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**Laminate floor coverings —  
Determination of impact resistance**

*Revêtements de sol stratifiés — Détermination de la résistance aux  
chocs*

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see <http://www.iso.org/directives>).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see <http://www.iso.org/patents>).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see <http://www.iso.org/iso/foreword.html>.

This document was prepared by Technical Committee ISO/TC 219, *Floor Coverings*.

This second edition cancels and replaces the first edition (ISO 24335:2006), which has been technically revised.

The main changes are as follows:

- replacement of the impact resistance test method for small ball impact by the new method of EN 17368;
- modification of the foam underlayment material for the impact test by large diameter ball.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at <http://www.iso.org/members.html>.

# Laminate floor coverings — Determination of impact resistance

## 1 Scope

This document specifies how to determine the impact resistance of laminate floor covering elements. The test described measures the ability of the surface layer to withstand impact from both small and large objects dropped on the floor covering. The testing is destructive by means of the impact on the surface layer from one small and one larger steel ball simulating different scenarios. The falling height of both the small and the large steel ball is used to define the ability for a laminate floor covering element to withstand impacts. Both tests are generally carried out on parts of the laminate floor panels with suitable sizes.

The precision of the large-diameter ball method is not known. When interlaboratory data become available, a precision statement will be added in subsequent revisions. The precision regarding the small diameter method is stated in [Clause 8](#).

## 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 16354, *Laminate floor coverings — Underlays — Specification, requirements and test methods*

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

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

### 3.1

#### **test panel**

laminate panel used for testing

### 3.2

#### **test specimen**

part of the test panel used for testing

### 3.3

#### **test field**

part of test surface affected by the impact stress and evaluated

## 4 Apparatus

### 4.1 Small-diameter ball apparatus

#### 4.1.1 General

Test apparatus with the following characteristics and parameters (see [Figure 1](#)):

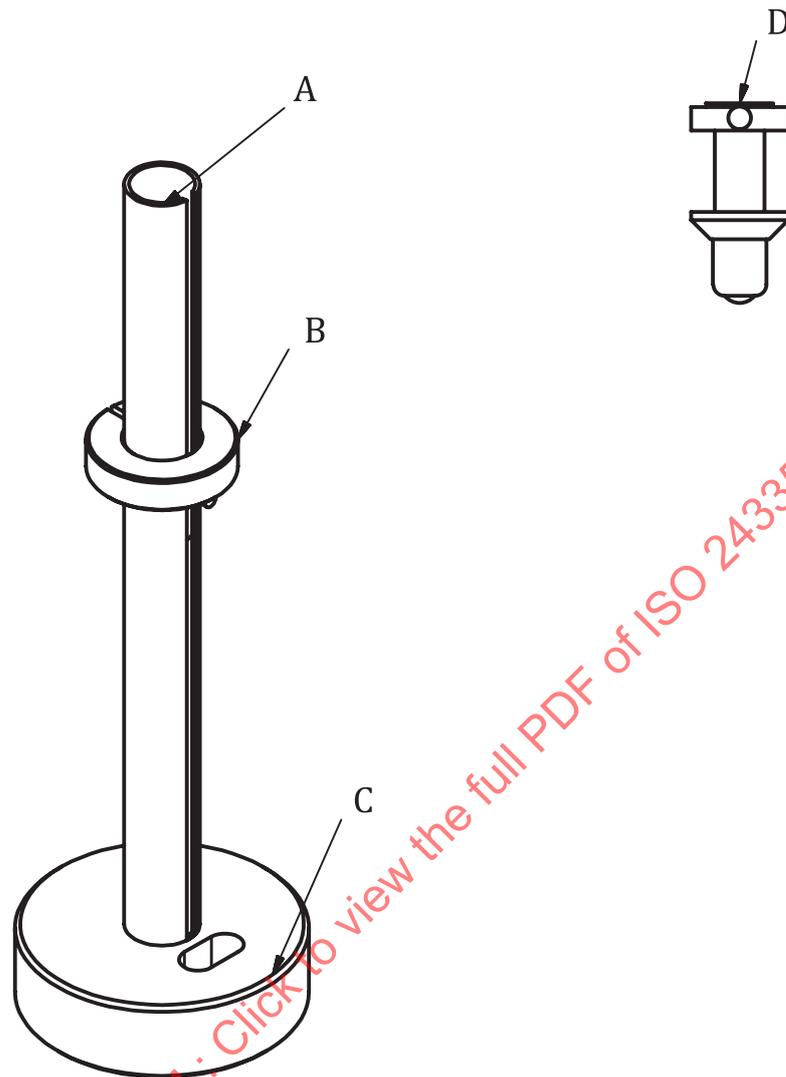
**4.1.2 Cylindrical impactor**, with a diameter of  $(25 \pm 1)$  mm with spherical impact head with  $(10 \pm 0,5)$  mm diameter of sphere, which is mounted to a falling weight.

