International Standard 6425

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Divers' watches

Montres de plongée

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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 6425 was developed by Technical Committee ISO/TC 114, *Horology*.

This second edition was submitted directly to the ISO Council, in accordance with clause 6.11.2 of part 1 of the Directives for the technical work of ISO. It cancels and replaces the first edition (i.e. ISO 6425-1982), which had been approved by the member bodies of the following countries :

Czechoslovakia	Italy	United Kingdom
Egypt, Arab Rep. of	Japan	USSR
France	Romania	
Germany, F. R.	Switzerland	

No member body had expressed disapproval of the document.

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Divers' watches

1 Scope and field of application

This International Standard specifies requirements and test methods for divers' watches.

2 References

ISO 764, *Horology — Antimagnetic watches.*

ISO 1413, *Horology — Shock-resistant watches.*

ISO 2281, *Horology — Water resistant watches.*

ISO 2859, *Sampling procedures and tables for inspection by attributes.*

3 Definition

diver's watch : A watch designed to withstand immersion in water at depths of at least 100 m. (Hereafter referred to as "watch".)

NOTE — Only the full hundreds of metres shall be mentioned for divers' watches.

4 Designation

A watch bearing the designation "diver's watch" in relation to diving depths of 100 m and beyond or any other similar term shall satisfy the minimum requirements laid down in clause 6.

5 Practical meaning

All operations described are intended to simulate conditions in which divers' watches will remain undamaged and operating after immersion at

a) L m of water for t h per day ($\Delta p = \frac{L}{10}$ bar*) :

if $L = 100$, $t = 1$ h per day,

if $L = 200$ and more, $t = 2$ h per day;

followed by

b) 3 m of water for 3 h per day ($\Delta p = 0{,}3$ bar*).

NOTE — L = 100, 200, 300, ... stands for the intended diving depth. Intermediate or inferior diving depths are not allowed (see clause 8).

6 Requirements

6.1 Time pre-selecting device

The watch shall be equipped with a time pre-selecting device for example a bezel ring. Such a device shall be protected against inadvertent rotation and shall function correctly throughout the whole diving range and at the maximum diving depth when tested as described in 7.3.3.

The time pre-selecting device shall be provided with a minute division. The markings indicating every 5 min shall be clearly indicated. Coordination between the markings on the dial if existing and the pre-selecting device shall be provided.

The markings shall be clearly visible against the dial if existing.

6.2 Visibility

The following items of the watch shall be legible at a distance of 25 cm in the dark :

a) indicated time;

b) set time of time pre-selecting device;

c) indication that the watch is running.

6.3 Antimagnetic property

The watch shall be antimagnetic in accordance with the requirements of ISO 764.

* 1 bar = 10^5 Pa = 10^5 N/m^2

6.4 Shock resistance

The watch shall be shock resistant in accordance with the requirements of ISO 1413.

6.5 Salt water resistance

The watch shall be salt water resistant, i.e. after submission to the tests as described in 7.3.3 it shall not show important changes on the case or on the accessories and the moving parts shall continue to function normally.

6.6 Reliability under water pressure

The watch shall function normally and in particular the second hand shall continue to function normally during and after testing as described in 7.3.4.

6.7 Operation in water

The mechanisms to be operated when submerged, for example the time pre-selecting device, lamp switch, shall function correctly when tested as described in 7.3.5.

6.8 Resistance to an external force

6.8.1 Attachments

No item shall become detached from the watch or be displaced when the watch is tested as described in 7.3.1.

6.8.2 Crowns and other setting devices

No condensation shall be observed and the watch shall function normally when tested as described in 7.3.7.

6.9 Resistance to thermal shock

The watch shall be resistant to thermal shock, i.e. it shall not show condensation, and the watch shall function normally when tested as described in 7.3.6.

6.10 Tightness

6.10.1 Tightness at an air overpressure

The watch shall show no air flow exceeding 50 µg/min when tested as described in 7.3.2.

6.10.2 Tightness at a water overpressure

The watch shall show no condensation when tested as described in 7.3.8.

6.11 Resistance to helium atmospheres

It should be noted that use of a watch in atmospheres containing helium may result in the failure of the normal function of the watches.

7 Methods of test

7.1 Type testing and 100 % single watch testing

Testing of the watch is divided in two groups :

- type testing;
- 100 % testing.

Tests for the following requirements shall be conducted as type testing in accordance with ISO 2859 :

- time pre-selecting device;
- visibility;
- antimagnetic property;
- shock resistance;
- salt water resistance;
- reliability under water pressure;
- operation in water;
- resistance to external force (attachments, crowns and setting devices);
- resistance to thermal shock.

The tests for tightness, which include the testing described in 7.3.2 and in 7.3.8, shall be conducted on every watch, i.e. 100 % testing.

7.2 Test procedure

Testing of the watch requires several consecutive tests which gives rise to considerable costs. The procedure given in the table is therefore recommended to reduce these costs.

