INTERNATIONAL STANDARD

ISO 8668-5

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Aircraft — Terminal junction systems —

Part 5 :
Detail specification for type 3 system

Aéronefs — Systèmes de raccordement à modules amovibles —
Partie 5 : Spécification détaillée pour le système du type 3

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Contents

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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 8668-5 was prepared by Technical Committee ISO/TC 20, *Aircraft and space vehicles,* Sub-Committee SC 1, *Aerospace electrical requirements*.

ISO 8668 will consist 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*

Aircraft — Terminal junction systems —

Part 5:
Detail specification for type 3 system

Section 1: General

1.1 Scope

This part of ISO 8668 establishes the specific characteristics of a Terminal Junction System (TJS), designated as type 3, and particularly designed for aircraft applications.

This part of ISO 8668 shall be read in conjunction with ISO 8668-1 and ISO 8668-2.

1.2 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 listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

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

ISO 7137 : 1987, *Aircraft — Environmental conditions and test procedures for airborne equipment.* [1)]

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

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

IEC 512-8 : 1984, *Electromechanical components for electronic equipment; basic testing procedures and measuring methods — Part 8: Connector tests (mechanical) and mechanical tests on contacts and terminations.*

1.3 Identification

1.3.1 Basic components comprising the type 3 system shall be identified as follows:

Identification	Basic component description
FBM	Feed-back module
FTM	Feed-through module
FBT	Feed-back track
FTT	Feed-through track
GM	Grounding module
JS	Junction splice
MB	Module mounting bracket
PC	Pin contact (male)
CT	Tool for contact insertion and extraction
SP	Sealing plug for grommet cavity

1.3.2 The designations of the individual items comprising the type 3 system shall be as shown on the corresponding figures.

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

Section 2: Design requirements

2.1 Description

2.1.1 General

The type 3 Terminal Junction System (TJS) shall comply with the requirements specified in ISO 8668-1 and ISO 8668-2. The TJS shall provide environment-proof terminations in modules and in-line junctions (splices) for joining wires attached to specified crimp-removable male (pin) contacts. The TJS components shall have integral female (socket) contacts internally bussed in prescribed configurations specified in the figures.

The following components shall comprise the TJS system. Design details shall be in accordance with the figures:

Feed-back junction modules
Feed-through junction modules
Feed-back grounding modules
In-line junctions (splices)
Tracks for mounting modules
Brackets for mounting modules
Crimp male contacts (pins)
Insertion/extraction tools
Sealing plugs

2.1.2 Sizes

The modules, in-line junctions (splices) and contacts are specified in five sizes: 22D, 22, 20, 16 and 12. The size number is the maximum gauge wire that the male (pin) contact wire barrel can accommodate.

2.1.3 Contacts

2.1.3.1 Contacts shall be finish gold-plated to a minimum of 1,27 µm (0,000 050 in) over a suitable underplate, other than silver.

2.1.3.2 Female (socket) contacts shall be integral within the modules and in-line junctions, bussed in various configurations, as specified.

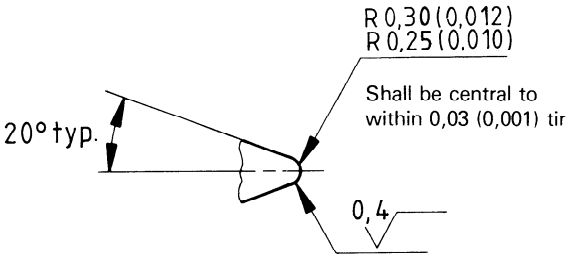
2.1.3.3 Male (pin) contacts shall comply with figure 40 and shall be designed for crimping (see 2.1.3.4) to the following conductor sizes and for insertion/extraction with tools used for rear release contacts in cylindrical connectors (see figure 42). Except for size 12, the mating end of the male contacts shall be larger than the wire barrel size in accordance with table 1.