**4.1.3 Mass of impactor**, including impact head:  $(100 \pm 1)$  g.

**4.1.4 Guiding tube**, to guide the falling weight. The tube has a height scale to determine the falling height and is mounted to the steel base with three feet (diameter  $(20 \pm 1)$  mm, thickness  $(3,0 \pm 0,1)$  mm (see [Figure 2](#)). The total mass of the steel base is  $(2\ 520 \pm 20)$  g. The steel base has a marking hole to mark the impact spot.

**4.1.5 Adjustable ring**, which is guided outside the tube, and can be fixed by a knurled screw and works as stop for the plug on the side of the falling weight to adjust the falling height.

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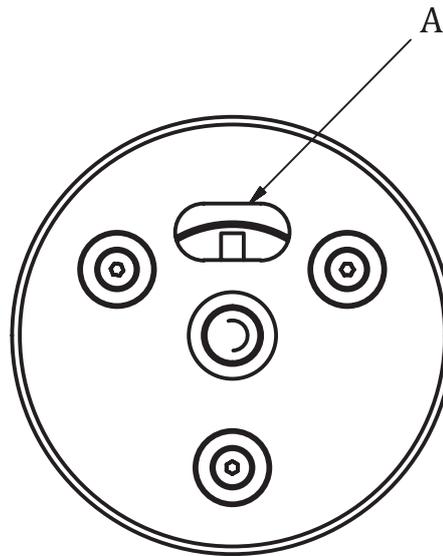


**Key**

- A guiding tube with scale
- B adjustable ring

- C steel base
- D impactor

**Figure 1 — Example of a suitable version of the test apparatus**



**Key**

A marking hole

**Figure 2 — Steel base with a marking hole**

**4.1.6 Steel plate**

With minimum dimensions of 300 mm length × 300 mm width × 10 mm thickness.

**4.1.7 Water soluble crayon or waterborne colouring matter**

To make cracks on the test area visible.

