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Third edition
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Horology — Water-resistant watches

Horlogerie — Montres étanches

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ISO 2281:1990

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Reference number
ISO 2281:1990(E)

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.

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.

International Standard ISO 2281 was prepared by Technical Committee ISO/TC 114, *Horology*.

This third edition cancels and replaces the second edition (ISO 2281:1984), of which it constitutes a technical revision.

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Introduction

This third edition of ISO 2281 recognizes the technical development of the last years with regard to water-tightness of watches for general use.

It provides for only one definition of the term "water-resistant".

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Horology — Water-resistant watches

1 Scope

This International Standard specifies the requirements and test methods for watches designated as "water-resistant" and marked accordingly, with or without an additional indication of an overpressure. It does not apply to divers' watches, which are specified in ISO 6425¹⁾.

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 2859-1:1989, *Sampling procedures for inspection by attributes — Part 1: Sampling plans indexed by acceptable quality level (AQL) for lot-by-lot inspection.*

3 Designation

Watches bearing the designation "water-resistant" with or without an additional indication of an overpressure are intended for ordinary daily use and are resistant to water during exercises such as swimming for a short period. They may be used under conditions where water pressure and temperature vary. However, whether they bear an additional indication of overpressure or not, they are not intended for submarine diving.

4 Requirements

Watches bearing the designation "water-resistant" shall comply with the requirements given in either 4.1 and 4.3, or in 4.2 and 4.3.

4.1 Resistance to air overpressure

The flow rate of air shall not exceed 50 µg/min.

Testing shall be carried out in accordance with 6.2.1.

4.2 Resistance to water overpressure

There shall be no condensation visible on the inside surface of the glass after conducting the condensation test given in 6.2.2 before and after the tests given in 6.2.3 to 6.2.6.

4.3 Resistance against temperature and mechanical stress

There shall be no condensation visible on the inside surface of the glass after conducting the condensation test given in 6.2.2 before and after the tests given in 6.2.3 to 6.2.5.

5 Sampling

This International Standard may be applied for piece-by-piece inspection or by sampling. In this case, sampling shall be carried out in accordance with ISO 2859-1.

The tests specified in 6.2.3, 6.2.4 and 6.2.5 are compulsory on at least one sample of the examined lot.

1) ISO 6425:1984, *Divers' watches.*

6 Testing

6.1 Test conditions

6.1.1 Before testing, the operative parts shall be operated and set back to their normal position.

6.1.2 Throughout the period of testing, the ambient temperature shall be between 18 °C and 25 °C. The water temperature shall be equal to the ambient temperature except for the test given in 6.2.5.

6.2 Test procedures

The sequence of the tests is optional. The condensation test shall be conducted before the test given in 6.2.3 and at the end of the test sequence. Condensation tests between each specified test are optional.

6.2.1 Resistance to air overpressure

Subject the watch to an air overpressure of 2 bar²⁾ and measure the flow rate of air entering the case.

NOTE 1 Comparable test procedures, for example using inert gases, are permitted.

Watches showing a flow rate of air greater than 50 µg/min do not satisfy the requirements of 4.1, and shall not be subjected to the subsequent tests.

6.2.2 Condensation test

Place the watch on a heating cushion controlled at 40 °C to 45 °C until the temperature of the watch is equal to that of the heating cushion (usually, a heating time of 10 min to 20 min is sufficient, depending on the type of watch). Place a drop of water of 18 °C to 25 °C on the watch glass.

After about 1 min, wipe the glass with a dry rag.

The watch presenting condensation on the inside surface of the glass does not satisfy the requirements of 4.2.

If the watch case was closed in a humidity saturated atmosphere, the condensation test may result in a type of condensation which is not caused by a possible lack of water-tightness of the watch case. If this occurs, the watch shall be dried and shall be re-subjected to the condensation test.

6.2.3 Resistance when immersed in water at a depth of 10 cm

Immerse the watch in water at a depth of (10 ± 2) cm and leave it for 1 h.

6.2.4 Resistance of operative parts

Immerse the watch in water at a depth of 10 cm for 5 min, and apply a force of 5 N perpendicular to the axis of the crown and buttons. See figure 1.

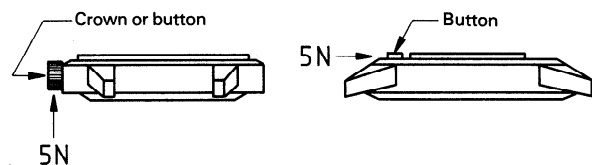


Figure 1

6.2.5 Resistance to different temperatures

Immerse the watch at a depth of 10 cm successively

- in water at 40 °C for 5 min;
- in water at 20 °C for 5 min;
- in water at 40 °C for 5 min;

The transfer time between the immersions shall not exceed 1 min.

6.2.6 Resistance to water overpressure

Immerse the watch completely in an adequate container filled with water. Within 1 min, apply an overpressure equivalent to the indicated value (see 7.2), or to 2 bar in case where no additional indication is given. Maintain this pressure for 10 min. Then reduce the overpressure to the ambient pressure within 1 min.

7 Marking

7.1 Terms

Watches which satisfy the requirements specified in clause 4 shall be marked with one of the following terms in the appropriate language:

- English: water-resistant
- French: étanche
- Russian: водонепроницаемые
- German: wasserdicht

2) 1 bar = 10⁵ Pa

- Japanese: 日常生活用防水
- Chinese: 防水

For the above languages only the expression given shall be used. Equivalent expressions are permitted for other languages, but one only per language.

7.2 Additional Indication

In addition to the term "water-resistant", watches may be marked with an indication of the test overpressure given as a pressure in bar (at least 2 bar) or in the sense of a substitute as a depth in metres (at least 20 m). These indications however do not correspond to a diving depth but refer to the pressure at which the water overpressure test was conducted.

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