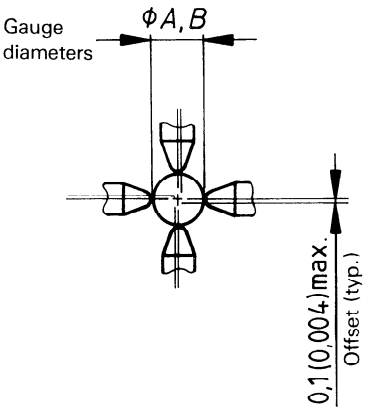
Table 1

Contact size	Mating end	Wire barrel	Conductor sizes
22D	20	22D	28 to 22
22	16	22	26 to 22
20	16	20	24 to 20
16	14	16	20 to 16
12	12	12	14 to 12

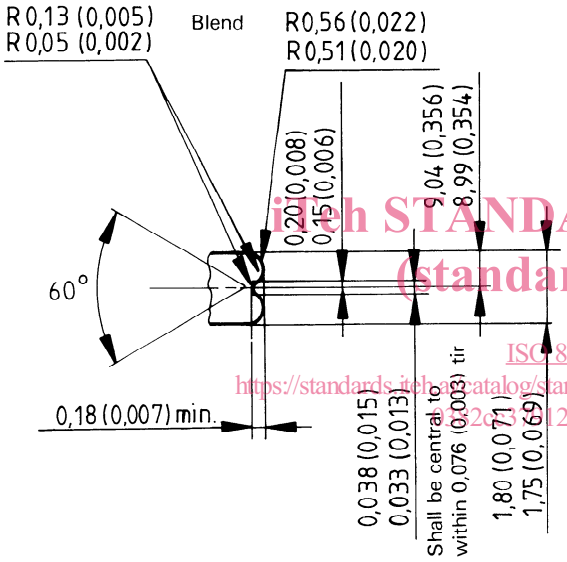
2.1.3.4 Contacts shall be designed so that their barrels can be crimped with indentors conforming to figures 1 and 2 on specified wire sizes. Contacts crimped on copper wire to aircraft quality, stranded, silver or tin coated shall comply with the tensile requirements of 3.2.5.4.

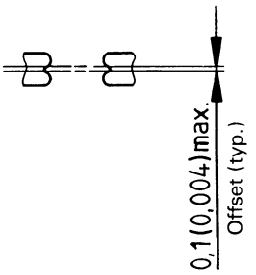
Dimensions in millimetres (inches)
Surface roughness value in micrometres





Indentor locations with tool in fully closed position





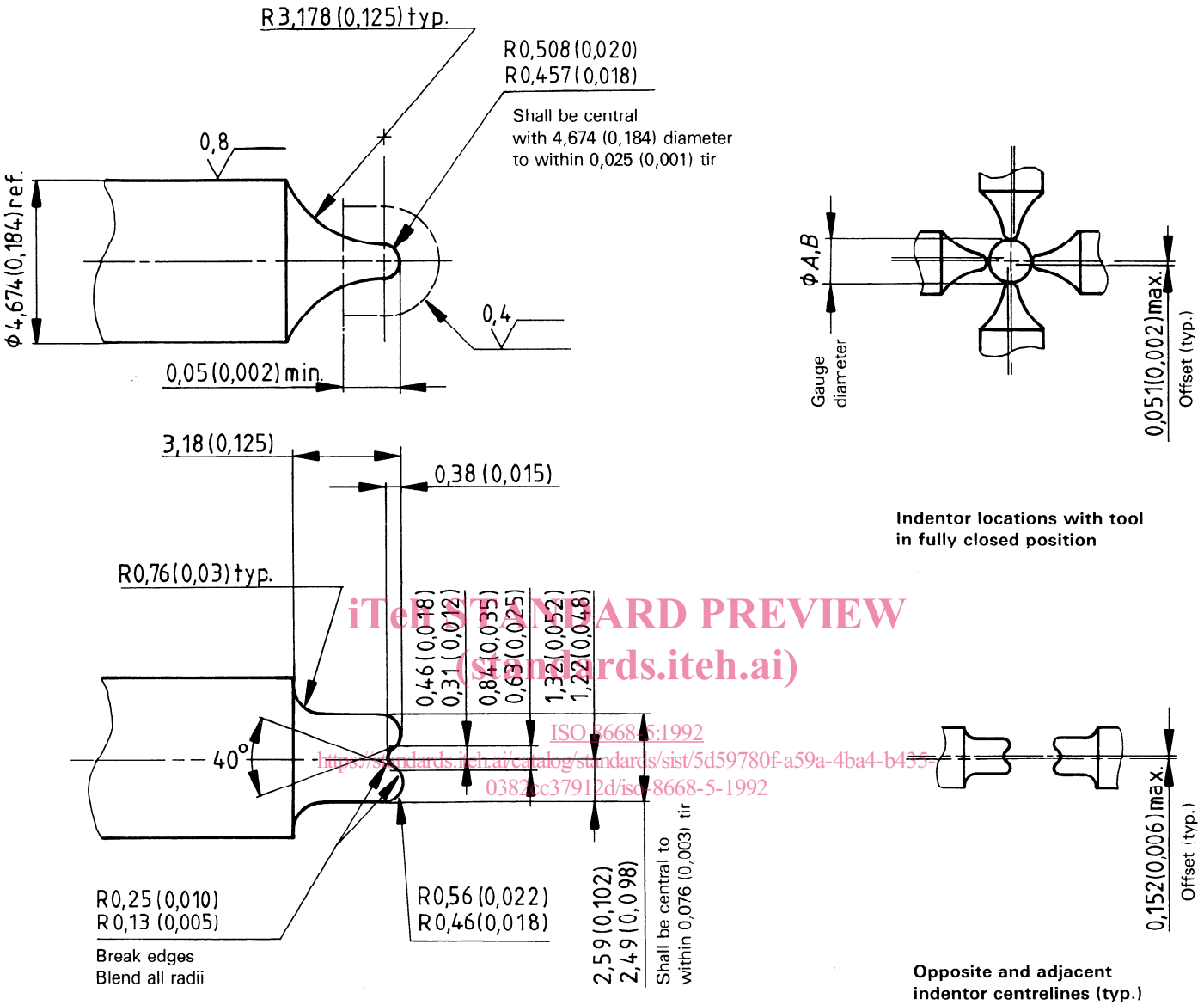
Opposite and adjacent indentor centrelines (typ.)