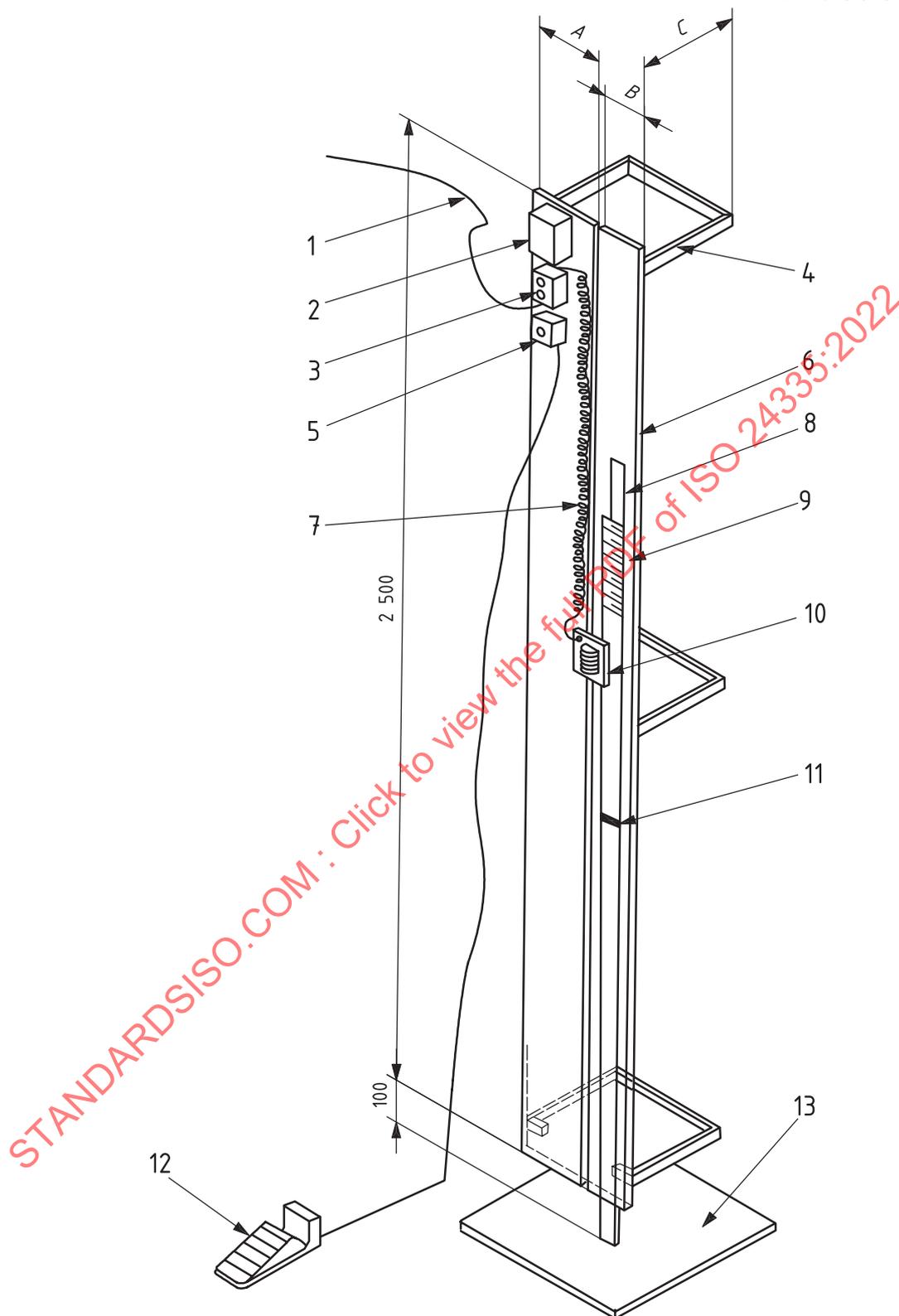
**4.1.8 Diffuse light source**

An artificial light source, providing evenly diffused light, giving an illumination on the test surface of  $(1\ 200 \pm 400)$  lx.

**4.2 Large-diameter ball apparatus**

**4.2.1 Free-fall test apparatus**, of the type shown in [Figure 3](#), or the equivalent.

Dimensions in millimetres



**Key**

- |   |              |   |   |
|---|--------------|---|---|
| A | 190 mm       | 6 | 19 mm mounting board for test apparatus - medium or high-density particle board |
| B | 100 mm       | 7 | coiled wire lead  |
| C | 250 mm       | 8 | 6,5 mm wide slot  |
| 1 | power supply | 9 | machinist's steel sliding scale 1 800 mm long                                   |

