
International Standard



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Aircraft — Magnetic indicators — Part 1 : Characteristics

Aéronefs — Indicateurs magnétiques — Partie 1: Caractéristiques

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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.

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. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 5065/1 was prepared by Technical Committee ISO/TC 20, *Aircraft and space vehicles*.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

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Aircraft — Magnetic indicators — Part 1 : Characteristics

1 Scope and field of application

1.1 This part of ISO 5065 specifies the general operating characteristics and standardization principles of magnetic indicators in aircraft.

1.2 This part of ISO 5065 lays down the basic requirements relating to the mechanical and electrical characteristics of magnetic indicators as well as the basic environmental conditions in service.

1.3 ISO 5065/2 gives details of the tests referred to in this part of ISO 5065.

NOTE — In order for magnetic indicators to be considered in conformity with ISO 5065, it is necessary to prepare a detail specification for the specific types. Detail specifications will be published as subsequent parts of ISO 5065 and will deal with the following aspects:

- a) sufficiently dimensioned drawings to ensure interchangeability;
- b) the degree of severity of the specified tests;
- c) drawings and illustrations of the gauges and tools necessary for the tests;
- d) a complete description of the connector type based upon the specifications laid down in IEC Publication 130-1;
- e) a complete table of samples, tests and frequencies of these tests, in order to ensure the maintenance of the quality and the inspection levels for all aspects of manufacture and production;
- f) a declaration of the performances and restrictions of use.

2 References

ISO 1966, *Crimped joints for aircraft electrical cables*.

ISO 5065/2, *Aircraft — Magnetic indicators — Part 2: Tests*.

IEC Publication 130-1, *Connectors used for frequencies below 3 MHz — Part 1: General requirements and measuring methods*.

3 Definitions

For the purposes of ISO 5065, the following definitions apply.

3.1 magnetic indicator: Display device having a mobile sector in which two or more predetermined conditions are achieved by electromagnetic control. The display may be provided with integral lighting.

3.2 magnetic indicator with screw mounting (type A): Magnetic indicator provided with two mounting lugs designed to be attached to a panel by means of screws.

3.3 front-panel-mounted magnetic indicator (type B): Magnetic indicator and related panel mounted assembly allowing the indicator to be installed and removed from the front of the panel.

3.4 mobile sector: Rotating element of the magnetic indicator showing the required displays.

3.5 pin; male contact: Contact suitable for mating with appropriate female contact (socket).

3.6 socket; female contact: Contact suitable for accommodating appropriate male contact (pin).

3.7 crimped contact: Contact where the barrel is designed to be physically compressed (deformed) around the conductor in order to establish a good electrical and mechanical contact.

3.8 barrel: Part of the contact designed to accommodate the cable conductor.

3.9 sealing plug: Insulated pin of suitable shape and size which is used to seal unused cable inlets.

3.10 retention of the contacts in the insert: Axial force which a contact can resist without undergoing permanent movement inside the insert.

3.11 insert: Insulating element designed to support and position contacts.

3.12 verification of data: Certification that the specimens are in conformity with the details indicated on the drawings.

3.13 type approval¹⁾: Decision by the proper authority (the customer himself or his nominee) that the manufacturer can be considered able to produce components in reasonable quantities meeting the relevant specification.

3.14 type [qualification] tests¹⁾: All the tests to be carried out on a number of specimens representative of the type of component of one manufacturer, with the object of determining whether the manufacturer can be considered able to produce components meeting the relevant specification.

Section one : Design requirements

4 Environmental conditions

4.1 Temperature range

Magnetic indicators shall operate satisfactorily over the ambient temperature range from -40 to $+90$ °C. After storage (unoperated) over the temperature range from -50 to $+110$ °C, they shall satisfy the requirements of tests Nos. 7 and 8 specified in ISO 5065/2.

4.2 Altitude

Magnetic indicators shall be suitable for use at altitudes up to 21 336 m.

4.3 Presentation

Magnetic indicators shall be designed and constructed in such a way as to allow the display to be read when viewed at an angle of 40° to the axis passing through the centre of the indicator perpendicular to the plane of the display face. The glass shall be treated to reduce reflections. There shall be no light leakage at an angle of less than 40° to the axis.

No portion of an unrequired display shall be visible when the indicator is viewed from any position within the 40° cone.

4.4 Vibration, acceleration and resistance to thermal shock

Magnetic indicators shall be designed and constructed in such a way as to satisfy the test requirements of tests Nos. 6, 12 and 13 specified in ISO 5065/2.

