BS ISO 22810:2010

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Horology — Water-resistant watches

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National foreword

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The UK participation in its preparation was entrusted to Technical Committee STI/53, Specifications and test methods for jewellery and horology.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Horology — Water-resistant watches

Horlogerie — Montres étanches

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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.

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ISO 22810 was prepared by Technical Committee ISO/TC 114, *Horology*, Subcommittee SC 3, *Water-resistant watches*.

This first edition of ISO 22810 cancels and replaces ISO 2281:1990, which has been technically revised.

Introduction

This International Standard has been drawn up to meet a global demand for specifications for watches resistant to immersion in water and to any form of aquatic environment.

This International standard is a reference. It clarifies the terms used, defines the criteria to be met by the product and specifies the marking which may appear on the product.

It stipulates the tests to be applied in the event of a dispute and leaves to the manufacturer the responsibility for defining the tests (within his area of expertise) which he applies at the production stage to his own products if he wishes to be able to guarantee that they satisfy the requirements of this International Standard.

The manufacturer is responsible for stating whether a specific activity falls within the field of use of a particular watch. Similarly, he defines the warranty conditions and the precautions to be taken to maintain the quality of the watch over an extended period of time.

The notion of immersion defines a depth at which protection against water penetration is guaranteed. However, mention is made of the fact that the quality and permanent nature of the protection will depend, in particular, on the sound construction of the watchcase, on the quality with which it has been made and on the product's history (service actions, shocks, etc.).

Annex A gives the user appropriate recommendations to ensure that use of his watch procures lasting satisfaction. Some useful notions of physics are also included.

Horology — Water-resistant watches

1 Scope

This International Standard establishes the requirements and specifies the test methods used to verify the water resistance of watches.

Moreover, it indicates the marking which the manufacturer is authorized to apply to them.

Divers' watches, specified as such, are covered by ISO 6425 which establishes special requirements.

2 Terms and definitions

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

2.1
water resistance
ability to resist water penetration

2.2
water-resistant watch
watch that resists water penetration

NOTE This International Standard applies to the watch or the watch head.

2.3
overpressure
mechanical strain undergone during immersion, expressed in bar [1)], proportional to the depth of immersion

NOTE Explanations and some useful notions of physics can be found in A.2.1 and A.2.2.

2.4
depth of immersion
vertical distance, expressed in metres, separating the immersed watch from the water surface

3 Requirements

3.1 General

Every water-resistant watch shall satisfy the following requirements.

3.2 Water resistance to overpressure

There shall be no condensation on the internal surface of the glass, as revealed by the condensation test performed in accordance with 4.2 and carried out before and after the test described in 4.3.2.

1) 1 bar = 10^5 Pa = 10^5 N/m^2 and corresponds to 10 m water depth.

3.3 Water resistance at shallow depth

There shall be no condensation on the internal surface of the glass, as revealed by the condensation test performed in accordance with 4.2 and carried out before and after the test described in 4.3.3.

3.4 Water resistance when a strain is placed on the operative components

There shall be no condensation on the internal surface of the glass, as revealed by the condensation test performed in accordance with 4.2 and carried out before and after the test described in 4.3.4.

3.5 Water resistance on exposure to thermal shocks

There shall be no condensation on the internal surface of the glass, as revealed by the condensation test performed in accordance with 4.2 and carried out before and after the test described in 4.3.5.

4 Test methods

4.1 Test conditions

Before performing the tests, the operative components of the watch are actuated and then returned to their normal position.

Throughout the duration of the tests, the ambient temperature is held at between 18 °C and 25 °C and the water temperature is equal to the ambient temperature, except for the test described in 4.3.5.

4.2 Condensation test

The purpose of this test is to verify the water resistance of the watch as follows:

a) place the watch on a heating plate set to between 40 °C and 45 °C until the watch glass reaches the temperature of the plate (in practice, the heating time varies depending on the particular watch);

b) on the glass (see Note 2), place a drop of water or a wet cloth or a wet pad at a temperature between 18 °C and 25 °C;

c) after around 1 min, wipe the glass down with a dry cloth.

A watch which presents condensation on the internal surface of the glass does not satisfy the requirements of this International Standard.

NOTE 1 If the watch has been closed in an atmosphere saturated with humidity, the condensation test can produce a result which is not caused by a defect in water-resistance. If that happens, the watch is dried before undergoing the condensation test again.

NOTE 2 For any type of glass with a thickness of more than 2 mm, the water drop condensation test is not reliable. It is therefore advisable to place a wet cloth or a wet pad onto the watch.

NOTE 3 If condensation is dissipated within 1 min, it is not considered to be a water resistance defect.

4.3 Water resistance tests by immersion

4.3.1 General

The watch is put under strain according to the following four tests.

4.3.2 Water resistance to overpressure

Immerse the watch completely in a suitable container filled with water. Raise the pressure in the container in 1 min to a minimum overpressure of 2 bar. Hold it at this pressure for 10 min. Then, in 1 min, reduce the pressure back down to ambient pressure.

NOTE Higher overpressure values can be specified by the manufacturer and marked on the watch.

4.3.3 Water resistance at shallow depth

Immerse the watch in water to a depth of 10 cm ± 2 cm and keep it there for a minimum of 1 h.

4.3.4 Water resistance when strain is placed on the operative components

Immerse the watch in water to a depth of 10 cm ± 2 cm for 5 min, while applying a force of 5 N to the crown and push-pieces perpendicular to their axis (see Figure 1).

NOTE If applicable, the crown and the push-pieces are screwed on.

