

INTERNATIONAL  
STANDARD

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**8668-6**

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**Aircraft — Terminal junction systems —**

**Part 6:**

Detail specification for type 4 system

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*Aéronefs — Systèmes de raccordement à modules amovibles —*

*Partie 6: Spécification détaillée pour le système du type 4*

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Reference number  
ISO 8668-6:1994(E)

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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.

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.

International Standard ISO 8668-6 was prepared by Technical Committee ISO/TC 20, *Aircraft and space vehicles*, Subcommittee SC 1, *Aerospace electrical requirements*.

ISO 8668 consists of the following parts, under the general title *Aircraft* — *Terminal junction systems*:

- Part 1: *Characteristics*
- Part 2: *Tests*
- Part 3: *Detail specification for type 1 system*
- Part 4: *Detail specification for type 2 system*
- Part 5: *Detail specification for type 3 system*
- Part 6: *Detail specification for type 4 system*

Annexes A, B and C form an integral part of this part of ISO 8668.

# Aircraft — Terminal junction systems —

## Part 6:

### Detail specification for type 4 system

#### 1 Scope

This part of ISO 8668 specifies the specific characteristics of a Terminal Junction System (TJS), designated as type 4 and particularly designed for aircraft applications. It shall be read in conjunction with ISO 8668-1 and ISO 8668-2.

ISO 8668-2:1986, *Aircraft — Terminal junction systems — Part 2: Tests.*

MIL-I-81969:1982, *Connector and electrical contact — General specification for installing and removing tools.*<sup>1)</sup>

#### 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 8668. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 8668 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 1966:1973, *Crimped joints for aircraft electrical cables.*

ISO 7137:1992, *Aircraft — Environmental conditions and test procedures for airborne equipment.*

ISO 8668-1:1986, *Aircraft — Terminal junction systems — Part 1: Characteristics.*

#### 3 Requirements

##### 3.1 Description

This part of ISO 8668 defines a range of multicontact connecting devices, comprising terminal junctions with their associated rails, electronic modules, grounding junctions and studs, wire in-line junctions and electronic in-line junctions, for d.c. and a.c. low-frequency use in aircraft and airframe applications. These devices form part of a common interconnecting wiring system. The devices are environmentally sealed and the removable single wire crimp-type contacts are of female form. The contacts are inserted and removed by use of the appropriate tools. Each group of contacts within a device is clearly marked and, when used with its appropriate rail, terminal and distribution junctions, has individual markings for each contact.

1) May be obtained from:

Naval Publications and Forms Center  
5801 Tabor Avenue  
Philadelphia, PA 19120  
USA

A range of terminal junction frames is provided for housing the modules. The frames are of aluminium alloy with anodised finish and are marked in such a way that when modules are mounted, every individual contact is uniquely identified. Individual terminal junction modules are removable and insertable from their frames using the appropriate removal tool. Grounding junctions (a device in which individual wires may be terminated to a common bus, which is in turn attached to a grounding plate or stud, and then attached to the airframe or equipment) also have unique contact marking. In-line junctions may form part of a cable loom or be separately mounted. Contacts for the above devices are available in four sizes, 22, 20, 16 and 12, and use insertion/removal tools and crimping

tools as used for a common interconnecting wiring system.

The devices are designed to operate over a temperature range of  $-65\text{ }^{\circ}\text{C}$  to  $+200\text{ }^{\circ}\text{C}$ , to be light in weight, and are capable of satisfactory performance during or after subjection to the defined environmental conditions.

Electronic modules and special individual modules have a reduced performance and reference should be made to the individual specification sheet.

The terminal junction system shall comprise the components given in table 1 and design details shall be in accordance with figures A.1 to A.23.