4.5 Explosion proofness

Magnetic indicators satisfying the requirements of ISO 5065 do not normally constitute an explosion risk.

4.6 Salt spray

The materials, finish and construction of magnetic indicators shall be such that they are sufficiently resistant to deterioration caused by salt spray to satisfy the requirements of test No. 10 specified in ISO 5065/2.

4.7 Sand and dust

Compliance with the requirements of ISO 5065 with respect to the resistance to deterioration caused by dust is not man-

datory, but when it is specifically required by the user, or claimed by the manufacturer, magnetic indicators shall satisfy the test requirements of test No. 21 specified in ISO 5065/2.

4.8 Damp heat

Magnetic indicators shall be designed and constructed in such a way as to resist any deterioration caused by damp heat in order to satisfy the requirements of test No. 9 specified in ISO 5065/2.

4.9 Magnetic effect

Magnetic indicators shall be designed and constructed in such a way as to satisfy the requirements of test No. 15 specified in ISO 5065/2 and the compass safe distance shall not exceed 305 mm.

4.10 Mechanical shocks

Magnetic indicators shall be designed and constructed in such a way that they are not damaged when subjected to the mechanical shocks of test No. 14 specified in ISO 5065/2.

4.11 Temperature and altitude

Magnetic indicators shall be designed and constructed in such a way that they are not damaged when subjected to test No. 17 specified in ISO 5065/2.

4.12 Resistance to fluids

Magnetic indicators shall be designed and constructed in such a way that they are not damaged when subjected to test No. 18 specified in ISO 5065/2.

4.13 Fungus resistance

Magnetic indicators shall be designed and constructed in such a way that they are not damaged when subjected to test No. 19 specified in ISO 5065/2.

4.14 Drip test

Magnetic indicators shall be designed and constructed in such a way that they are not damaged when subjected to test No. 20 specified in ISO 5065/2.

1) As defined in IEC Publication 130-1.

5 Mechanical specifications

5.1 Inserts

The inserts of magnetic indicators shall provide an insulating support suited to the cable and shall be able to hold all the contacts corresponding to the maximum cable size the type of which is specified by the manufacturer.

5.2 Contacts

5.2.1 The removable contacts shall be of the crimped type and shall conform to the detail specification.

5.2.2 The hardness of the crimped part of the barrel of the contacts shall be within the range of 60 to 110 HV or shall ensure the operating characteristics specified when crimped with a tool having indentors complying with the requirements of the detail specification (see 9.2).

The crimped part of the barrel of the contacts shall also have an inspection hole to ensure correct insertion of the cable conductor in the barrel.

5.2.3 Devices shall be provided to lock the contacts axially in the insert.

5.3 Sealing

5.3.1 Magnetic indicators shall be drip-proof and shall satisfy the requirements of test No. 20 specified in ISO 5065/2.

5.3.2 The sealing plugs specified by the manufacturer shall be used in all unwired cable inlets.

5.4 Life

Magnetic indicators shall satisfy the requirements of test No. 11 specified in ISO 5065/2.

6 Electrical specifications

6.1 Voltage and current

6.1.1 Magnetic indicators shall be classified according to the supply and consumption characteristics of their coils:

Category 1: from 17 to 31 V continuous rating between – 40 and + 90 °C

Category 2: from 22 to 31 V continuous rating between – 40 and + 90 °C

They shall meet the requirements of test No. 4 specified in ISO 5065/2 with respect to supply voltage and current consumption.

6.1.2 Magnetic indicators with integral lighting shall meet the requirements of test No. 4 specified in ISO 5065/2 with respect to supply voltage and current consumption.

6.2 Insulation resistance

Magnetic indicators shall meet the requirements of test No. 5 specified in ISO 5065/2.

6.3 Supply polarity

If the magnetic indicator is polarity sensitive, this shall be stated by the manufacturer and clearly marked on the indicator case.

7 Marking

7.1 Contact position identification

7.1.1 Position and identification of the contacts shall be specified by the magnetic indicator manufacturer.

7.1.2 The markings identifying the contacts shall be legible and in clear contrast to the colour of the insert.

7.2 Magnetic indicator identification

The identification and the electrical scheme of the magnetic indicator shall be legible and indelible; they shall appear on the casing.

7.3 Display markings

All markings used by the displays shall be as specified by the manufacturer of the indicator type and shall meet the full environmental requirements of the indicator.

