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Horology — Magnetic resistant watches

Horlogerie — Montres antimagnétiques

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

The main task of technical committees is to prepare International Standards. 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.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 764 was prepared by Technical Committee ISO/TC 114, *Horology*, Subcommittee SC 12, *Antimagnetism*.

This third edition cancels and replaces the second edition (ISO 764:1984), which has been technically revised.

Annex A forms a normative part of this International Standard.

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Horology — Magnetic resistant watches

1 Scope

This International Standard specifies the minimum requirements and test methods for magnetic resistant watches.

It is based on the simulation of an accidental exposure of a watch to a direct current magnetic field of 4 800 A/m.

Annex A deals with watches designated as magnetic resistant with an additional indication of intensity of a magnetic field exceeding 4 800 A/m.

2 Normative reference

The following normative document contains provisions which, through reference in this text, constitutes provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the normative document indicated below. For undated references, the latest edition of the normative documents referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 3158:1976, *Timekeeping instruments — Symbolization of control positions*

3 Terms and definitions

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

3.1

magnetic resistant watch

watch designed to withstand a homogeneous and continuous magnetic field of 4 800 A/m

3.2

residual effect

difference of rates observed under the conditions of test specified in this International Standard

4 Designation

A watch bearing the designation “magnetic resistant” is intended for usual daily use. Its running shall not be disturbed by an accidental exposure to a direct current magnetic field of 4 800 A/m.

5 Minimum requirements

5.1 General

Watches bearing the designation “magnetic resistant” or any other similar term shall meet the requirements specified in 5.2 and 5.3.

5.2 Running in a magnetic field

The watch shall not stop during the magnetic resistance test described in 6.3.2.

For a quartz watch equipped with multiple motors, no motor shall stop during the magnetic test described in 6.3.2.

5.3 Residual effect for a mechanical watch

5.3.1 The residual effect shall not exceed 30 s per day for a watch whose movement has a casing diameter exceeding 20 mm or an area exceeding 314 mm².

5.3.2 The residual effect shall not exceed 45 s per day for a watch whose movement has a casing diameter not exceeding 20 mm or an area not exceeding 314 mm².

6 Test methods

6.1 Test conditions

6.1.1 A wrist-watch shall be tested without the bracelet, unless the latter forms an integral part of the watch.

6.1.2 Throughout the test period, the ambient temperature shall be in the range of 23 °C ± 5 °C and shall not vary by more than 2 °C.

6.2 Testing apparatus

The testing apparatus used shall produce a homogeneous and continuous magnetic field of an intensity of 4 800 $\frac{0}{400}$ A/m (admissible variations during the test ± 1 %) in the three directions specified in 6.3.2.

6.3 Testing procedure

6.3.1 Checking of the rate before the magnetic resistance test

The first measurement shall be taken 1 h after maximum winding for mechanical watches. The rate shall be checked for at least 1 min in position CH, in accordance with ISO 3158. The checking is made by using an apparatus for measuring the instantaneous rate.

This procedure applies only to mechanical watches.

6.3.2 Magnetic resistance test

6.3.2.1 Place the watch on the stand as intended in the test machine, in position CH.

6.3.2.2 Set the test machine in motion and check that the magnetic field has reached the required intensity. Observe the running of the watch for 1 min, during which time it shall undergo the effect of a magnetic field according to one of the following specified axes. For quartz watches equipped with a motor having an interval of impulses of 20 s or more, observe the running of the watch during five motor runs instead of during 1 min. Reduce the intensity of the magnetic field progressively, and then stop the test machine.

For mechanical watches, this procedure is carried out in three separate phases, i.e. for each direction of the magnetic field, in the following order:

- in the axis parallel to the surface of the watch, with the magnetic field in the direction 3 h → 9 h;
- then in the direction 6 h → 12 h; and lastly

— in the axis perpendicular to the surface of the watch.

For quartz watches, this procedure is carried out for each critical direction of the magnetic field.

NOTE The critical directions are directions for which maximum sensitivity is observed for quartz watches. Quartz watches equipped with two or more motors may have plural critical directions for each of their motors and this will be taken into account at the time of the test.

6.3.2.3 Carefully remove the watch from the stand.

6.3.3 Checking of the rate after the magnetic resistance test

The rate shall be checked for at least 1 min in position CH. The checking is made using an apparatus for measuring the instantaneous rate.

This procedure applies only to mechanical watches.

6.4 Residual effect

The residual effect shall be calculated from the differences of rates observed under the conditions specified in 6.3.1 and 6.3.3.

7 Marking

NOTE 1 In addition to terms used in the three official ISO languages (English, French and Russian), this International Standard gives the equivalent terms in German, Japanese and Chinese; they are published under the responsibility of the member bodies for Germany (DIN), Japan (JISC) and China (SACS).

Watches meeting the minimum requirements specified in clause 5 may be marked with the following terms in each of the respective languages:

- in English: “magnetic resistant”
- in French: “antimagnétique”
- in Russian: “антимагнитные”
- in German: “antimagnetisch”
- in Japanese: “耐磁”
- in Chinese: “防磁”

Equivalent terms in other languages are admissible.

NOTE 2 The designation “antimagnetic” and the abbreviation “mag resist” in English may be used on the manufacturer's own responsibility.

Annex A (normative)

Magnetic resistant watches with an additional indication

A.1 General

It is recognized that magnetic field environments in daily life have changed due to an increase in equipment generating strong magnetic fields. However, technical developments have made it possible for magnetic resistant watches to withstand strong magnetic fields.

Consequently, watches designed to withstand strong magnetic fields shall successfully undergo the tests specified in this annex and be designated as "magnetic resistant" with an additional indication of the intensity of the magnetic field to which they can resist.

A.2 Designation

Watches bearing the designation "magnetic resistant" with an additional indication of the intensity of the magnetic field are intended for usual daily and professional use. Their running shall not be disturbed even in a strong magnetic environment such as, for example, in the case of close proximity with goods generating a high magnetic field.

Values of additional indication of intensity of the magnetic field shall be selected at 16 000 A/m, 40 000 A/m and above.

A.3 Minimum requirements

Watches bearing the designation "magnetic resistant" or any other similar term with an additional indication of the intensity of the magnetic field shall meet the requirements specified in clause 5.

A.4 Test methods

A.4.1 Test conditions

The test conditions are specified in 6.1.

A.4.2 Testing apparatus

The testing apparatus used shall produce a homogeneous and continuous magnetic field in the three directions specified in 6.3.2.

The intensity of the direct current magnetic field produced shall correspond to the value of additional indication (see A.2). Allowable minimum intensity shall be 92 % of the above values. Admissible variation of the intensity of direct current magnetic field during the test shall be ± 1 %.

A.5 Testing procedure

Testing procedure is given in 6.3.