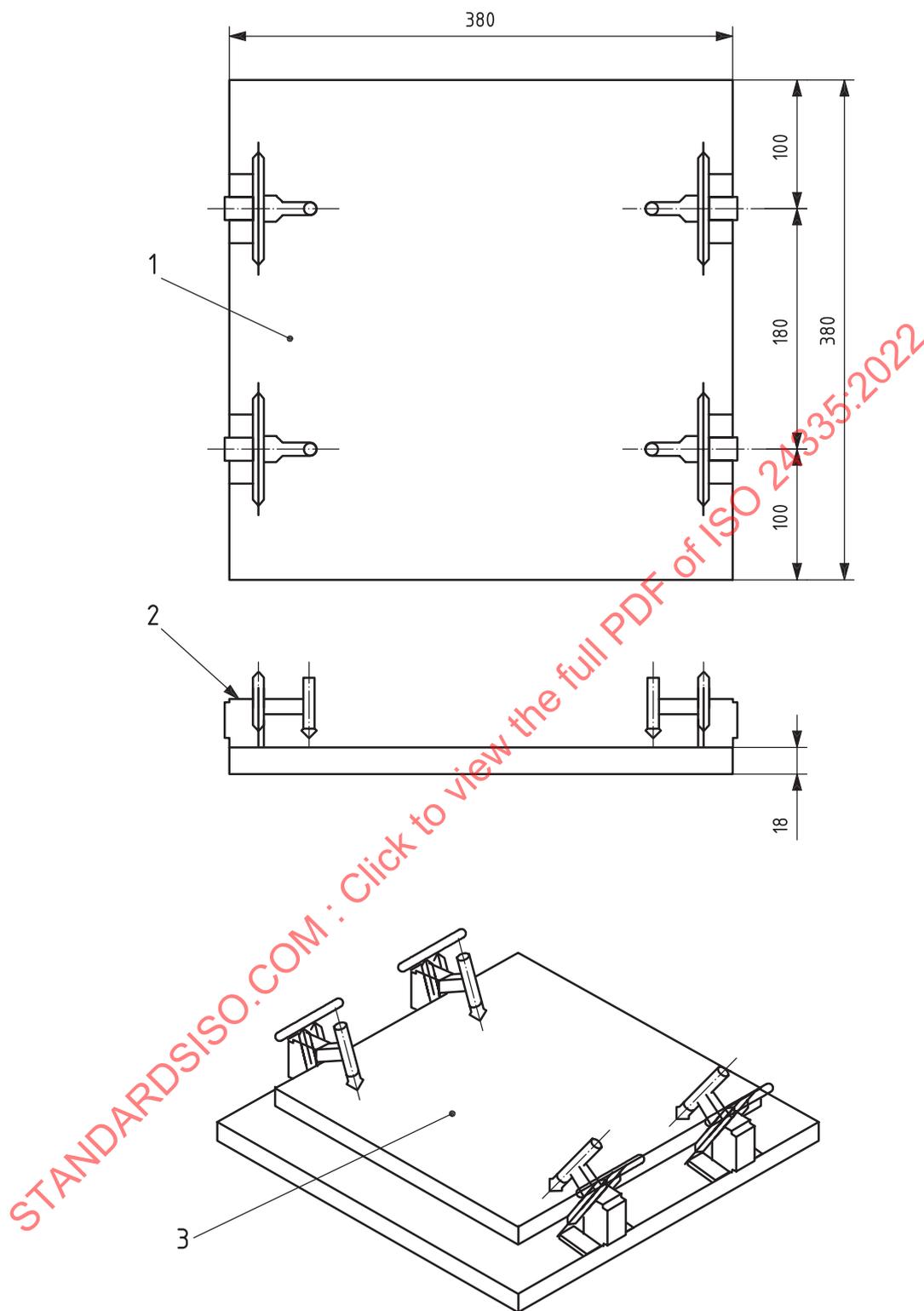
- |   |  |    |  |
|---|--|----|--|
| 2 | transformer and rectifier  | 10 | electromagnet on sliding mount   |
| 3 | junction box with duplex receptacle  | 11 | wing nut   |
| 4 | angle iron brackets (Attach firmly to wall or column. Shall be plumb and perpendicular to base plate.) | 12 | foot switch  |
| 5 | junction box with indicator light  | 13 | 460 mm × 460 mm × 19 mm steel plate base levelled and set firmly to the floor with mounted clamping jig (see <a href="#">4.2.3</a> ) |

**Figure 3 — Example of a free-fall test apparatus**

**4.2.2 Polished stainless-steel ball**, with a mass of  $(224 \pm 3)$  g, a diameter of 38,1 mm and no damaged or flattened surfaces.

**4.2.3 Clamping jig**, capable of holding the test specimen flat or the equivalent (see [Figure 4](#)).

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**Key**

- 1 base
- 2 clamps
- 3 test specimen

**Figure 4 — Clamping jig**

**4.2.4 Marking pen**, black, water-washable marking pen (suitable for overhead transparencies).

**4.2.5 Cloth**, clean, damp, soft, white cloth.

**4.2.6 Fluorescent light**, overhead white fluorescent lights with bulb(s) positioned parallel to the line of sight and providing an intensity of 800 lx to 1 100 lx (75 foot-candles to 100 foot-candles) on the specimen surface.

