
**Footwear — Test methods for whole
shoe — Thermal insulation**

*Chaussures — Méthodes d'essai applicables à la chaussure entière —
Isolation thermique*

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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

International Standard ISO 20877 was prepared by the European Committee for Standardization (as EN 12784:1999) and was adopted, under a special "fast-track procedure", by Technical Committee ISO/TC 216, *Footwear* in parallel with its approval by the ISO member bodies.

Annex A of this International Standard is given for information only.

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 309 "Footwear", the secretariat of which is held by AENOR.

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of an identical text or by endorsement, at the latest by June 2000, and conflicting national standards shall be withdrawn at the latest by June 2000.

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.

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1 Scope

This European standard describes a method for the measurement of insulation against cold of footwear.

It applies to all types of closed footwear or boot.

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 into it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 12222 *Footwear – Standard atmospheres for conditioning and testing of footwear and components for footwear.*

3 Terms and definitions

For the purposes of this standard the following definition applies:

3.1

thermal insulation

temperature difference on the inner surface of the vamp and insoles after 30 min under the specific test conditions

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4 Apparatus and material

The following apparatus and material shall be used:

4.1 Insulated cold box, the internal air temperature of which can be regulated to $-20\text{ °C} \pm 2\text{ °C}$ (see figure 1).

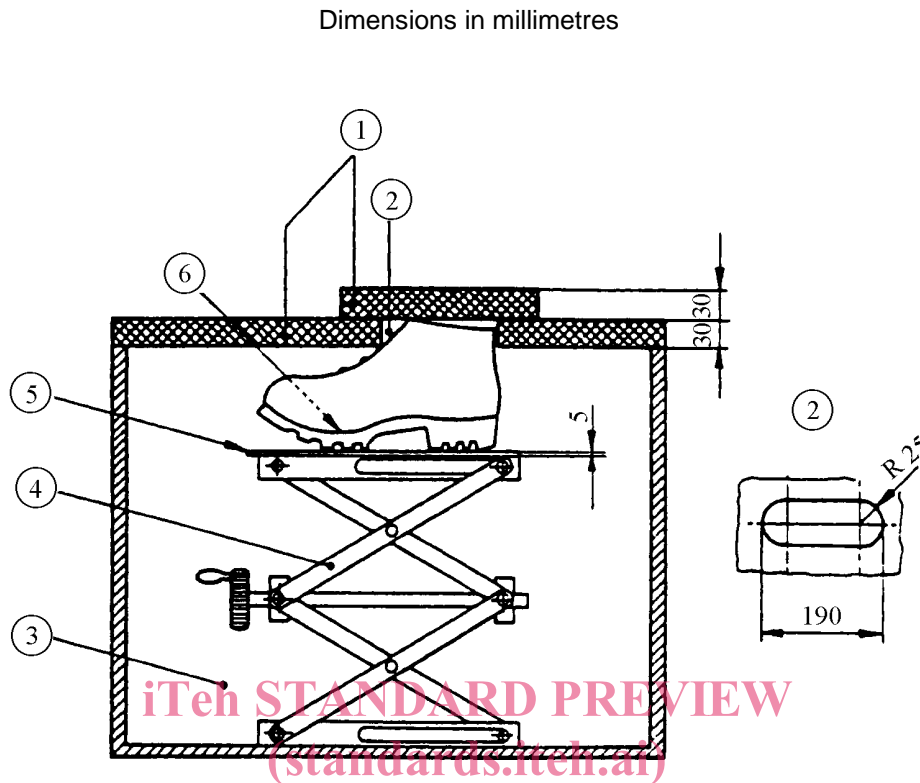
4.2 Heat transfer medium, comprising steel balls of 5 mm diameter and of total mass of 4 kg.

NOTE Ball bearings complying with the requirements of ISO 3290 are suitable.

4.3 Temperature measuring system, for example, thermocouple, copper/copper-nickel thermocouple, soldered to a copper disc $2\text{ mm} \pm 0,1\text{ mm}$ thick and $15\text{ mm} \pm 1\text{ mm}$ diameter.

4.4 Temperature recording device, with a compensator, suitable for use with 4.3.

4.5 Copper/zinc alloy plate (150 mm x 350 mm), of 5 mm thickness, positioned as illustrated in figure 1.



- 1 Thermal insulating cover [ISO 20877:2001](http://standards.itih.ai/catalog/standards/sist/06577025-4ff8-4f04-b0e5-d8cec77cccb5/iso-20877-2001)
- 2 Elongated hole standards.itih.ai/catalog/standards/sist/06577025-4ff8-4f04-b0e5-d8cec77cccb5/iso-20877-2001
- 3 Cold box
- 4 Laboratory jack
- 5 Cooper / Zinc plate
- 6 Measuring point for temperature

Figure 1 – Cold insulation test apparatus

5 Sampling and conditioning

Minimum two test pieces are necessary.

Use the complete item of footwear as the test piece.

Condition it for 24 hours (See EN 12222).

The temperature measuring system and the balls shall also be conditioned according EN 12222.

Fix one temperature measuring system on the insoles and one temperature measuring system on the inside of the upper assembly in the vamp area and place the steel balls inside the footwear. If the upper is not high enough to accommodate the balls, increase its height with a collar.

Leave in a conditioned environment in accordance with EN 12222 until the temperature measuring shows a stable temperature equal to that of the surrounding environment.

6 Test method

Adjust and maintain the temperature of the cold box to $-20\text{ °C} \pm 2\text{ °C}$ during the test and measure the temperature at the beginning of the test. Place the test piece on the laboratory jack inside the cold box, adjusting the height so that the top line of the footwear is level with the opening with the heat insulating cover (see Figure 1). Close the top of the footwear in order to prevent cold air entering through it so that the top line of the footwear is level with the opening and seal the opening with a heat insulating cover.

Use the temperature measuring device (4.4) to record the temperature of the thermocouple when the item of the footwear has been in the cold box (4.1) for a total of 30 min. Calculate the reduction in temperature that has occurred over 30 min.

NOTE It is possible to use the temperature recording device connected to the temperature measuring system to measure the temperatures as a function of time, recording the temperature decrease graphically.

7 Expression of results

Note the final temperatures attained.

Results (one in the insole and one in upper) is the average of the values.

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8 Test report

The test report shall include the following information:

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- a) reference to this draft standard;
 - b) the difference in temperatures at the measuring point on insock;
 - c) the difference in temperatures at the measurement point on upper;
 - d) full description of samples tested including commercial styles codes, colours, nature, etc.;
 - e) description of the sampling procedure, where relevant;
 - f) any deviations from this test method.