Table

No.	Test	Sub-clause
1	Visibility	6.2
2	Antimagnetic property	6.3
3	Shock resistance	6.4
4	Resistance of attachments to an external force	7.3.1
5	Tightness at an air overpressure	7.3.2
6	Salt water resistance	7.3.3
7	Time pre-selecting device	7.3.3
8	Reliability under water pressure	7.3.4
9	Operation in water	7.3.5
10	Resistance to thermal shock	7.3.6
11	Resistance of crowns and other setting devices to an external force	7.3.7
12	Tightness at a water overpressure	7.3.8

7.3 Description of tests

7.3.1 Testing the resistance of attachments to an external force

The watch under test shall be subjected to an external force of 200 N as shown in figure 1.

7.3.2 Testing tightness at an air overpressure

All tested watches shall be subjected to an air overpressure of Δp = 2 bar and the flow of air entering the case shall be measured.

Comparable test methods for example with inert gases are permitted.

The watches with a greater flow shall be eliminated from the test immediately.

7.3.3 Testing salt water resistance and time pre-selecting device

The watches under test shall be put in a 30 g/l sodium chloride solution and remain there for 24 h at 23 ± 3 °C. After this test the case and accessories shall be examined for changes. Moving parts, particularly the bezel ring, shall be checked for correct functioning.

7.3.4 Reliability under water pressure

The watches under test shall be immersed in water contained in a suitable vessel. Then an overpressure of $\frac{L + 0{,}25\,L}{10}$ bar shall be applied within 1 min and maintained for 2 h.

7.3.5 Testing of operation in water

The watches under test shall be immersed in water and the mechanisms operated at a depth of 0,3 m.

7.3.6 Testing resistance to thermal shock

The watch under test shall be subjected to the following test cycle when immersed to a depth of 0,3 m in water :

a) immersion in water of 40 ± 2 °C for 10 min;

b) immersion in water of 5 ± 2 °C for 10 min;

c) immersion in water of 40 ± 2 °C for 10 min.

The time of transition from one immersion to the other shall not exceed 1 min.

The condensation test as described in 7.3.9, shall be carried out before and after this test to ensure that the result is related to the above test.

7.3.7 Testing resistance of crowns and other setting devices to an external force

The watches under test shall be subjected to an overpressure in water of $\frac{L + 0{,}25\,L}{10}$ bar for 10 min and to an external force of 5 N as shown in figure 2.

The condensation test as described in 7.3.9 shall be carried out before and after this test to ensure that the result is related to the above test.

Dimensions in millimetres

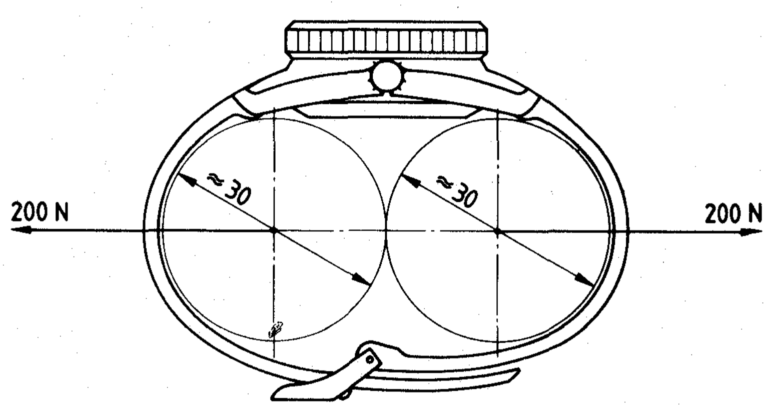

Figure 1

NOTE — The band of the watch under test is clasped by a buckle.

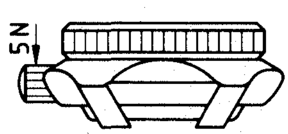

Figure 2

7.3.8 Testing tightness at a water overpressure

All tested watches shall be immersed in water contained in a suitable vessel. Then an overpressure of $\frac{L + 0{,}25\,L}{10}$ bar shall be applied within 1 min and maintained for 2 h. Subsequently the overpressure shall be reduced to 0,3 bar within 1 min and maintained at this pressure for 1 h. The watches shall then be removed from the water and dried with a rag.

The condensation test as described in 7.3.9 shall be carried out before and after this test to ensure that the result is related definitely to the above test.

7.3.9 Testing of condensation

The watches under test shall be placed for 30 min on a heated plate at a temperature of 40 to 45 °C. A piece of felt of 1 cm^2 moistened with water at 18 to 25 °C shall be placed on the glass of the watch. After about 1 min the piece of felt shall be removed quickly and the glass wiped with a dry rag.

The watches which show condensation on the interior surface of the glass shall be excluded from further tests.

NOTE — Instead of the piece of felt a drop of water may be used for this test.

8 Marking

For the marking of watches which satisfy the requirements of clause 6, the following terms may be used in the respective languages :

— English : Diver's watch L m;

— French : Montre plongeur L m, or montre de plongée L m;

— Russian : водонепроницаемые Lm.

An abbreviated designation "diver's L m" or "plongeur L m" may be used.

Similar terms in other languages are admissible.

NOTE — The letter L stands for the intended diving depths. For the diving depth of a watch only the full hundreds of meters are admitted, for example 100, 200, 300, 400. The inscription of an intermediate diving depth is not allowed.

Water-resistant watches for less than 100 m depth are not divers' watches.