8 Installation

8.1 Mounting style

Mounting style shall be as detailed by the manufacturer and shall be of two types:

- a) by means of screws passing through the panel to lugs attached to the indicator case;
- b) by jacking screw attachment to a suitable panel-mounted rack assembly.

8.2 Panel thickness

Depending on the position of the mounting lugs, a panel thickness not exceeding 8,6 mm shall be accommodated for screw-mounted magnetic indicators. Panel-mounted assemblies for front removal type indicators shall be suitable for a panel thickness from 1,5 to 3,5 mm.

8.3 Mounting centres

The design of magnetic indicators shall be such that they can be mounted on panels with no restriction on their mounting centres other than that determined by their physical size. Under these conditions the operation of one indicator shall not adversely affect the operation of adjacent magnetic indicators.

9 Tools

9.1 Contact insertion and extraction tools

If tools are necessary for the insertion and extraction of contacts, their use shall not adversely affect the characteristics specified in this part of ISO 5065. These tools shall preferably be non-metallic and shall not require lubrication in order to make a satisfactory insertion.

9.2 Crimping tools

Crimping tools shall be suitable for crimping as specified in ISO 1966.

Section two : Type approval testing

10 Sampling for type tests

10.1 For the type approval of any range of magnetic indicators, a number of samples shall be chosen representing all variations in the range (e.g. mobile sector with two positions, three positions, categories 1 and 2 coils). The selection shall be subject to agreement by the national approval body and shall be incorporated as an appendix to the detail specification (see note in clause 1).

Each sample or specimen shall consist of a complete set of parts. Sampling shall be carried out on 12 specimens from the same batch of parts (see 13.1).

10.2 All the contacts of specimens Nos. 1, 4, 7 and 10 shall be wired with the maximum cable dimension which is specified for the indicator.

All the contacts of specimens Nos. 2, 5, 8 and 11 shall be wired with the minimum cable dimension which is specified for the indicator.

Specimens Nos. 3, 6, 9 and 12 shall have about 25 % of the cable inlets sealed by the sealing plugs and the remainder shall be wired with the minimum cable dimension which is specified for the indicator.

10.3 For the type approval test, suitable lengths of the appropriate type of cable shall be used. A cable of the same generic type shall be used for all the specimens. The type of cable used shall be stated in the test reports.

10.4 For the approval of the use of magnetic indicators with other types of cable, supplementary tests may be required by the national approval body.

10.5 The specimens shall be submitted to the tests in the order indicated in the table.

Any practical difficulties experienced in assembling or wiring the magnetic indicator shall be referred to in the test and approval report.

11 Test conditions

Unless otherwise specified, all tests shall be carried out in normal temperature, pressure and humidity conditions, i.e.:

- temperature: between 15 °C and 35 °C;
- atmospheric pressure: 86 to 106 kPa
(860 to 1 060 mbar);
- relative humidity: between 45 % and 80 %.

12 Test methods

12.1 Measurements

When measurements are required, the precise values obtained shall be recorded in the type test report.

12.2 Mounting

When mounting is specified, the magnetic indicator shall be rigidly mounted on a metal plate by means of the normal attachment. The material and dimensions of the plate shall be such that no indicator is mounted closer than 20 mm to the edge of the plate.

12.3 Contacts

When individual tests on the contacts are specified, the tests shall be carried out on each contact.

13 Test details

13.1 Verification of data

13.1.1 Each part of the batch (see 10.1) shall be checked to verify that it is, in all aspects, in conformity with the manufacturing drawings.

13.1.2 The interchangeability features of each magnetic indicator shall be verified or established to the satisfaction of the inspection body.

13.1.3 After the tests have been completed, all specimens shall be examined from the point of view of the legibility of the marking (see 7.2 and 7.3).

13.2 Tests

The following tests, which are detailed in ISO 5065/2, shall be carried out for type approval:

Title of test	Test No.
Contact insertion force	1
Contact extraction force and mechanical endurance	2
Contact retention in the insert	3
Supply voltage and current consumption	4
Insulation resistance	5
Thermal shock	6
Low and high temperature operation	7
Extreme storage temperature	8
Damp heat (humidity)	9

Salt spray	10
Life	11
Acceleration	12
Vibration	13
Mechanical shock	14
Magnetic effect	15
Luminance	16
Temperature and altitude	17
Resistance to fluids	18
Fungus resistance	19
Drip test	20

13.3 Optional test

If required, a sand and dust test shall be carried out in accordance with test No. 21 specified in ISO 5065/2.

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