BS EN 2997-002:2016

BSI Standards Publication

Aerospace series — Connectors, electrical, circular, coupled by threaded ring, fire-resistant or non fire-resistant, operating temperatures — 65 °C to 175 °C continuous, 200 °C continuous, 260 °C peak

Part 002: Specification of performance and contact arrangements

bsi.

National foreword

This British Standard is the UK implementation of EN 2997-002:2016. It supersedes BS EN 2997-002:2012 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee ACE/6, Aerospace avionic electrical and fibre optic technology.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Date	Text affected

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English Version

Aerospace series - Connectors, electrical, circular, coupled by threaded ring, fire-resistant or non fire-resistant, operating temperatures - 65 °C to 175 °C continuous, 200 °C continuous, 260 °C peak - Part 002: Specification of performance and contact arrangements

Série aérospatiale - Connecteurs électriques circulaires à accouplement par bague filetée, résistant au feu ou non, températures d'utilisation - 65 °C à 175 °C continu, 200 °C continu, 260 °C en pointe - Partie 002 : Spécification de performances et d'arrangements des contacts

Luft- und Raumfahrt - Elektrische Rundsteckverbinder mit Schraubkupplung, feuerbeständig oder nicht feuerbeständig, Betriebstemperaturen - 65 °C bis 175 °C konstant, 200 °C konstant, 260 ° C Spitze - Teil 002: Leistungsdaten und Kontaktanordnungen

This European Standard was approved by CEN on 4 April 2016.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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European foreword

This document (EN 2997-002:2016) has been prepared by the Aerospace and Defence Industries Association of Europe - Standardization (ASD-STAN).

After enquiries and votes carried out in accordance with the rules of this Association, this Standard has received the approval of the National Associations and the Official Services of the member countries of ASD, prior to its presentation to CEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by March 2017, and conflicting national standards shall be withdrawn at the latest by March 2017.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 2997-002:2012.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

This family of connectors is derived from MIL-DTL-83723 series III, type T with which it is intermateable.

1 Scope

This European Standard defines the performance and contact arrangements of circular electrical connectors, coupled by threaded ring. It also lists the product standards and models available for selection in this series.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 2591-202, *Aerospace series — Elements of electrical and optical connection — Test methods — Part 202: Contact resistance at rated current*

EN 2591-209, *Aerospace series — Elements of electrical and optical connection — Test methods — Part 209: Current temperature derating*

EN 2997-001, *Aerospace series — Connectors, electrical, circular, coupled by threaded ring, fire-resistant or non fire-resistant, operating temperatures −65 °C to 175 °C continuous, 200 °C continuous, 260 °C peak — Part 001: Technical specification*

EN 2997-003, *Aerospace series — Connectors, electrical, circular, coupled by threaded ring, fire-resistant or non fire-resistant, operating temperatures −65 °C to 175 °C continuous, 200 °C continuous, 260 °C peak — Part 003: Square flange receptacle — Product standard*

EN 2997-004, *Aerospace series — Connectors, electrical, circular, coupled by threaded ring, fire-resistant or non fire-resistant, operating temperatures −65 °C to 175 °C continuous, 200 °C continuous, 260 °C peak — Part 004: Jam-nut mounted receptacle — Product standard*

EN 2997-005, *Aerospace series — Connectors, electrical, circular, coupled by threaded ring, fire-resistant or non fire-resistant, operating temperatures −65 °C to 175 °C continuous, 200 °C continuous, 260 °C peak — Part 005: Hermetic square flange receptacle — Product standard*

EN 2997-006, *Aerospace series — Connectors, electrical, circular, coupled by threaded ring, fire-resistant or non fire-resistant, operating temperatures −65 °C to 175 °C continuous, 200 °C continuous, 260 °C peak — Part 006: Hermetic jam-nut mounted receptacle — Product standard*

EN 2997-007, *Aerospace series — Connectors, electrical, circular, coupled by threaded ring, fire-resistant or non fire-resistant, operating temperatures −65 °C to 175 °C continuous, 200 °C continuous, 260 °C peak — Part 007: Hermetic receptacle with round flange attached by welding or brazing — Product standard*

EN 2997-008, *Aerospace series — Connectors, electrical, circular, coupled by threaded ring, fire-resistant or non fire-resistant, operating temperatures −65 °C to 175 °C continuous, 200 °C continuous, 260 °C peak — Part 008: Plug — Product standard*

