
International Standard



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Aircraft — Terminal junction systems — Part 1 : Characteristics

Aéronefs — Systèmes de raccordement à modules amovibles — 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 8668/1 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 — Terminal junction systems — Part 1 : Characteristics

1 Scope and field of application

1.1 This part of ISO 8668 specifies the general operating characteristics and standardization principles of terminal junction systems in aircraft. It does not define a specific pattern for the connection system from the point of view of dimensions, but lays down limits for the design and performance for each system.

1.2 This part of ISO 8668 lays down the basic requirements for the mechanical structure and electrical performances of terminal junction systems as well as the basic environmental conditions in service.

1.3 ISO 8668/2 gives details of the tests referred to in this part of ISO 8668.

NOTE — In order for a series of terminal junction systems to be considered in conformity with ISO 8668, it is necessary to prepare a detail specification for each specific type of system. Detail specifications will be published as subsequent parts of ISO 8668 and will deal with the following aspects:

- a) sufficiently dimensioned drawings to ensure interchangeability;
- b) environmental conditions, electrical performance and mechanical requirements;
- c) drawings and illustrations of the gauges and tools necessary for the tests;
- d) a complete description of the type designations;
- e) type approval tests, type approval maintenance tests, production acceptance tests and production quality tests, together with the frequency of testing and severity of inspection levels;
- f) a declaration of performances and restrictions of use;
- g) any restrictions or variances from the general characteristic requirements stated in this part of ISO 8668.

2 References

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

ISO 2100, *Aircraft — Electrical connectors — Tests*.

ISO 7137, *Aircraft — Environmental conditions and test procedures for airborne equipment*.¹⁾

ISO 8668/2, *Aircraft — Terminal junction systems — Part 2: Tests*.

3 Definitions

For the purposes of ISO 8668, the following definitions apply.

3.1 terminal junction system: An assembly of removable modules, mounted in a frame, and splices using common crimped contacts attached to the wires being connected.

3.2 module: Connection device consisting of one or more groups of non-removable contacts, arranged in cavities in an insulating casing, connected together according to a pre-established interconnection diagram and designed to accept removable crimp contacts.

A module may be either a feed-back or feed-through type.

3.3 removable module: Module, either feed-back or feed-through, designed so that it may be positioned, moved and removed from the frame in order to achieve or modify the composition of a terminal junction system.

3.4 feed-back module: Module with all contact cavities on the same side of the module.

3.5 feed-through module: Module with contact cavities on opposite sides of the module.

3.6 removable elements: Accessories generally associated with the modules, such as end plate, module clamp, etc.

1) Endorsement, in part, of the publication EUROCAE ED-14A/RTCA DO-160A (a document published jointly by the European Organisation for Civil Aviation Electronics and the Radio Technical Commission for Aeronautics).

3.7 group of contacts: Bussed assembly of non-removable contacts in a module.

3.8 interconnection diagram (of a module); bussing arrangement: Electrical arrangement of the group or groups of contacts within a module.

3.9 frame; rail; track: In general, metal component of specified shape constituting both the device for mounting the modules and the removable elements and the device for fixing the assembly.

3.10 module clamp: Appropriate device with lateral tightening, generally made of metal, used to strengthen the attachment of an assembly of modules to the frame.

3.11 end plate: Removable wall, intended to be placed at each end of assembly of juxtaposed modules in a frame.

3.12 spacer: Removable barrier made from insulating material intended to be inserted between two modules to ensure supplementary insulation between them.

3.13 in-line junction; disconnect splice: Device with non-removable contacts in an insulated housing designed for incorporation into a wire harness.

3.14 size (of a contact): All those contacts the dimensions of which are in accordance with one control drawing.

3.15 rated current (of a contact): The permissible current between two adjacent interconnected contacts of the same size under normal atmospheric conditions.

Section one : Design requirements

4 Environmental conditions

4.1 Temperature range

Terminal junction systems shall be classified as follows, according to the maximum hot spot temperature for which they are intended:

Class 1: - 55 to + 155 °C

Class 2: - 55 to + 175 °C

Class 3: - 65 to + 200 °C

NOTE — The temperature is the only classification stipulated in this International Standard.

4.2 Altitude

Terminal junction systems shall be suitable for use at altitudes up to 31 000 m.

4.3 Sealing (immersion at low air pressure)

Terminal junction systems shall be designed and constructed in such a way as to satisfy the requirements of test No. 14 specified in ISO 8668/2.

