



Government of India

Civil Aviation Department  
Directorate General of Civil Aviation  
Aircraft Engineering Directorate  
New Delhi

ITSO-C7d

Effective  
Date: xx-xx-2014

# Indian Technical Standard Order

**Subject: Direction Instrument, Magnetic Non-Stabilized Type (Magnetic Compass)**

1. **PURPOSE:** This Indian Technical Standard Order (ITSO) is for manufacturers of Direction Instrument, Magnetic Non-Stabilized Type (Magnetic Compass) applying for an ITSO authorization (ITSOA).
2. **APPLICABILITY:** This ITSO is effective from the date of its issue.
3. **REQUIREMENTS:** This Indian Technical Standard Order (ITSO) prescribes the Minimum Performance Standard (MPS) that direction instruments, magnetic non-stabilized type (magnetic compass) must meet in order to be identified with the marking of this ITSO.
  - a. **Functionality:** The instrument indicates the magnetic heading during flight in all possible position combinations and sequences. The electromagnetic fields of the aircraft including its electronic devices may cause deviation in the magnetic heading. The deviation can be adjusted to a certain extent by the compensators inside the instrument. A deviation correction card is attached adjacent to the magnetic compass in the aircraft.
  - b. **Failure Condition Classifications.** There is no standard minimum failure condition classification for this ITSO. The failure condition classification appropriate for the equipment will depend on the intended use of the equipment in a specific aircraft. Document the loss of function and malfunction failure condition classification for which the equipment is designed.
  - c. **Functional Qualification:** Demonstrate the required functional performance under the test conditions specified in SAE standard AS398B, "Direction Instrument, Magnetic Non-Stabilized Type (Magnetic Compass)," dated 01<sup>st</sup> July 2001, as modified by Appendix-1 of this ITSO.
  - d. **Environmental Qualification:** Demonstrate the required performance under the test conditions specified in section 5 of AS398B, using standard environmental conditions of sections 3.3, 5, 6 and 7 of this standard, appropriate for the airborne equipment. The procedures of RTCA/DO-160G, *Environmental Conditions and Test Procedures*, dated December 8, 2010 may be used provided the same are appropriate for the subject equipment.

- e. **Deviations:** The DGCA has provisions for alternative or equivalent means of compliance to the criteria in this ITSO. Manufacturers invoking these provisions must demonstrate that they maintain an equivalent level of safety and must apply for a deviation as per CAR21.610.

#### 4. **MARKING:**

- a. Mark at least one major component permanently and legibly with all the information in CAR 21.609(e) / 21.807 (a) & (b). The marking must include the serial number.
- b. Also, mark the following permanently and legibly, with at least the manufacturer's name, sub-assembly part number and the ITSO number:

- (1) Each component that is easily removable (without hand tools); and
- (2) Each sub-assembly of the article that you determined may be interchangeable.

#### 5. **APPLICATION DATA REQUIRMENTS:**The applicant must submit to DGCA (AED), a Statement of Compliance (Form CA-35 of CAR-21) along with documents required under CAR 21.605 and one copy each of the following technical data in support of design and production approval:

- a. A manual (s) containing the following:

- (1) Operating instructions and article limitations sufficient to describe the equipment's operational capability.
- (2) Describe in detail any deviations.
- (3) Installation procedures and limitations sufficient to ensure that the Magnetic Compass, when installed according to the installation or operational procedures, still meets this ITSO's requirements. Limitations must identify any unique aspects of the installation. The limitations must include a note with the following statement:

“This article meets the minimum performance and quality control standards required by Indian technical standard order (ITSO). Installation of this article requires separate approval.”

- (4) A summary of the test conditions used for environmental qualifications for each component of the article.
- (5) Schematic drawings and wiring diagrams, and any other documentation necessary for installation of the magnetic compass.
- (6) List of replaceable components, by part number that makes up the

magnetic compass. Include vendor part number cross-references, when applicable.