Indentor gauging limits (with tool in fully closed position)

Wire size	Contact sizes			
	22D and 22		20	
	A GO	*B* NO GO	*A* GO	*B* NO GO
	± 0,003 (± 0,000 1)		± 0,003 (± 0,000 1)	
28	0,330 2 (0,013)	0,457 2 (0,018)	—	—
26	0,406 4 (0,016)	0,533 4 (0,021)	—	—
24	0,482 6 (0,019)	0,609 6 (0,024)	0,660 4 (0,026)	0,787 4 (0,031)
22	0,558 8 (0,022)	0,685 8 (0,027)	0,762 (0,03)	0,889 (0,035)
20	—	—	0,863 6 (0,034)	0,990 6 (0,039)

Figure 1 — Tool indentor — Sizes 22D, 22 and 20

Dimensions in millimetres (inches)
Surface roughness value in micrometres



Indentor gauging limits (with tool in fully closed position)

Wire size	Contact sizes 22, 20, 16 and 12	
	A GO ± 0,003 (± 0,000 1)	*B* NO GO ± 0,003 (± 0,000 1)
22	0,914 4 (0,036)	1,041 4 (0,041)
20	0,990 6 (0,039)	1,117 6 (0,044)
18	1,143 (0,045)	1,27 (0,05)
16	1,320 8 (0,052)	1,447 8 (0,057)
14	1,498 6 (0,059)	1,625 6 (0,064)
12	1,727 2 (0,068)	1,854 2 (0,073)

Figure 2 — Tool indentor — Sizes 22, 20, 16 and 12

2.1.4 Tracks (rails) and brackets

It shall be possible to mix and accommodate all sizes of modules in their respective mounting tracks and brackets. Tracks shall be designed to allow the removal of individual modules without having to remove other modules in the installed track. Tracks shall accommodate from three to 15 modules from size 22D to size 16. Size 12 modules occupy the space of three smaller modules. Brackets shall accommodate one or three modules, as specified.

2.1.5 Grounding modules

All integral contacts shall be bussed in common and shall be conductive to a common mounting plate or stud, as specified.

2.1.6 Temperature rating

The TJS components shall comply with the class 3 requirements specified in ISO 8668-1 for a temperature range of − 65 °C to + 200 °C.

2.1.7 Sealing

The modules and in-line junctions shall have integral grommets designed to provide moisture seals on wires or sealing plugs, having smooth insulation, of the diameters specified in table 2.

