INTERNATIONAL STANDARD 1413

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Shock-resistant wristwatches

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FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees. Every Member Body interested in a subject for which a Technical Committee has been set up 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.

Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 1413 was drawn up by Technical Committee ISO/TC 114, *Horology*, and circulated to the Member Bodies in March 1972.

It has been approved by the Member Bodies of the following countries :

Czechoslovakia	Japan	Spain
Egypt, Arab Rep.of	New Zealand	Switzerland
France	Portugal	United Kingdom
Germany	Romania	U.S.S.R.
Italy	South Africa, Rep. of	

No Member Body expressed disapproval of the document.

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Shock-resistant wristwatches

1 SCOPE AND FIELD OF APPLICATION

This International Standard lays down the technical definition of shock-resistant wristwatches and specifies the corresponding test method.

NOTE — This International Standard has been drawn up to provide a product ratification test; it is not applicable for checking each individual watch in production since the test can cause alteration in the rate of the watch, necessitating readjustment even if the minimum requirements have been satisfied.

2 DEFINITION

A wristwatch bearing the mention "shock-resistant" — or any other similar term — shall comply with the minimum requirements described under section 3.

3 MINIMUM REQUIREMENTS

The watch meets with minimum requirements if :

a) it does not stop after the shocks;

b) the residual effect does not exceed 60 seconds per day (60 s/d);

c) an examination of the watch does not reveal any apparent deterioration affecting its performance (bent or displaced hands, impaired automatic device or calendar, etc.) or its appearance (for example, cracked glass).

4 PRACTICAL SIGNIFICANCE

All the operations described are designed to simulate the shock received by a watch on falling accidentally from a height of 1 m on to a horizontal hardwood surface.

5 METHODS OF TESTING

5.1 A wristwatch shall be tested without the bracelet, unless the latter forms an integral part of the watch.

5.2 During the whole test period, the ambient temperature shall be between 18 and 25 °C and shall not vary by more than 2 °C.

5.3 The device used to produce the shock shall be a pendulum impact tester or any other apparatus the construction of which corresponds to the definitions given in section 7.

5.4 Operations

5.4.1 *Observations of rate before shocks*

60 min after maximum winding, the rate shall be successively observed during at least 2 min in each of the following positions :

5.4.1.1 FH (back of case up)

5.4.1.2 6H (6 o'clock up)

5.4.1.3 9H (9 o'clock up)

5.4.2 *1st shock*

The shock shall be directed against the caseband, parallel to the plane of the watch, on the "9 o'clock" side.

5.4.3 *2nd shock*

The shock shall be directed against the glass, perpendicularly to the plane of the watch.

5.4.4 *Observations of rate after shocks*

5 min after the last shock, the rate shall be successively observed during at least 2 min in each of the following positions :

5.4.4.1 FH (back of case up)

5.4.4.2 6H (6 o'clock up)

5.4.4.3 9H (9 o'clock up)

6 RESIDUAL EFFECT

The residual effect is defined by the greatest difference of rates observed, respectively in the three positions described in 5.4.1 and 5.4.4.

7 CHARACTERISTICS COMMON TO ALL TYPES OF APPARATUS

The following characteristics shall be identical for all types of apparatus :

7.1 Impact speed

The impact speed corresponding to an unimpeded fall from a height of 1 m is :

$$V = 4{,}43 \text{ m/s}$$

7.2 Material, dimensions of sabot and mass of hammer

7.2.1 The sabot striking the watch is made of polytetrafluoroethylene.

7.2.2 The total mass of the hammer and sabot is 3 kg minimum.

7.2.3 The dimensions of the sabot (see Figure 1) are :

$a \geqslant 30$ mm

$e \geqslant 10$ mm

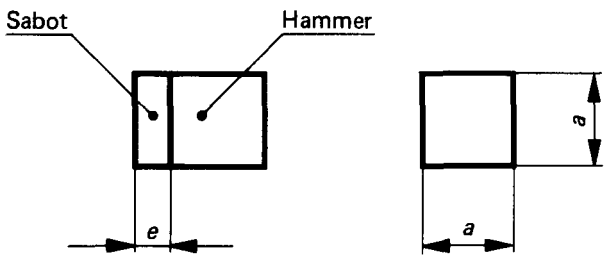

FIGURE 1

7.3 Arresting device applied to the watch after shock

After the shock, the watch travels freely along its trajectory and is gradually arrested by a device which does not inflict any further shock.