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**Table 1 — Terminal junction system components**

Specification sheet No. (see annex A)	ISO 8668-6:1994 Component
8668-6AA	Bussing modules, feed-back
8668-6BB	Distribution modules
8668-6CC	Electronic modules
8668-6DD	Grounding modules
8668-6EE	Grounding studs
8668-6FF	Wire in-line junctions
8668-6GG	In-line electronic junctions
8668-6HH	Rack assembly, rail, feed-back type
8668-6JJ	Module mounting brackets
8668-6KK	Module extraction tools
8668-6LL	Contacts, female, crimp-removable
8668-6MM	Sealing plugs
8668-6NN	Insertion and extraction tools
8668-6PP	Crimping tools

## 3.2 Ratings

### 3.2.1 Electrical

#### 3.2.1.1 Current

Table 2 gives the current rating.

**Table 2 — Current rating**

Contact size	Maximum test current at 25 °C <sup>1)</sup>
	A
22	5
20	7,5
16	13
12	13

1) For largest size of conductor accommodated by contact.

The continuous current rating of any contact or group of contacts is governed by the heating effects of the electric loading and ambient temperature.

Devices may have any combination of electric loading and ambient temperature, provided the housing insert or contact temperature does not exceed + 200 °C.

#### 3.2.1.2 Voltage

Table 3 gives the voltage rating.

**Table 3 — Voltage rating**

Voltage rating	Sea level	Altitude
	101,1 kPa	3 kPa (24 000 m)
	V	V
Working voltage, nominal, d.c. or a.c. peak	600	300
Proof voltage, d.c. or a.c. peak	1 500	600

NOTE — The establishment of an electrical safety factor is the responsibility of the user.

#### 3.2.2 Environmental

- a) Temperature range: – 65 °C to + 200 °C
- b) Altitude: 24 km

- c) Low air pressure: ISO 8668-2:1986, test No. 14 (immersion at 1 kPa)
- d) Vibration: ISO 8668-2:1986, test No. 10 (10 Hz to 2 000 Hz, 10g, duration 12 h)
- e) Mechanical shock: ISO 8668-2:1986, test No. 9 [981 m/s<sup>2</sup> (100g), duration 6 ms]
- f) Climatic test: ISO 8668-2:1986, test No. 11
- g) Salt spray: ISO 8668-2:1986, test No. 16
- h) Flammability: test under consideration
- i) Magnetic effect: to satisfy the test procedure given in ISO 7137-3.1
- j) Resistance to fluids: ISO 8668-2:1986, test No. 18

The wired specimens shall be subjected to immersion in the fluids specified for fluid susceptibility, test procedure ISO 7137-1.6, for the time and temperature conditions stated therein.

- k) Endurance

temperature: 1 000 h at 200 °C

mechanical: complies with ISO 8668-2:1986, test No. 7, except that the number of insertions and extractions shall be 100.

## 3.3 Characteristics

- a) Module frames: see annex A, Sections HH and JJ of this part of ISO 8668.
- b) Accessories: contacts and sealing plugs: see annex A, Section LL of this part of ISO 8668. Contacts must comply with annex C.
- c) Tools: crimping, insertion and extraction: see annex A, Sections PP and NN.
- d) Electrical
  - 1) Maximum contact resistance: ISO 8668-2:1986, test No. 5 (see table 4)
  - 2) Minimum insulation resistance: ISO 8668-2:1986, test No. 3
    - initially, 5 000 MΩ
    - after conditioning, 100 MΩ

e) Mechanical

- 1) Contact retention force: ISO 8668-2:1986, test No. 8 (see table 5)
- 2) Contact insertion force: ISO 8668-2:1986, test No. 1 (see table 6)
- 3) Contact resistance stability: ISO 8668-2:1986, test No. 17 (see table 7)

f) Conductor accommodation and wire seal (see table 8)

**Table 4 — Contact resistance**

Contact size	Resistance
	mΩ
22	5
20	4
16	3
12	2

**4 Test methods**

**4.1 Type approval**

This shall be in accordance with ISO 8668-1:1986, Section 2.

**4.1.1 Measurement group**

The range of samples chosen to represent terminal junction systems is shown in annex B.

Each different component of the samples chosen shall be measured to verify that it complies with the manufacturing drawings.

Each sample shall consist of a complete assembly from the verified components.

The interchangeability characteristics of each sample shall be verified.

**4.1.2 Test group**

**4.1.2.1 Bussing modules**

A specimen shall consist of four fully wired modules, one of each contact size, mounted in their associated rail. See annex B.