2.1.8 Contact retention

Retention of the male (pin) contact shall be provided by a metal sleeve having a minimum of two tines integral with the module or splice housing. The retention system shall provide mechanical integrity when tested with both axial and side loads on the crimped wire in accordance with ISO 8668-2. There shall be no electrical discontinuity during this test.

2.1.9 Resistance to probe damage

The modules and splices shall withstand test probe damage incidental to use when tested in accordance with 3.2.3.

2.1.10 Oversize pin protection

An oversize pin shall not enter the module or splice housing when tested in accordance with 3.2.1.

2.1.11 Contact durability

The TJS component shall tolerate 100 cycles of probe insertion/extraction without damage when tested in accordance with 3.2.2.

Table 2

Dimensions in millimetres (inches)

Module or splice size	Finished wire diameter	
	min.	max.
22D	0,76 (0,030)	1,37 (0,054)
22	0,86 (0,034)	1,68 (0,066)
20	0,96 (0,038)	2,11 (0,083)
16	1,52 (0,060)	2,57 (0,101)
12	2,21 (0,087)	3,74 (0,147)

Section 3: Type approval tests

3.1 Samples for type approval tests

3.1.1 Samples shall be selected in accordance with the requirements specified in ISO 8668-1.

3.1.2 A family of parts comprising one type may be approved based on similarity to a representative part which has been fully tested.

3.1.3 Modules of the same type and size, differing only in bussing arrangements, may be approved by similarity to approved bussing arrangements C1 or 38, as applicable.

3.2 Test details

Tests and their sequence shall be carried out in accordance with ISO 8668-1 and ISO 8668-2. The additional tests specified in 3.2.1 to 3.2.5 shall be incorporated.

3.2.1 Oversize pin: Test No. 20

Specimens Nos. 11 and 12 (see the table in ISO 8668-1 : 1986) shall be subjected to this test after completion of the indicated tests. The grommet shall be removed for this test and an attempt shall be made to axially insert the oversize probe specified in table 3. A force of 13,35 N ± 0,05 N (3 lbf ± 0,125 lbf) shall be applied. Four socket contact cavities shall be tested. The probe shall neither make electrical engagement to the socket under test nor damage the assembly.

Table 3

Dimensions in millimetres (inches)

Module and splice size	Oversize pin diameter $^{0}_{-0,005}$ $\left(^{0}_{-0,000\,2}\right)$
22D	1,168 (0,046)
22	1,778 (0,07)
20	1,778 (0,07)
16	2,235 (0,088)
12	2,667 (0,105)

3.2.2 Contact durability: Test No. 21

Specimens Nos. 1 and 2 (see the table in ISO 8668-1 : 1986) shall be subjected to 100 cycles of durability testing on each of four contacts with the applicable test probe specified in table 4. A cycle shall consist of one insertion and one withdrawal. The socket contact shall then be subjected to the contact resistance, rated current, test No. 5b, specified in ISO 8668-2 : 1986.

3.2.3 Probe damage: Test No. 22

Specimens Nos. 11 and 12 (see the table in ISO 8668-1 : 1986) shall be subjected to this test after completion of the indicated tests. The grommet shall be removed for this test and a probe, specified in figure 3, shall be inserted to impose the specified bending moment at each of the three depths specified in figure 3. The procedure shall be carried out in accordance with IEC 512-8 : 1984, test 16A, except that the module or in-line junction shall be suitably mounted instead of the specified collet. Following this stress, the socket contact shall comply with the contact resistance test Nos. 5a and 5b specified in ISO 8668-2 : 1986.

3.2.4 Resistance to fluids: Test No. 18

The wired specimen shall be subjected to immersion in the fluids specified in ISO 7137, under the fluids susceptibility test procedure, for the time and at the temperature conditions specified, and subject to the procedures of test No. 18 specified in ISO 8668-2 : 1986.

3.2.5 Visual examination (see ISO 8668-1 : 1986, 12.1.1)

The component parts shall be examined to ensure that they conform to the specified dimensional and marking requirements. The examination shall be performed on all type approval specimens before ISO 8668-2 tests and shall include the following.

3.2.5.1 Workmanship

Component parts shall be examined for workmanship flaws which would be detrimental to the intended function.