EN 2997-009, *Aerospace series — Connectors, electrical, circular, coupled by threaded ring, fire-resistant or non fire-resistant, operating temperatures −65 °C to 175 °C continuous, 200 °C continuous, 260 °C peak — Part 009: Protective cover for receptacle — Product standard*

EN 2997-010, *Aerospace series — Connectors, electrical, circular, coupled by threaded ring, fire-resistant or non fire-resistant, operating temperatures −65 °C to 175 °C continuous, 200 °C continuous, 260 °C peak — Part 010: Protective cover for plug — Product standard*

EN 2997-011, *Aerospace series — Connectors, electrical, circular, coupled by threaded ring, fire-resistant or non fire-resistant, operating temperatures −65 °C to 175 °C continuous, 200 °C continuous, 260 °C peak — Part 011: Dummy receptacle — Product standard*

EN 2997-012, *Aerospace series — Connectors, electrical, circular, coupled by threaded ring, fire-resistant or non fire-resistant, operating temperatures −65 °C to 175 °C continuous, 200 °C continuous, 260 °C peak — Part 012: Jam-nut for jam-nut receptacles — Product standard*

EN 2997-013, *Aerospace series — Connectors, electrical, circular, coupled by threaded ring, fire-resistant or non fire-resistant, operating temperatures −65 °C to 175 °C continuous, 200 °C continuous, 260 °C peak — Part 013: O-ring seal for jam-nut receptacles — Product standard*

EN 2997-014, *Aerospace series — Connectors, electrical, circular, coupled by threaded ring, fire-resistant or non fire-resistant, operating temperatures −65 °C to 175 °C continuous, 200 °C continuous, 260 °C peak — Part 014: Square flange receptacle with integrated accessory — Product standard*

EN 2997-015, *Aerospace series — Connectors, electrical, circular, coupled by threaded ring, fire-resistant or non fire-resistant, operating temperatures −65 °C to 175 °C continuous, 200 °C continuous, 260 °C peak — Part 015: Jam-nut mounted receptacle with integrated accessory — Product standard*

EN 2997-016, *Aerospace series — Connectors, electrical, circular, coupled by threaded ring, fire-resistant or non fire-resistant, operating temperatures −65 °C to 175 °C continuous, 200 °C continuous, 260 °C peak — Part 016: Plug with integrated accessory — Product standard*

EN 3155-002, *Aerospace series — Electrical contacts used in elements of connection — Part 002: List and utilization of contacts*

EN 3155-004, *Aerospace series — Electrical contacts used in elements of connection — Part 004: Contacts, electrical, male, type A, crimp, class T — Product standard*

EN 3155-005, *Aerospace series — Electrical contacts used in elements of connection — Part 005: Contacts, electrical, female, type A, crimp, class T — Product standard*

EN 3155-018, *Aerospace series — Electrical contacts used in elements of connection — Part 018: Contacts, electrical, male, type A, crimp, class S — Product standard*

EN 3155-019, *Aerospace series — Electrical contacts used in elements of connection — Part 019: Contacts, electrical, female, type A, crimp, class S — Product standard*

EN 3155-080, *Aerospace series — Electrical contacts used in elements of connection — Part 080: Contacts, size 22 for EN 2997, electrical, male, type A, crimp, class T — Product standard*

EN 3155-081, *Aerospace series — Electrical contacts used in elements of connection — Part 081: Contacts, size 22 for EN 2997, electrical, female, type A, crimp, class T — Product standard*

EN 3197, *Aerospace series — Design and installation of aircraft electrical and optical interconnection systems*

EN 3660-002, *Aerospace series — Cable outlet accessories for circular and rectangular electrical and optical connectors — Part 002: Index of product standards*

EN 4529-002, *Aerospace series — Elements of electrical and optical connection — Sealing plugs — Part 002: Index of product standards*

MIL-DTL-83723, *Connectors, electrical, (circular, environment resisting), receptacles and plugs, general specification for* [1)]

3 Model description and codification of models

See Table 1.