4.4 Vibration, acceleration and resistance to climatic conditions

Terminal junction systems shall be designed and constructed in such a way as to satisfy the requirements of tests Nos. 9, 10 and 11 specified in ISO 8668/2.

4.5 Flammability

Terminal junction systems, in conformity with the specifications of ISO 8668, shall not constitute a fire hazard.

4.6 Resistance to fluids

Terminal junction systems and their accessories shall be designed so as to resist the fluids used in aircraft and to meet the requirements of test No. 18 specified in ISO 8668/2.

The applicable fluids shall be stated in the detail specification.

4.7 Salt spray

The materials, finish and construction of terminal junction systems shall be such that they are sufficiently resistant to deterioration caused by salt spray to satisfy the requirements of test No. 16 specified in ISO 8668/2.

4.8 Dust

Compliance with the requirements of ISO 8668 with respect to the resistance to deterioration caused by dust is not mandatory, but when it is specifically required by the user, or claimed by the manufacturer, terminal junction systems shall satisfy the requirements of test No. 23 specified in ISO 2100.

4.9 Magnetic effect

It shall be stated in the detail specification whether terminal junction systems and their accessories are designed to satisfy the test requirements of ISO 7137.

5 Mechanical specifications

5.1 Sealing grommets

The sealing grommets of terminal junction systems shall provide an insulating support and shall seal, to the requirements specified in ISO 8668, the maximum and minimum outside diameter of cable specified in the detail specification.

5.2 Contacts

5.2.1 The 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 all the contacts shall be within the range of 60 to 110 HV or shall give specified performance when crimped with a tool having indentors complying with the requirements of the detail specification (see 8.2).

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

5.2.3 A means shall be provided integral to the module and splice to lock the inserted crimp contact axially.

5.3 Sealing (immersion at low air pressure)

5.3.1 Terminal junction systems shall be watertight (immersion at low air pressure, see test No. 14 in ISO 8668/2) at all points on the removable module and splice, including the cable inlet.

5.3.2 Sealing plugs shall be specified by the detail specification.

6 Electrical specifications

6.1 Voltage

The working voltage of terminal junction systems between contacts and between groups of contacts in a normal combination of environmental conditions (specified in clause 10) shall be at least 350 V d.c. or a.c. peak.

The modules shall satisfy the requirements of test No. 4 specified in ISO 8668/2.

6.2 Current

Contacts of sizes 22, 20, 16 and 12 shall be capable of receiving standard conductors of dimensions not greater than the nominal size of the contact. Individual contacts, when mounted in the module or splice, shall be capable of carrying the appropriate cable bunch rating under equivalent conditions.

6.3 Insulation resistance

The modules and splices shall satisfy the requirements of test No. 3 specified in ISO 8668/2.

6.4 Contact resistance

The modules and splices shall satisfy the requirements of test No. 5 specified in ISO 8668/2.

7 Marking

7.1 Contact position identification

7.1.1 In the absence of an agreement with the national approval body, the positioning and identification of the contacts shall be in conformity with 7.1.2, 7.1.3, 7.2 and 7.3.

7.1.2 Each group of contacts shall be marked. This marking shall be in clear contrast to the colour of the sealing grommet and, in addition, it shall be legible when the modules are mounted on the frame.

7.1.3 When the modules are mounted on the frame, a system of marking shall allow the position of each contact to be identified.

7.2 Module and splice identification

The identification of the modules and splices shall be legible and indelible; it shall appear on the casing.

7.3 Frame identification

The frame shall be identified in an indelible way on one of its lateral sides.

8 Tools

8.1 Contact insertion and extraction tools

If tools are necessary to insert and extract the contacts, their use shall not adversely affect the characteristics specified in this part of ISO 8668. These tools shall preferably be non-metallic and shall not require lubricating in order to make a satisfactory insertion.

8.2 Crimping tools

Crimping tools shall be such that they produce a crimp joint performance which complies with the requirements laid down in ISO 1966.

Section two : Type approval testing

9 Sampling for type tests

9.1 For the type approval of any range of terminal junction systems, a number of samples shall be chosen representing all variations in the range (e.g. size of module, class, arrangement

of contacts), together with all variations in accessories. The selection shall be subject to agreement by the national approval body and shall be included as an appendix to the detail specification (see note in clause 1).

Each sample shall consist of a complete assembly of the components making up the specimen. Prepare 12 specimens (plus four specimens per specified fluid) made up from the same batch of components (see 12.1).