3.2.5.2 Mechanical features (see ISO 8668-1 : 1986, 12.1.2)

Component parts designed for user assembly, such as modules and tracks, shall be assembled to ensure proper fit.

3.2.5.3 Marking (see ISO 8668-1 : 1986, 12.1.3)

Component parts shall be examined to ensure that marking and identification are in accordance with the requirements of this part of ISO 8668.

3.2.5.4 Crimped joint tensile strength (see ISO 8668-1 : 1986, 8.2)

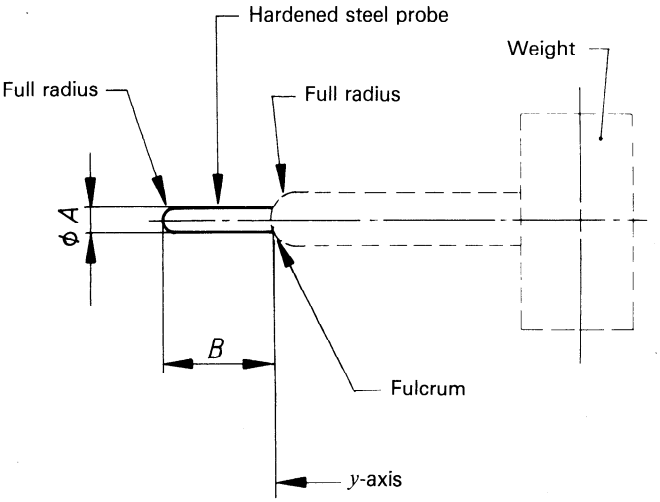
The tensile strength of the crimped joints shall not fall below the relevant values specified in table 5, instead of the values specified in ISO 1966.

Table 4

Dimensions in millimetres (inches)

Module and splice size	Durability pin diameter [1] $^{0}_{-0,005}$ $\left(^{0}_{-0,000\,2}\right)$
22D	1,041 (0,041)
22	1,6 (0,063)
20	1,6 (0,063)
16	1,981 (0,078)
12	2,413 (0,095)

1) The surface roughness of the pin shall be 0,2 µm (8 µin)



Module and splice size	A ± 0,013 (± 0,000 5)	Bending moment about the y-axis ± 10 %
	mm (in)	N·m (in·lbf)
22D	1,02 (0,04)	0,057 (0,5)
22	1,59 (0,062)	0,057 (0,5)
20	1,59 (0,062)	0,057 (0,5)
16	1,96 (0,077)	0,266 (2)
12	2,39 (0,094)	0,266 (2)

Probe depths B + 0,08 (0,003)
mm (in)
Full insertion
Full insertion − 1,02 (0,04)
Full insertion − 2,79 (0,11)

Figure 3 — Probe damage tool and bending moment

Table 5

Contact size	Conductor gauge	Tensile strength, min.			
		Specimen not subjected to thermal cycling		Specimen subjected to thermal cycling	
		N	lbf	N	lbf
22D	28	13,3	3	10	2,25
22D	26	22,2	5	17,8	4
22D	22	53,3	12	33,3	7,5
22	26	22,2	5	17,8	4
22	22	53,3	12	33,3	7,5
20	24	35,6	8	26,7	6
20	20	89	20	62	14
16	20	89	20	62	14
16	16	222	50	200	45
12	14	311	70	271	61
12	12	489	110	413	93