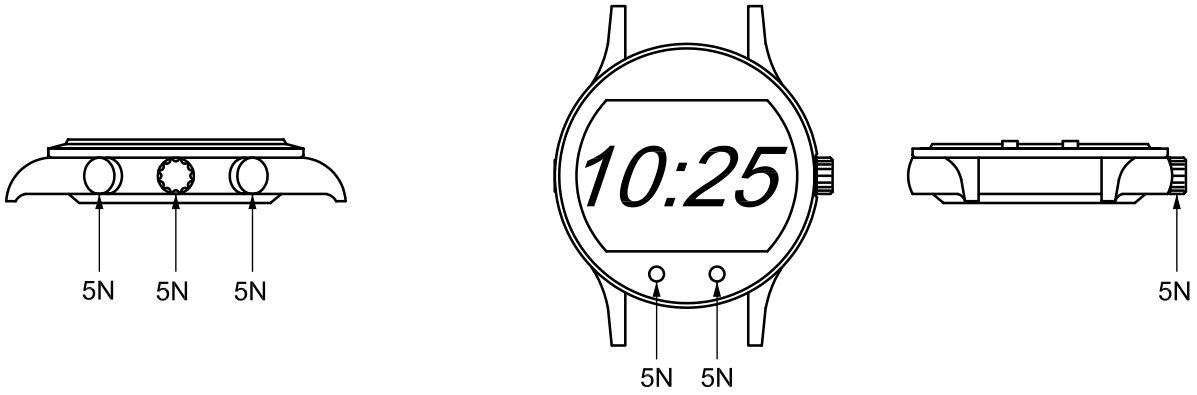

Figure 1 — Examples of crown and push-pieces

4.3.5 Water resistance on exposure to thermal shocks

Immerse the watch in water to a depth of 10 cm ± 2 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 time taken to transfer from one immersion to another shall not exceed 1 min.

4.4 Water resistance test by air overpressure

A preliminary test may be performed on the watch. This will enable a water resistance defect to be detected without jeopardizing its integrity.

Expose the watch to an air overpressure and then measure the flow rate of air penetrating into the case, successively with 2 bar and 0,5 bar.

It is advisable not to perform the water resistance tests by immersion, defined in 4.3, on watches that show a flow rate of air over 50 µg/min.

NOTE The air can be replaced by an inert gas.

This optional preliminary test, introduced as an example, is not a substitute to the water resistance tests by immersion described in 4.3.

5 Marking

5.1 Each watch which satisfies the requirements set out in Clause 3 may be marked, depending on the language, with one of the terms shown below:

— in Chinese: 防水

— in English: water-resistant

— in French: étanche

— in German: wasserdicht

— in Japanese: 日常生活用防水

— in Korean: 방 수

— in Russian: водонепроницаемый

5.2 When the manufacturer specifies a higher overpressure than 2 bar for the test described in 4.3.2, the watch may be marked as follows:

— in Chinese: 防水 *x* bar

— in English: water-resistant *x* bar

— in French: étanche *x* bar

— in German: wasserdicht *x* bar

— in Japanese: 日常生活用防水 *x* bar

— in Korean: 방 수 *x* bar

— in Russian: водонепроницаемый *x* bar

where *x* corresponds to the overpressure applied during the test described in 4.3.2. Only whole numbers are allowed.

The overpressure may be indicated in metres instead of bar.

Annex A
(informative)

Precautions in use and notions of physics

A.1 Precautions in use

To safeguard the characteristics of the watch for an extended period, knowing that water resistance is not a definitive and acquired characteristic, the user is advised to:

— arrange for the water resistance of the watch to be checked by an expert according to the manufacturer's recommendations and in every case after the watch has been opened. In this case, it is recommended that the air overpressure test be performed in accordance with 4.4;

— make sure, on purchasing, that the bracelet is suitable for the intended use;

— avoid exposing the watch to excessively sudden variations of temperature;

— preserve the watch against falls and shocks (arrange for the water resistance to be checked after every violent shock);

— refrain from using the control elements, push-pieces or time-setting crown under water and outside water when the watch is not dry;

— replace securely and screw on (if applicable) the time-setting crown and the push-pieces after every operation;

— rinse the watch in fresh water after use in sea water.

A.2 Notions of physics

A.2.1 Overpressure

When the watchcase is closed, the internal and external pressures are identical. In an air environment, the watch is exposed to atmospheric pressure which varies according to altitude and meteorological conditions.

When the watch is immersed, the external pressure increases with depth, while the internal pressure continues to refer to atmospheric pressure.

The atmospheric pressure augmented by water pressure is referred to as absolute pressure. The pressure exerted by the water is called overpressure.

Variations of atmospheric pressure are minimum and negligible by comparison with the overpressures on immersion. The tests performed according to this International Standard are tests of overpressure.

A.2.2 Conversion rule

In the International System of Units (SI), pressure is expressed in pascal (Pa). A pressure of 1 Pa corresponds to the force of 1 N exerted on a surface area of 1 m^2.

However, the bar is used more commonly because it is better adapted to the watch scale, as 1 bar is 10^5 Pa. Moreover, its value is close to that of atmospheric pressure, which is 1,013 bar at sea level. The bar is not part of the SI system but is accepted for fluids.

The weight per unit of volume of water varies between 0,998 kg/dm^3 (freshwater at 20 °C) and 1,030 kg/dm^3 (typical salt water). The earth's acceleration of gravity is relatively constant with values ranging from 9,780 m/s^2 at the equator to 9,832 m/s^2 at the poles.

Under these conditions, the ratio between depth of immersion and water static pressure does not vary by more than ± 2 %. For the purposes of this International Standard, the relation that 1 bar corresponds to 10 m of water depth can be used.

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[1] ISO 6425, *Divers' watches*

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