**4.2.7 Expanded polystyrene (EPS) foam underlayment** of  $(1,6 \pm 0,2)$  mm thickness, with a CS value of at least 60 kPa and with PC-value of  $(0,9 \pm 0,1)$  mm shall be used. The three parameters of the foam shall be determined according to EN 16354.

## 5 Test specimens

### 5.1 General

Take, from five laminate floor covering elements, the materials to be tested. The small diameter test as elasticity test for the surface shall be carried out without underlay material, also in the case of pre-attached underlay. The material for the big diameter ball test shall be tested in accordance with the manufacturer's intention for installation in order to simulate as real in situ situations as possible or with a defined underlay material if no underlay is pre-attached to the elements or recommended.

### 5.2 Specimens for the small-diameter ball test

Prepare for each test at least five test specimens cut from five test panels of at least 260 mm (length)  $\times$  minimum 160 mm (panel width)  $\times$  thickness. In case of smaller panels, install a test specimen with at least the named dimensions from two parts with a joint in the middle.

### 5.3 Specimens for the large-diameter ball test

Take, from each of the five elements, one test specimen having dimensions of approximately 300 mm  $\times$  300 mm, with a joint if needed.

### 5.4 Conditioning

Test specimens are normally measured in the received state. For type approval or verification purposes, the test specimens shall be stabilized at least for 72 h in an atmosphere of  $(23 \pm 2)$  °C and  $(50 \pm 5)$  % relative humidity.

## 6 Procedure

### 6.1 Impact by small-diameter ball

#### 6.1.1 Principle

The specimens from the laminate floor covering are subjected to the impact from a cylindrical impactor with a mass of  $(100 \pm 1)$  g as specified in 4.1. The impactor is dropped from different heights. The maximum height is determined from which the impactor does not cause any damage at five impacts. This height is used as a measure of resistance to impact by small-diameter ball.

#### 6.1.2 Testing

The test shall be performed immediately after conditioning the test specimen if required. It is recommended to perform the testing at standard climatic conditions of  $(23 \pm 2)$  °C and at relative humidity of  $(50 \pm 5)$  %.

Put the test specimen with the decor side on top on the steel plate (see [4.1.6](#)). Take the test apparatus (see [4.1.2](#)) and put it on the test specimen.

For the first test specimen, fix the adjustable ring with its upper edge at a falling height of 70 mm and lift the handle of the impactor to the ring. Make five impacts on the specimen across to the decor direction or haptic structure. The distance between points of impact shall be at least 20 mm and to the edge or the joint of the test specimen at least 40 mm.

At all impacts, the three feet of the steel base (see [Figure 2](#)) shall be placed on the test specimen.