**4.1.2.2 Grounding junctions**

A specimen shall consist of four fully wired modules, one of each contact size, mounted in a mounting plate representing aircraft practice. See annex B.

**4.1.2.3 Wire in-line junctions**

A specimen shall consist of four fully wired in-line junctions, one of each contact size, mounted in the form of a loom representing aircraft practice. See annex B.

**Table 5 — Contact retention force**

Contact size	Maximum retention force
	N
22	44
20	67
16	111
12	111

**Table 6 — Contact insertion force**

Contact size	Maximum insertion force
	N
22	45
20	68
16	68
12	68

**Table 7 — Contact resistance stability**

Contact size	Maximum variation
	mΩ
22	2,5
20	1,75
16	1,25
12	1

**Table 8 — Wire size**

Contact size	Wire size AWG	Finished wire outside diameter mm	
		min.	max.
		22	26, 24, 22
20	24, 22, 20	1,01	2,10
16	20, 18, 16	1,65	2,76
12	14, 12	2,46	3,60



#### 4.1.2.4 Electronic junctions and blocks

Qualification of dimensional and material requirements may be by similarity to a qualified bussed component. Electronic junctions shall be rated at the electronic component level or the bussed junction level whichever has the lesser requirement.

#### 4.1.3 Wiring of specimens

Annex B shows the components to be used to make up a specimen.

Specimens 1, 2, 3, 7, 9 and 11 shall be wired with extruded sheath PTFE wire of maximum external diameter.

Specimens 4, 5, 6, 8, 10, 12, 13, 14, 15, 16, 17 and 18 shall be wired with extruded sheath PTFE wire of minimum external diameter for 75 % of the cavities, and sealing plugs shall be fitted to the remaining 25 % of cavities.

Specimens with wired contacts, the contact resistance of which are to be measured, shall be submitted to the special preparations defined, in ISO 8668-2:1986, annex A.

#### 4.1.4 Contacts

The contacts used for testing shall be taken from batches tested to and complying with annex C.

#### 4.1.5 Sealing plugs

Sealing plugs shall be in accordance with annex A, Section MM.

#### 4.1.6 Crimping

The tools used for crimping the wires to the contacts shall produce crimped joints complying with ISO 1966.

#### 4.1.7 Test conditions

These shall be in accordance with ISO 8668-1:1986, clause 10.

#### 4.1.8 Measurements

When measurements are necessary, the precise figures obtained shall be noted in the type approval test report.

#### 4.1.9 Test details

Subject the test specimens to their tests concurrently. Specimens 1 to 12 shall be subjected to the tests stated and in the order shown in the table of type approval tests of ISO 8668-1:1986. Specimens 13 to 18 shall be used for immersion in fluids and shall be subjected to tests 1, 3, 4, 5a, 18, 4 and 3, in that order, of the same table.

Fluids and temperatures of immersion are as stated in 3.2.2.

#### 4.2 Production tests

Production control tests comprise the production acceptance 100 % test and batch sampling tests.

##### 4.2.1 Acceptance tests, 100 % inspection

Each component shall be examined visually without magnification. Construction, workmanship, finish and marking shall comply with the requirements of the manufacturing drawings.

a) Internal electrical continuity: ISO 8668-2:1986, test No. 2

b) Withstanding voltage: ISO 8668-2:1986, test No. 4

##### 4.2.2 Batch sampling tests

To be applied on a sampling basis lot by lot.

a) Insulation resistance: ISO 8668-2:1986, test No. 3

b) Contact resistance: ISO 8668-2:1986, test No. 5a

c) Contact retention: ISO 8668-2:1986, test No. 8

#### 4.3 Quality control tests

Quality control tests consist of repeated qualification approval tests, omitting those tests which are for initial approval only, namely, ozone, resistance to fluids, and flammability.

##### a) Group 1

To be applied not later than 18 months after type approval testing and thereafter at intervals of 3 years. Carry out the tests described for specimen numbers 1 and 2 of the table of type approval tests of ISO 8668-1:1986.