Section 4: Production and quality tests

4.1 Production acceptance tests

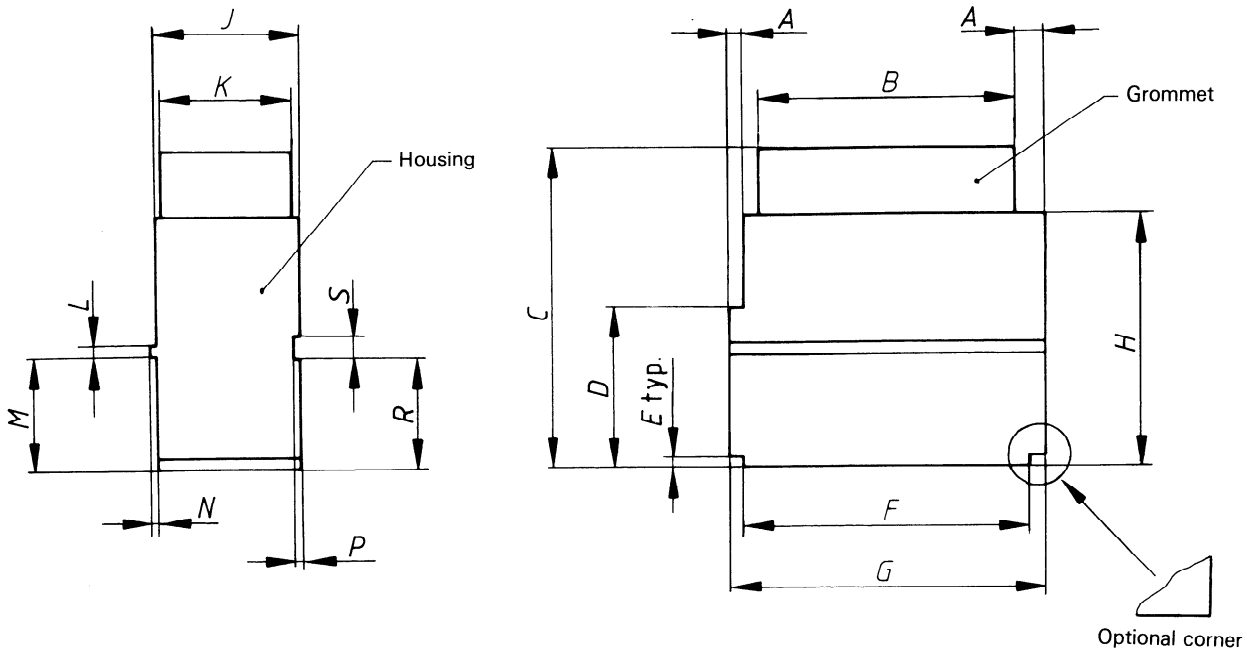
Production acceptance tests shall consist of the non-destructive tests shown below, carried out on components offered for delivery selected statistically.

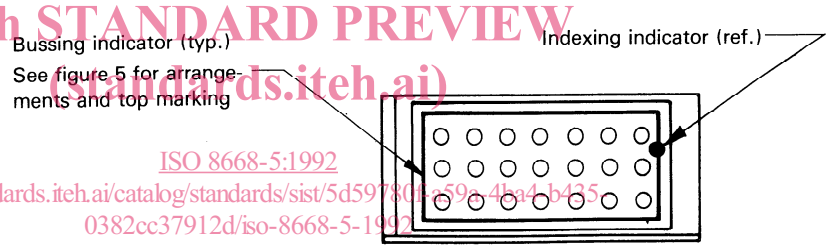
Title of test	Applicable requirement
Workmanship	ISO 8668-5, 3.2.5.1
Marking	ISO 8668-5, 3.2.5.3
Withstanding voltage (DWV)	ISO 8668-2, test No. 4
Insulation resistance	ISO 8668-2, test No. 3
Contact resistance	ISO 8668-2, test No. 5b
Internal electrical continuity	ISO 8668-2, test No. 2

4.2 Production quality tests

Production quality tests shall consist of the tests shown below, carried out on components statistically selected from lots which have passed the production acceptance tests (see 4.1).

Title of test	Applicable requirement
Contact insertion force	ISO 8668-2, test No. 1
Contact resistance	ISO 8668-2, test No. 5
Contact resistance stability	ISO 8668-2, test No. 17
Contact extraction force	ISO 8668-2, test No. 7





Dimensions in millimetres

A min.	*B* max.	*C* max.	*D* ± 0,25	*E* ± 0,18	*F* ± 0,13	*G* ± 0,13	*H* ± 0,25	*J* ± 0,13	*K* max.	*L* ± 0,13	*M* + 0,2 0	*N* ± 0,05	*P* ± 0,05	*R* 0 − 0,2	*S* ± 0,13
1,02	19,3	21,51	11,18	0,97	19,3	21,59	17,53	9,91	9,78	0,86	7,77	0,28	0,41	7,75	1,5

Dimensions in inches

A min.	*B* max.	*C* max.	*D* ± 0,01	*E* ± 0,007	*F* ± 0,005	*G* ± 0,005	*H* ± 0,01	*J* ± 0,005	*K* max.	*L* ± 0,005	*M* + 0,008 0	*N* ± 0,002	*P* + 0,002	*R* 0 − 0,008	*S* ± 0,005
0,04	0,76	0,847	0,44	0,038	0,76	0,85	0,69	0,39	0,385	0,034	0,306	0,011	0,016	0,305	0,059

NOTE — Applicable crimp pin contact: ISO 8668-5 PC22D.