1) Published by: DoD National (US) Mil. Department of Defense. http://www.defenselink.mil/

Table 1 — Model description *(1 of 2)*

Class	Model description
Connectors	
W	Sealed plug with housing (shell) in olive-green cadmium-plated aluminium alloy, conductive finish, 500 h resistance to salt mist, crimp contacts, maximum operating temperature 175 °C continuous
WS	Sealed plug and receptacle with housing (shell) in olive-green cadmium-plated aluminium alloy, conductive finish, 500 h resistance to salt mist, crimp contacts, plug with grounding-spring-system, maximum operating temperature 175 °C continuous
K	Sealed plug with housing (shell) in passivated stainless steel, 500 h resistance to salt mist, crimp contacts, fire resistant, maximum operating temperature 200 °C continuous
KV	Sealed plug with housing (shell) in passivated stainless steel, 500 h resistance to salt mist, crimp contacts, fire resistant, high vibrations, maximum operating temperature 260 °C peak
SV	Sealed plug and receptacle with housing (shell) in passivated stainless steel, 500 h resistance to salt mist, crimp contacts, fire resistant, high vibrations, plug with grounding-spring-system, maximum operating temperature 260 °C peak
SF	Sealed plug and receptacle with housing (shell) in passivated stainless steel, 500 h resistance to salt mist, crimp contacts, fire-resistant (including fire immersion), high vibrations, plug with grounding-spring-system, maximum operating temperature 260 °C peak
R	Sealed plug with housing (shell) in nickel-plated aluminium alloy, 48 h resistance to salt mist, crimp contacts, maximum operating temperature 200 °C continuous
RS	Sealed plug and receptacle with housing (shell) in nickel-plated aluminium alloy, 48 h resistance to salt mist, crimp contacts, plug with grounding-spring-system, maximum operating temperature 200 °C continuous
S	Sealed plug and receptacle with housing (shell) in passivated stainless steel, 500 h resistance to salt mist, crimp contacts, fire resistant, plug with grounding-spring-system, maximum operating temperature 200 °C continuous
Y	Hermetic receptacle with housing (shell) in passivated stainless steel, 500 h resistance to salt mist, solder contacts, maximum operating temperature 200 °C continuous
KE	Sealed plug with housing (shell) in passivated stainless steel, 500 h resistance to salt mist, crimp contacts, fire resistant, maximum operating temperature 260 °C peak
SE	Sealed plug and receptacle with housing (shell) in passivated stainless steel, 500 h resistance to salt mist, crimp contacts, fire resistant, plug with grounding-spring-system, maximum operating temperature 260 °C peak
YE	Hermetic receptacle with housing (shell) in passivated stainless steel, 500 h resistance to salt mist, solder contacts, maximum operating temperature 260 °C peak

Table 1 — Model description *(2 of 2)*

Class	Model description
Protective covers	
K	Protective cover for plug in passivated corrosion resisting steel, 500 h resistance to salt mist – Maximum operating temperature 200 °C continuous
R	Protective cover for receptacle or plug in nickel-plated aluminium alloy, 48 h resistance to salt mist – Maximum operating temperature 200 °C continuous
W	Protective cover for receptacle or plug in olive-green cadmium-plated aluminium alloy, 500 h resistance to salt mist – Maximum operating temperature 175 °C continuous
KE	Protective cover for receptacle or plug in passivated corrosion resisting steel, 500 h resistance to salt mist – Maximum operating temperature 260 °C peak
Dummy receptacles	
K	Dummy receptacle in passivated stainless steel, 500 h resistance to salt mist – Maximum operating temperature 200 °C continuous
R	Dummy receptacle in nickel-plated aluminium alloy, 48 h resistance to salt mist – Maximum operating temperature 200 °C continuous
W	Dummy receptacle in olive-green cadmium-plated aluminium alloy, 500 h resistance to salt mist – Maximum operating temperature 175 °C continuous
KE	Dummy receptacle in passivated corrosion resisting steel, 500 h resistance to salt mist – Maximum operating temperature 260 °C peak

4 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 2997-001 apply.

5 Operating conditions

5.1 General

Tables 2 and 3 show:

— Combinations marked by “yes” achieve the characteristics specified for the two classes.

— Combinations marked by “yes*” achieve the lowest characteristics of the two classes.

— All other combinations are under the responsibility of the user.

5.2 Combinations of plugs and receptacles

See Table 2.