Prepare a certified test report.

b) **Group 2**

To be applied 6 months after the commencement of Group 1 tests and thereafter at intervals of 3 years. Carry out the tests described for specimens 7 and 8 of the table of type approval testing of ISO 8668-1:1986.

Prepare a certified test report.

c) **Group 3**

To be applied 6 months after the commencement of Group 2 tests and thereafter at intervals of 3 years. Carry out the tests described for specimens 3 and 4 of the table of type approval tests of ISO 8668-1:1986.

Prepare a certified test report.

d) **Group 4**

To be applied 6 months after the commencement of Group 3 tests and thereafter at intervals of 3 years. Carry out the tests described for specimens 9 and 10 of the table of type approval tests of ISO 8668-1:1986, but exclude test No. 15 (ozone).

Prepare a certified test report.

e) **Group 5**

To be applied 6 months after the commencement of Group 4 tests and thereafter at intervals of 3 years. Carry out tests described for specimens 5 and 6 of the table of type approval tests of ISO 8668-1:1986, but exclude test No. 19 (flammability).

Prepare a certified test report.

f) **Group 6**

To be applied 6 months after the commencement of Group 5 tests and thereafter at intervals of 3 years. Carry out tests described for specimens 11 and 12 of the table of type approval tests of ISO 8668-1:1986.

Prepare a certified test report.

g) **Measurement group**

After the completion of Group 6 tests, repeat the tests described in 4.1. Use one sample of each contact size of bussing module, grounding junction, in-line junction and one rail size.

**4.4 Certified test records**

Certified test records shall be prepared.

**4.5 Declaration of performance**

A declaration of performance and restrictions of use shall be prepared by the manufacturer for the whole range of devices on completion of type approval testing.

**5 Designation**

This terminal junction system shall be known as ISO 8668 for type 4 systems.

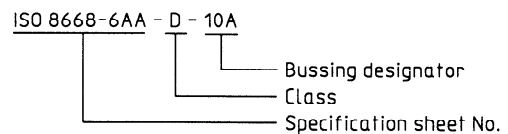
**6 Marking, packaging and ordering**

**6.1 Marking**

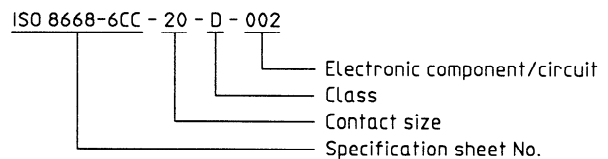
Each component of the terminal junction system shall be legibly and permanently marked with the appropriate part number.

Terminal junction system reference numbers shall be as follows:

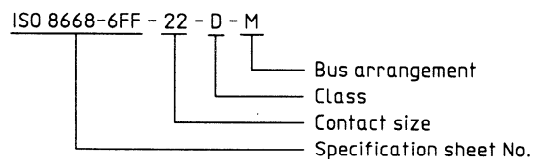
a) Bussing blocks



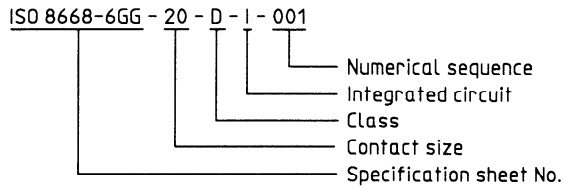
b) Electronic blocks



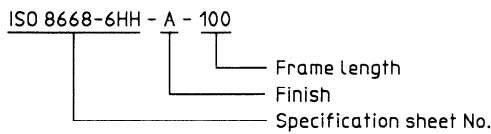
c) Wire in-line junctions



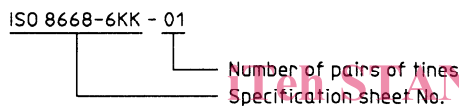
d) In-line electronic junctions



e) Rail assemblies



f) Block extraction tools



Insertion/extraction tools, contacts and sealing plugs shall be protected with a semi-rigid container that prevents bending or other damage, such as plating abrasion during shipment or storage.

Rail assemblies shall be packed as separate items to the same standard as terminal junction modules.