Designation

ISO 8668-5 FBM22D-

- Bussing arrangement (see figure 5)
- Feed-back module, size 22D

Figure 4 — Feed-back module, size 22D

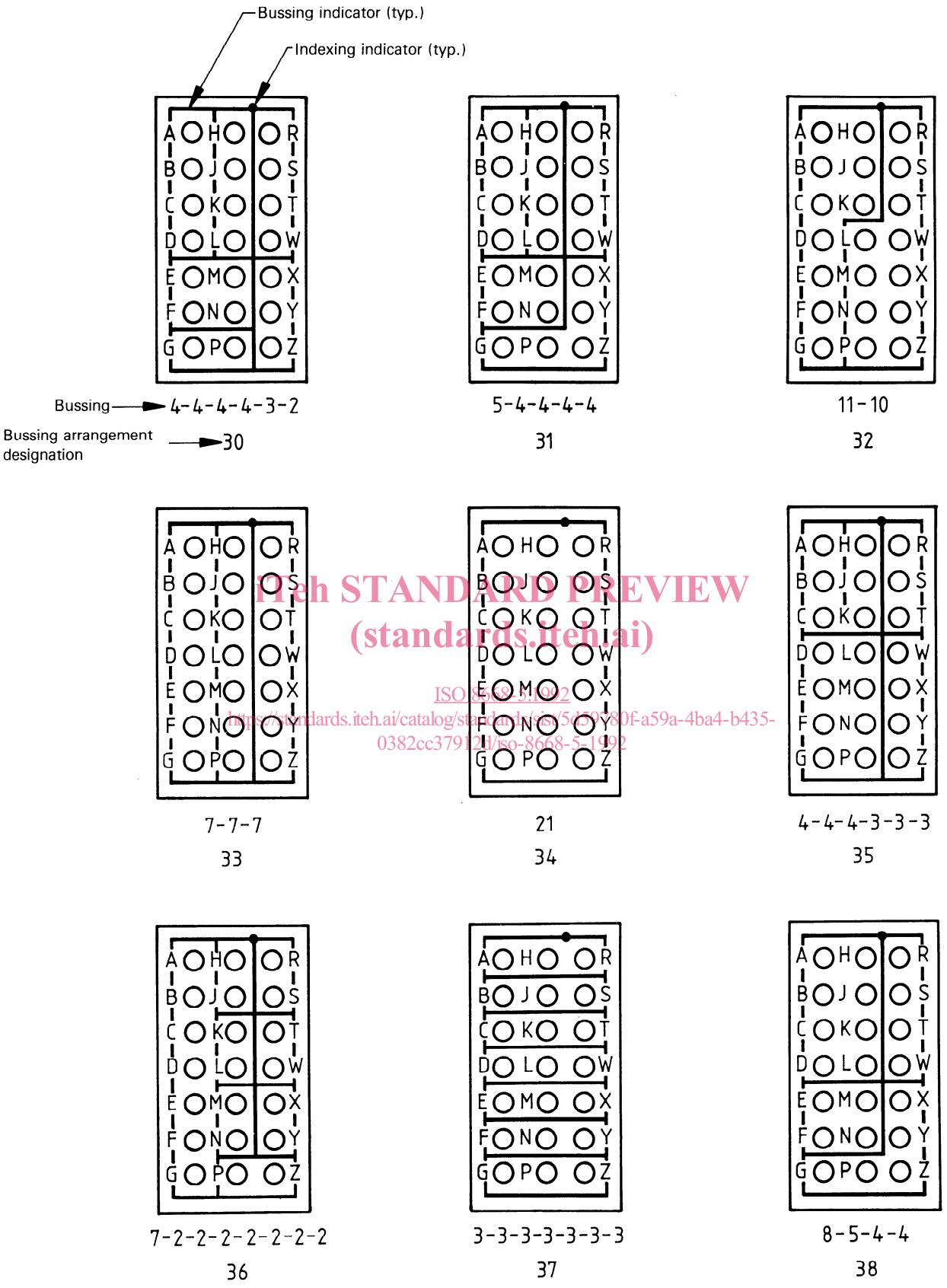