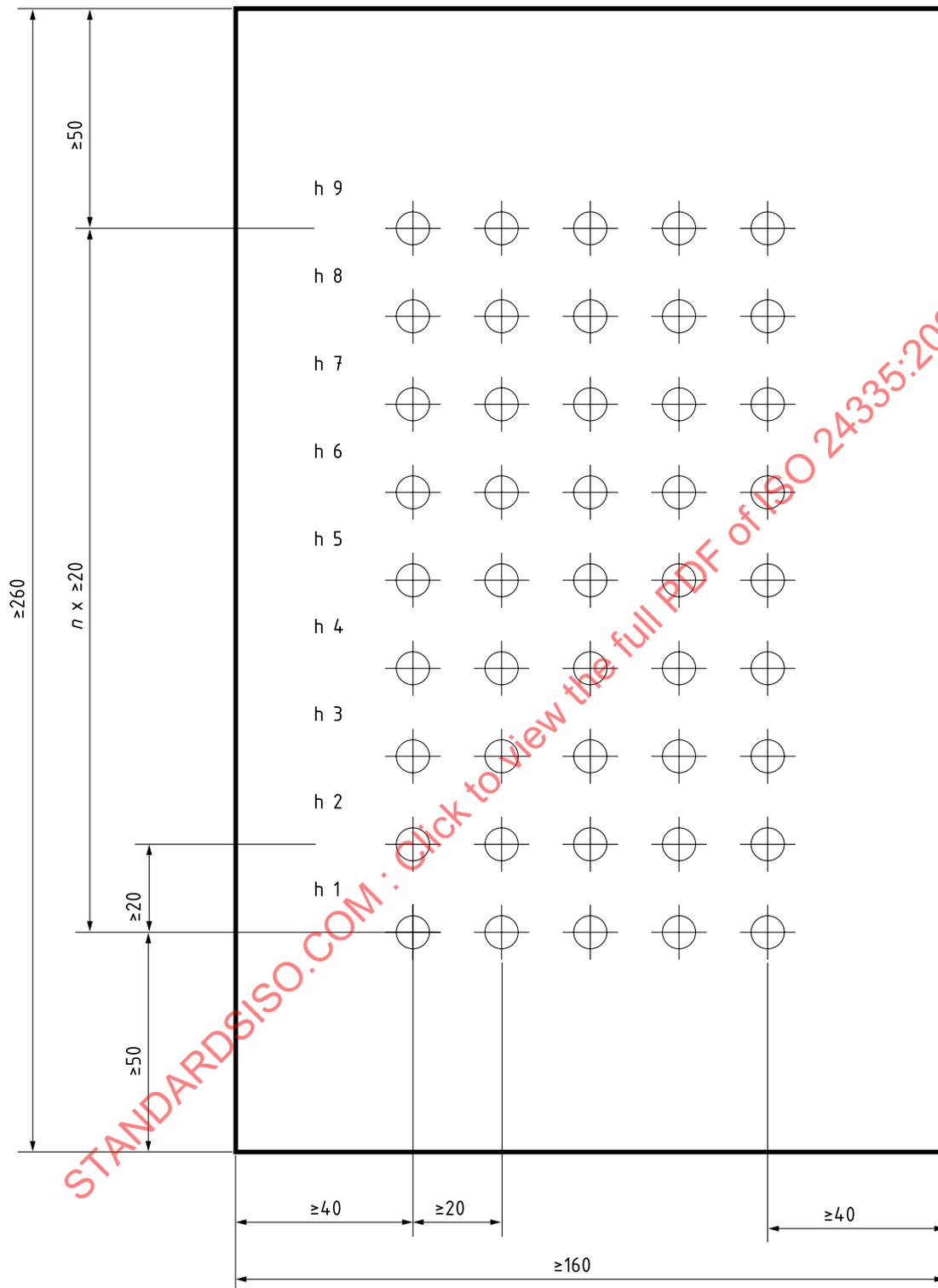
Use a crayon or colouring matter (see [4.1.7](#)) to make possible cracks on the test field visible, remove the residues and examine the five test fields on the test specimen under the diffuse day light source (see [4.1.8](#)) without any additional magnification. The visual assessment shall be carried out with a viewing distance of  $(500 \pm 200)$  mm with different viewings angles by use of diffuse light source (see [4.1.8](#)). The time for the assessment shall be  $\leq 30$  s after marking for all five test fields. The test specimen fails for this falling height if at least one crack is detected.

In case of passing at the tested height, carry out the next test after moving the specimen 20 mm further (the new line of impacts shall be parallel to the previous one, see [Figure 5](#)) with a falling height of 120 mm and repeat the procedure with the five impacts per falling height. Depending on the result (pass or fail), go up or down in 10 mm steps until five of five impacts are without damage.

In case of fail at 70 mm with the first impact, go down in 10 mm steps of falling height and repeat the procedure until five of five impacts are without damage.

Repeat the test with the other four test specimens. The beginning of the test shall be with the determined falling height of the previous test specimen with no damages and shall be continued with increasing or decreasing falling height in 10 mm steps.

Dimensions in millimetres



**Key**

n number of impacts at one force

**Figure 5 — Positioning of the impacts on one test specimen**

**6.1.3 Factors influencing accuracy of the test**

Damaged or flattened impactor heads shall never be used.