The following information shall be permanently marked or readable through the package:

- a) type of component;
- b) part number;
- c) manufacturer's name.

Assembly instructions, including wire preparation, crimping and contact replacement, shall be included in the packaging if requested. Alternatively, modules, rails and accessories may be marked and packaged as specified in the contract or purchase order.

6.3 Ordering information

The following information shall be given when ordering parts in accordance with this part of ISO 8668:

- a) the individual reference numbers described in 6.1;
- b) details of marking which may be required in addition to that specified;
- c) requirements for the provision of assembly instructions.

6.2 Packaging

Each individual device shall be enclosed and sealed in a transparent thermoplastic bag with characteristics equal to or better than those of 350 gauge polyethylene.

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## Annex A (normative)

### Specification sheets

This annex consists of the following sections:

AA Bussing modules, feed-back

BB Distribution modules

CC Electronic modules

DD Grounding modules

EE Grounding studs

FF Wire in-line junctions

GG In-line electronic junctions

HH Rack assembly, rail, feed-back type

JJ Module mounting brackets

KK Module extraction tools

LL Contacts, female, crimp-removable

MM Sealing plugs

NN Insertion and extraction tools

PP Crimping tools

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## A.1 Section AA: Bussing modules, feed-back

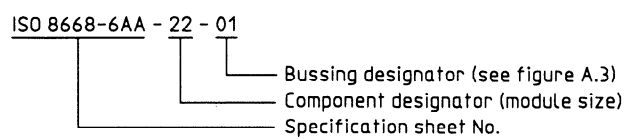
### A.1.1 Requirements

This specification sheet No. ISO 8668-6AA gives the complete requirements for acquiring the module described in figures A.1 to A.3 and tables A.1 and A.2.

### A.1.2 Designation

A bussing module that meets the requirements of this part of ISO 8668 shall be designated by this specification sheet No., component designator and bussing designator.

