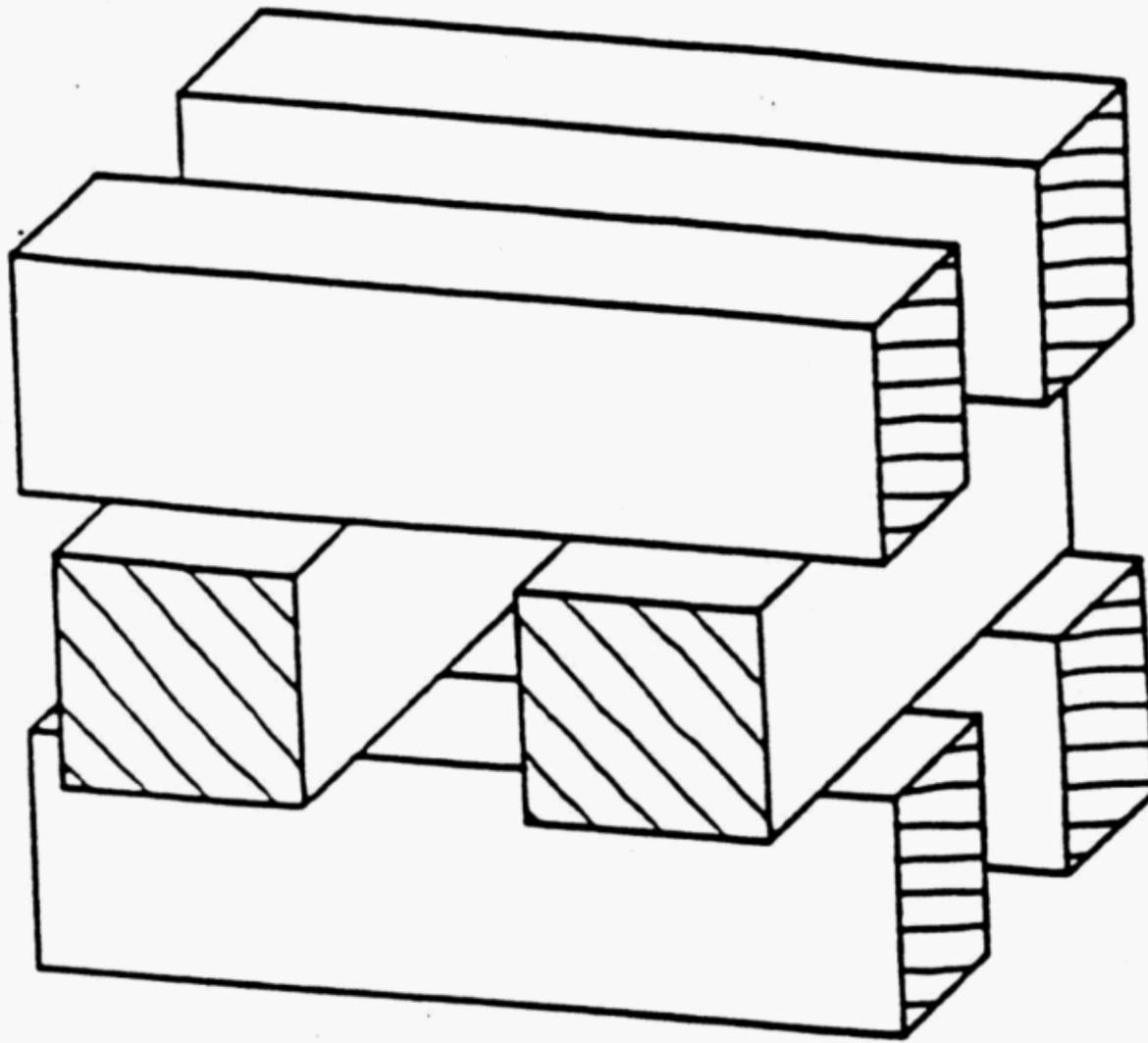


Figure 2 — Wooden blocks for Activity 17

Annex A
(normative)

Test results — Uncertainty of measurement

For each of the required measurements performed in accordance with this standard, a corresponding estimate of the uncertainty of measurement shall be evaluated. This estimate of uncertainty shall be applied and stated when reporting test results, in order to enable the user of the test report to assess the reliability of the data.

Annex ZA
(informative)

Clauses of this European Standard addressing essential requirements or other provisions of EU Directives

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association and supports essential requirements of EU Directive 89/686/EEC.

WARNING Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.

The clauses of this standard are likely to support requirements in Clauses 1 and 2 of Annex II of Directive 89/686/EEC

Compliance with this standard provides one means of conforming with specific essential requirements of the Directive(s) concerned and associated EFTA regulations.

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