- b.** Instructions covering periodic maintenance, calibration and repair for continued airworthiness of the magnetic compass. Include recommended inspection intervals and service life, as appropriate.
- c.** A drawing depicting how the article will be marked with the information required by paragraph 4 of this ITSO.
- d.** Identify functionality or performance contained in the article not evaluated under paragraph 3 of this ITSO (i.e. Non-TSO/ITSO functions). Non-TSO/ITSO functions are accepted in parallel with the ITSO authorisation. For those non-TSO/ITSO functions to be accepted, applicant must declare these functions and include the following information with ITSO application:
  - (1)** Description of the non-TSO/ITSO function(s), such as performance specifications, failure condition classifications, software, hardware, and environmental qualification levels. Include a statement confirming that the non-TSO/ITSO function(s) does not interfere with the article's compliance with the requirements of paragraph 3.
  - (2)** Installation procedures and limitations sufficient to ensure that the non-TSO/ITSO function(s) meets the declared functions and performance specification(s) described in paragraph 5. d.(1).
  - (3)** Instructions for continued performance applicable to the non-TSO/ITSO function(s) described in paragraph 5.d.(1).
  - (4)** Interface requirements and applicable installation test procedures to ensure compliance with the performance data defined in paragraph 5.d.(1).
  - (5)** Test plans, analysis and results, as appropriate, to verify that performance of the hosting ITSO article is not affected by the non-TSO/ITSO function(s).
  - (6)** Test plans, analysis and results, as appropriate, to verify the function and performance of the non-TSO/ITSO function(s) as described in paragraph 5.d.(1).
- e.** The quality system description required by subpart G or Subpart F of CAR 21, including functional test specifications. The quality system should ensure that holder of ITSOA will detect any change to the approved design that could adversely affect compliance with MPS of this ITSO, and reject the article accordingly. (Not required for LODA Applicants).
- f.** Material and process specifications list.

- g. List of all drawings and processes (including revision level) that define the article's design.
- h. Manufacturer's ITSO qualification report showing results of testing accomplished according to paragraph 3.c of this ITSO.

**NOTE:** ITSOA holders applying for FAA's Letter of TSO Design Approval (LODA) must submit the above data (excluding paragraph 5.e.) to FAA through DGCA.

**6. MANUFACTURER DATA REQUIREMENTS:** In addition to the above application data, each manufacturer must make the following technical data available to DGCA (AED) for review:

- a. Functional qualification specifications for qualifying each production article to ensure compliance with this ITSO.
- b. Article calibration procedures.
- c. Schematic drawings.
- d. Wiring diagrams.
- e. Material and process specifications.
- f. The results of the environmental qualification tests conducted according to paragraph 3.d of this ITSO.
- g. If the article contains non-TSO/ITSO function(s), applicant must also make available items 6.a through 6.f pertaining to the non-TSO/ITSO function(s).

**7. FURNISHED DATA REQUIREMENTS:**

- a. If furnishing one or more articles manufactured under this TSO to one entity (such as an operator or repair station), provide one copy or on-line access to the data in paragraphs 5.a and 5.b of this ITSO. Add any other data needed for the proper installation and continued airworthiness of the magnetic compass with this ITSO.
- b. If the article contains declared non-TSO function(s), include one copy of the data in paragraphs 5.d.(1) through 5.d.(4).

**8. HOW TO GET REFERENCED DOCUMENTS:**

- (1) Copy of SAE AS 398B may be purchased from the Society of Automotive Engineers Inc., Department 331 and 400 Commonwealth Drive, Warrendale Pennsylvania 15096. Copies can also be ordered on-line through web site: [www.sae.org](http://www.sae.org)
- (2) RTCA documents may be purchased from: Radio Technical Commission for Aeronautics, Inc. 1150 18th Street NW, Suite 910, Washington, D.C. 20036-USA. Copies can also be ordered on-line through web site: [www.rtca.org](http://www.rtca.org)

- (3) CAR 21 is available on DGCA website [www.dgca.nic.in](http://www.dgca.nic.in). Hardcopy of CARs may be obtained from:

The English Book Store  
17-L, Connaught Circus, New Delhi-110001(India)

(Lalit Gupta)  
Joint Director General  
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**APPENDIX-1**

- (a.) Sections 3.1, 3.1.1, 3.1.2, and 3.2 of AS 398B are excluded from this ITSO.
- (b.) Substitute the following for section 7 of AS 398B:

ENVIRONMENT QUALIFICATION TESTS: The following tests, in addition to any other deemed necessary by the manufacturers, shall be the basis for determining compliance with the performance requirements under environmental conditions specified therein;