Figure 5 — Feed-back module, size 22D — Bussing arrangements

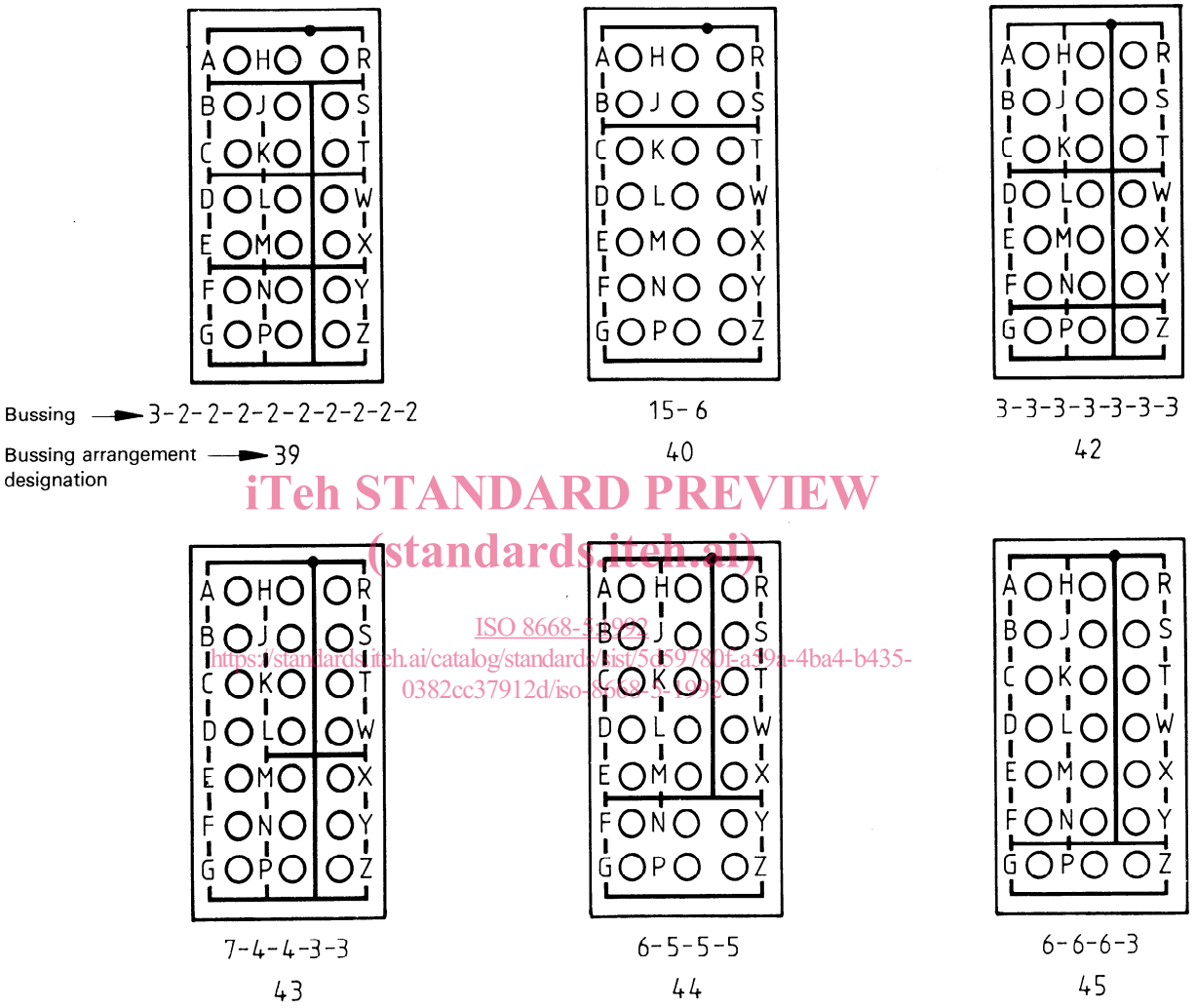


Figure 5 — Feed-back module, size 22D — Bussing arrangements (*concluded*)