Table 2 — Combinations of plugs and receptacles

Receptacle class	Plug class										
	W	WS	K	R	RS	S	KE	KV	SE	SV	SF
WS	yes	yes	–	–	–	–	–	–	–	–	–
RS	–	–	–	yes	yes	–	–	–	–	–	–
S	–	–	yes	–	–	yes	yes*	yes*	yes*	yes*	yes*
Y	–	–	yes	–	–	yes	yes*	yes*	yes*	yes*	yes*
SE	–	–	yes*	–	–	yes*	yes	yes	yes	yes	yes*
YE	–	–	yes*	–	–	yes*	yes	yes	yes	yes	yes*
SV	–	–	yes*	–	–	yes*	yes*	yes	yes*	yes	yes*
SF	–	–	yes*	–	–	yes*	yes*	yes*	yes*	yes*	yes

5.3 Combinations of protective covers and connectors

See Table 3.

Table 3 — Combinations of protective covers and connectors

Protective cover class	Plug class											Receptacle class							
	W	WS	K	R	RS	S	KE	KV	SE	SV	SF	WS	RS	S	Y	SE	SV	SF	YE
R	–	–	–	yes	yes	–	–	–	–	–	–	–	yes	–	–	–	–	–	–
W	yes	yes	–	–	–	–	–	–	–	–	–	yes	–	–	–	–	–	–	–
K	–	–	yes	–	–	yes	–	–	–	–	–	–	–	yes	yes	–	–	–	–
KE	–	–	–	–	–	–	yes	yes	yes	yes	yes	–	–	yes	yes	yes	yes	yes	yes

5.4 Permissible cables

The performance of these connectors is achieved with the cables of the dimensions given in Table 4 and using the cable outlets and wiring tools specified. The use of cables exceeding the maximum diameter indicated is prohibited. Cables smaller than the minimum diameter may be used, subject to a concession, provided that the requirements of EN 3197 are observed.

Table 4 — Permissible cables

Dimensions in millimetres

Contact size	Outer diameter of cables	
	min.	max.
22	0,85	1,68
20	0,85	2,11
16	1,22	2,77
12	1,9	3,61

5.5 Operating characteristics

5.5.1 Electrical conditions

— For operating temperature including self-heating from electrical operation see EN 2591-209.

— For rated test current refer to the relevant contact standard for removable contacts. For solder contacts refer to EN 2997-001 test requirements listed against test EN 2591-202 requirements.

— Insulation resistance at ambient temperature: 5 000 MΩ.

— Withstand voltage at sea level: 1 500 V r.m.s.

— Withstand voltage from 15 000 m to 30 000 m: 1 000 V r.m.s (connector mated).

5.5.2 Climatic conditions

— Operating temperatures:
  — minimum temperature: – 65 °C;
  — maximum temperature: see Table 1. Furthermore, the connector operating temperature shall be limited to the maximum operating temperature indicated in the product standards for contacts.

— Corrosion resistance and fluid resistance: see EN 2997-001;

— Salt mist resistance: see Table 1 and EN 2997-001.

5.5.3 Mechanical conditions

Mechanical endurance, see EN 2997-001: 500 mating and unmating operations,

250 mating and unmating operations for class R, RS, W and WS.

6 Connector type codes

See Table 5 for codes. For spare parts not listed in this specification, refer to the relevant product standard.

Table 5 — Connector type codes *(1 of 2)*

Model	Class	Product standard	Model description
Connectors			
0	WS RS S SE SV SF	EN 2997-003	Square flange receptacle
	Y YE	EN 2997-005	Hermetic square flange receptacle
A	WS RS S SE SV SF	EN 2997-014	Square flange receptacle with integrated cable outlet
1	Y YE	EN 2997-007	Hermetic receptacle with round flange attached by welding or brazing
6	W K R KE KV	EN 2997-008	Plug without grounding spring system
	WS RS S SE SV SF	EN 2997-008	Plug with grounding spring system
C	WS RS S SE SV SF	EN 2997-016	Plug with grounding spring system and integrated cable outlet
	R K W KV KE	EN 2997-016	Plug without grounding spring system but with integrated cable outlet
7	WS RS S SE SV SF	EN 2997-004	Jam-nut mounted receptacle
	Y YE	EN 2997-006	Hermetic jam-nut mounted receptacle

Table 5 — Connector type codes *(2 of 2)*

Model	Class	Product standard	Model description
B	WS RS S SE SV SF	EN 2997-015	Jam-nut mounted receptacle with integrated cable outlet
Protective covers			
3	R W KE	EN 2997-009	Protective cover for receptacle
4	K R W KE	EN 2997-010	Protective cover for plug
Dummy receptacle			
5	K R W KE	EN 2997-011	Dummy receptacle
Spare parts			
8	K W R	EN 2997-012	Nut (For Jam-nut mounted receptacle)
9	–	EN 2997-013	O-ring seal

7 Polarization

See Table 6 for available polarizations (marked *).