#### EXAMPLE



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Dimensions in millimetres

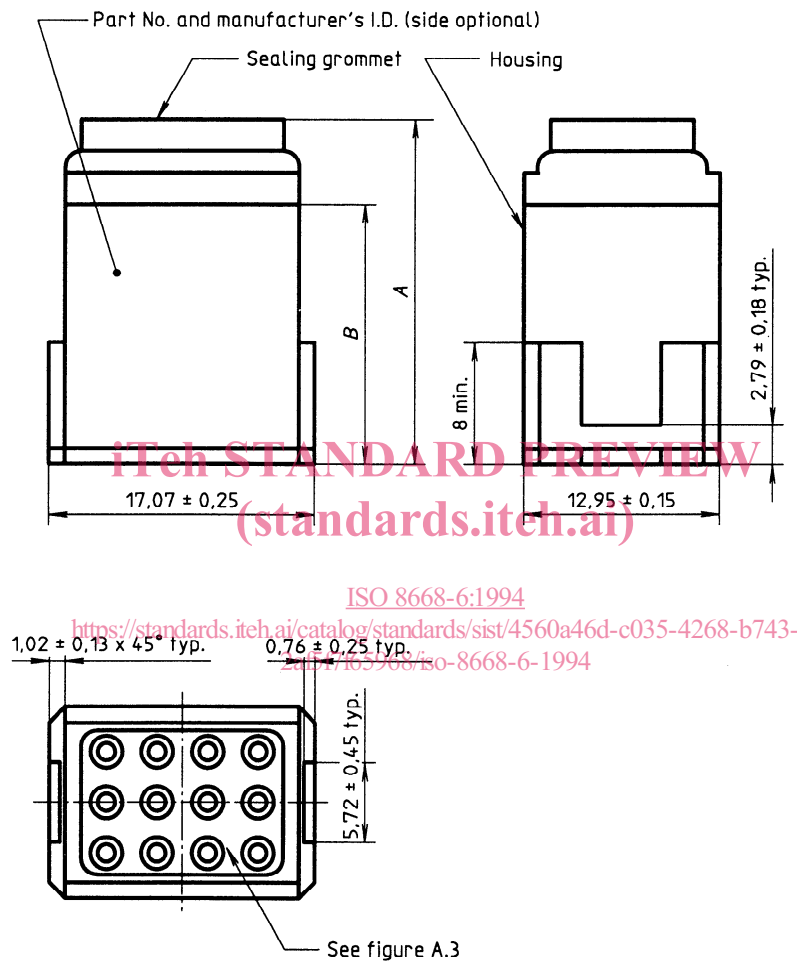


Figure A.1 — Module sizes 22, 20 and 16

Dimensions in millimetres

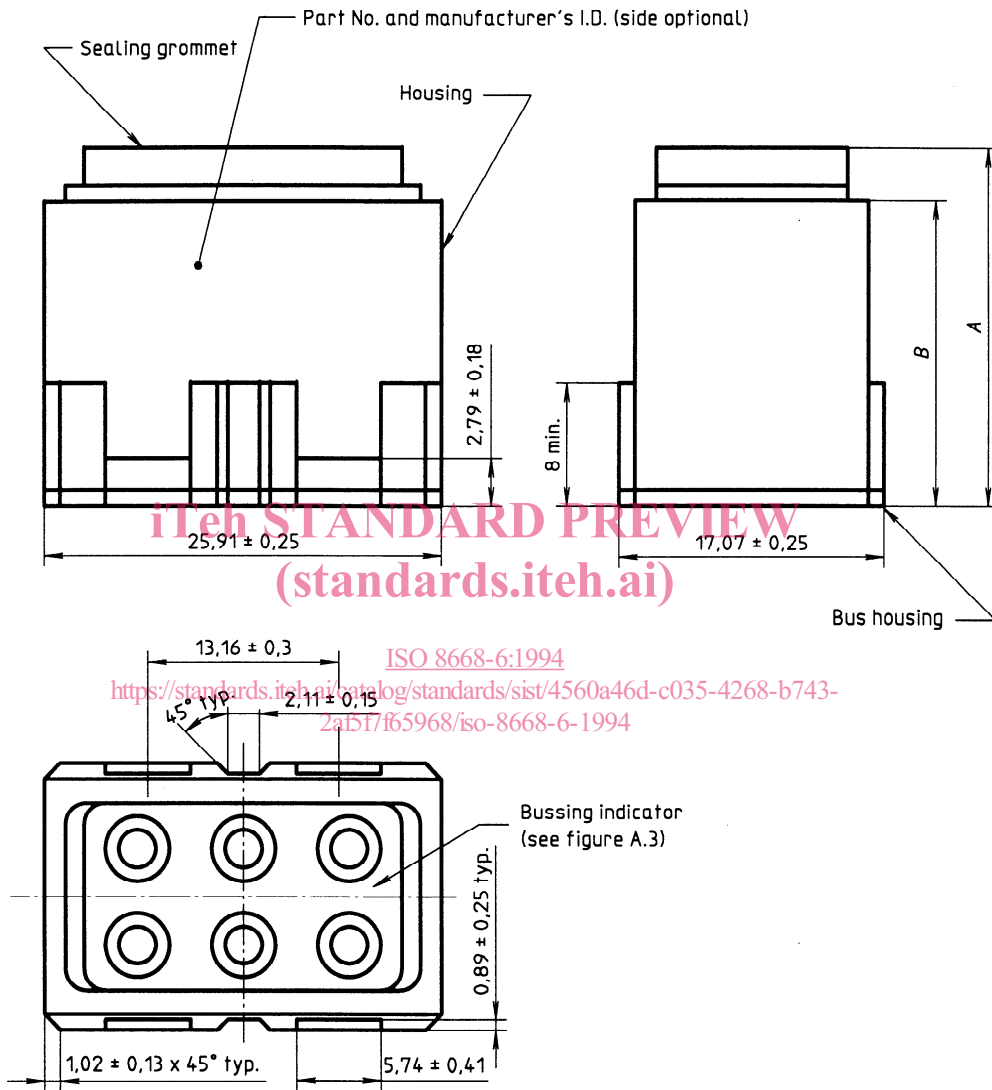


Figure A.2 — Size 12 module