A specimen shall consist of a frame fitted with a certain number of modules. As the detached components are often common to several assemblies, it is permitted for a single one of these components to be included in the composition of the specimen to be verified.

9.2 All the contacts of specimens Nos. 1, 2, 5, 6, 11 and 12 shall be connected with wire of maximum external diameter.

For specimens Nos. 3, 4, 7, 8, 9, 10, 13, 14 and 15, the contacts shall be wired with minimum diameter wire in 75 % of the cavities and 25 % sealing plugs in the remainder of cavities.

9.3 For the type approval test, suitable lengths of the appropriate type of wire shall be used. Wire of the same generic type shall be used for all the specimens. The type of wires used shall be stated in the test reports.

9.4 For the approval of the use of terminal junction systems with other types of wire, supplementary tests may be required by the national approval body.

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

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

10 Test conditions

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

- temperature: between 15 and 35 °C;
- atmospheric pressure: 86 to 106 kPa (860 to 1 060 mbar);
- relative humidity: not greater than 80 %.

11 Test methods

11.1 Measurements

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

11.2 Mounting

When mounting is specified, the specimens shall be rigidly mounted on a metal plate by means of the normal attachment. The dimensions of the plate shall exceed those of the contours of the specimens.

11.3 Contacts

When individual tests on the contacts are specified and there are more than five identical contacts in the same specimen, the number of contacts tested shall be equal to 10 % of the total number of contacts, the minimum being five contacts.

12 Test details

12.1 Verification of data

12.1.1 Each component of the batch (see 9.1) shall be checked to verify that it is, in all respects, in conformity with the manufacturing drawings and with the detail specification.

12.1.2 The interchangeability features of each assembly shall be verified or established to the satisfaction of the inspection body.

12.1.3 After the tests have been completed, all specimens and accessories shall be examined from the point of view of the legibility of the marking (see 7.2 and 7.3) which shall be visible to the naked eye.

12.2 Tests

The following tests, which are detailed in ISO 8668/2, shall be carried out for type approval:

Title of test	Test No.
Contact insertion force	1
Insulation resistance	3
Voltage	4
Contact resistance	5
— low voltage	5a
— rated current	5b
Thermal shock	6
Contact extraction force and mechanical endurance	7
Contact retention in the insulator	8
Mechanical shock	9
Vibration	10
Climatic	11
Endurance at maximum temperature	12
Damp heat, steady-state	13
Immersion at low air pressure	14
Ozone	15
Salt spray	16
Contact resistance stability	17
Resistance to fluids	18
Flammability	19

Table – Type approval test schedule

Test No.	Title of test	Specimen number						
		1	3	5	7	9	11	13-14
		2	4	6	8	10	12	15
Test sequence ¹⁾								
1	Contact insertion force	1	1	1	1	1	1	1
3	Insulation resistance	2	2	2	2	2	2	2
		8	8					
			11	6	6	6		
4	Voltage	3	3	3	3	3	3	3
			12			7		6
5a	Contact resistance, low voltage	4	4	4	4	4	4	4
			7			10		
5b	Contact resistance, rated current	5	9		7			
		7						
6	Thermal shock	6						
7	Contact extraction force and mechanical endurance	9						
8	Contact retention in the insulator	10						
9	Mechanical shock		5					
10	Vibration		6					
11	Climatic		7					
12	Endurance at maximum temperature			5				
13	Damp heat, steady-state				5			
14	Immersion at low air pressure			10		5		
15	Ozone					8		
16	Saline mist					9		
17	Contact resistance stability						5	
18	Resistance to fluids							5
19	Flammability			8	8			

1) The test sequence for a particular specimen is indicated in the relevant vertical column.

Example:

Specimens Nos. 3 and 4 would be tested in the following order:

- 1st test: No. 1 – Contact insertion force.
- 2nd test: No. 3 – Insulation resistance.
- 3rd test: No. 4 – Voltage.
- 4th test: No. 5a – Contact resistance, low voltage.
- 5th test: No. 9 – Mechanical shock.
- 6th test: No. 10 – Vibration.
- 7th test: No. 11 – Climatic.
- 8th test: No. 3 – Insulation resistance.
- 9th test: No. 5b – Contact resistance, rated current.
- 10th test: No. 14 – Immersion at low air pressure.
- 11th test: No. 3 – Insulation resistance.
- 12th test: No. 4 – Voltage.