8 CHARACTERISTICS PECULIAR TO PENDULUM IMPACT TESTERS

If the device is a pendulum impact tester, it shall be made and used according to the following data :

8.1 Starting position of hammer

The angle α, giving the starting position of the hammer (see Figure 2), may be calculated by means of the formula :

$$\cos\frac{\alpha}{2} = \frac{VT}{4\pi r}$$

where

$V = 4{,}43$ m/s;

T is the period, expressed in seconds;

r is the radius, expressed in metres.

These last two values are determined by the manufacturer of the pendulum impact tester.

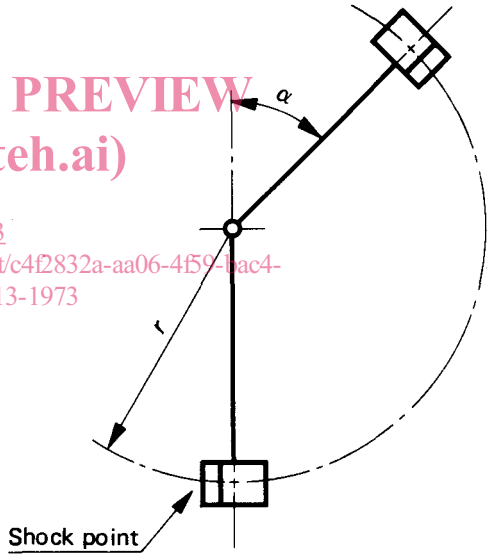

FIGURE 2

The period T represents the duration, expressed in seconds, of one oscillation of low amplitude (see Figure 3) :

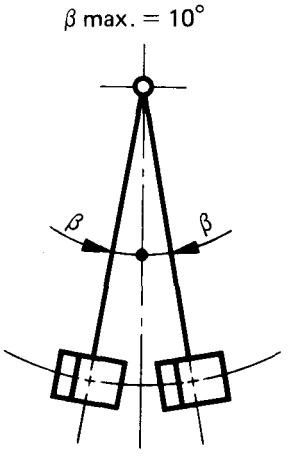

FIGURE 3

8.2 Adequate working check

The check shall be executed with the hammer freely oscillating.

The manufacturer of the pendulum impact tester must state the minimum height *h* (see Figure 4) corresponding to the ascent of the hammer to position B after starting in position A (horizontal). If this height *h* is not reached, the working of the pendulum impact tester must be checked.

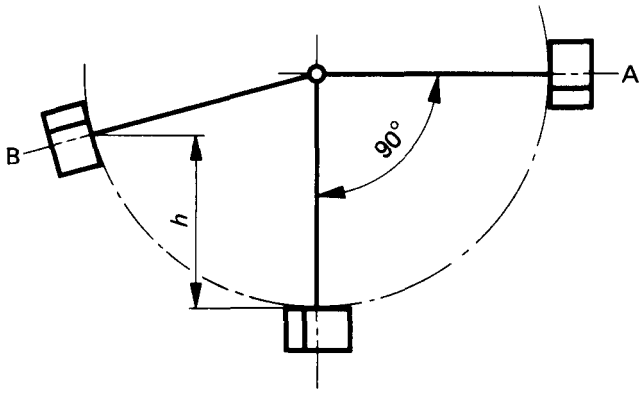

FIGURE 4

8.3 Position of watch

8.3.1 The watch shall be laid freely on its horizontal support to be subjected to the two shocks indicated in 5.4.2 and 5.4.3.

8.3.2 The position occupied by the watch on this support shall be such that the shock is produced at the exact instant when the pendulum passes through its point of stable equilibrium.

8.4 Conditions of shock

8.4.1 At the moment of impact, the face of the sabot entering into contact with the watch shall be vertical and parallel to the vertical plane containing the axis of oscillation of the pendulum.

8.4.2 Periodically, the polytetrafluoroethylene plate striking the watch shall be shifted or ground flat.