Table 6 — Polarization

Polarizations positions	Housing sizes									
	08	10	12	14	16	18	20	22	24	28
N	*	*	*	*	*	*	*	*	*	*
6	*	*	*	*	*	*	*	*	*	*
7	*	*	*	*	*	*	*	*	*	*
8	*	*	*	*	*	*	*	*	*	*
9	*	*	*	*	*	*	*	*	*	*
Y	–	*	*	*	*	*	*	*	*	*

8 Housing sizes and contact arrangements

See Table 7 and Figures 1 to 32.

Table 7 — Housing sizes and contact arrangements *(1 of 2)*

Housing sizes	Contacts		
	Arrangements	Number	Size
08	03	3	20
08	06	6	22
08	98	3	20
10	02	2	20
10	05	5	20
10	06	6	20
10	12	12	22
12	03	3	16
12	12	12	20
12	21	21	22
14	04	4	12
14	07	7	16
14	12	9	20
		3	16
14	15	15	20
16	10	10	16
16	24	24	20
18	08	8	12
18	14	14	16
18	31	31	20

Table 7 — Housing sizes and contact arrangements *(2 of 2)*

Housing sizes	Contacts		
	Arrangements	**Number**	**Size**
20	16	16	16
20	25	19	20
		6	12
20	28	24	20
		4	12
20	39	37	20
		2	16
20	41	41	20
22	12	12	12
22	19	19	16
22	30 [a]	24	20
		6	12
22	32	26	20
		6	12
22	39	27	20
		12	16
22	55	55	20
24	30	30	16
24	43	23	20
		20	16
24	57	55	20
		2	12
24	61	61	20
28	42	42	16

[a] This arrangement is not available for new design.

08-03
3 contacts size 20

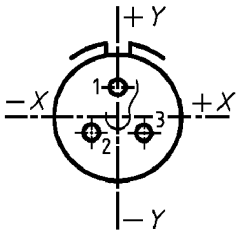


Figure 1

08-06
6 contacts size 22

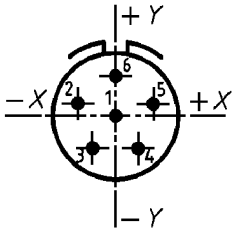


Figure 2

08-98
3 contacts size 20

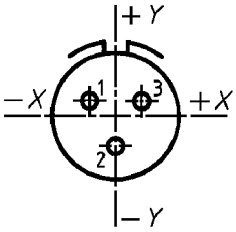


Figure 3

10-02
2 contacts size 20

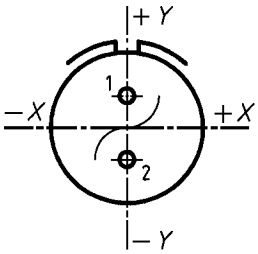


Figure 4

10-05
5 contacts size 20

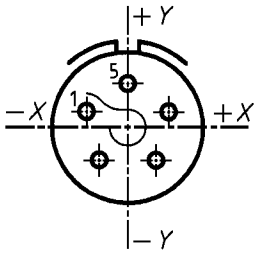


Figure 5

10-06
6 contacts size 20

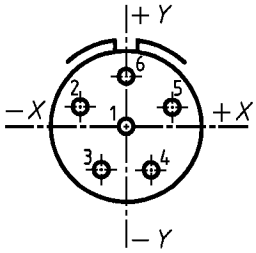


Figure 6

10-12
12 contacts size 22

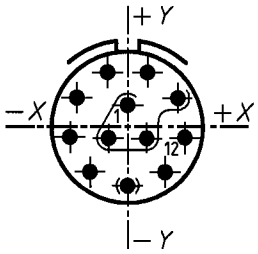


Figure 7

12-03
3 contacts size 16

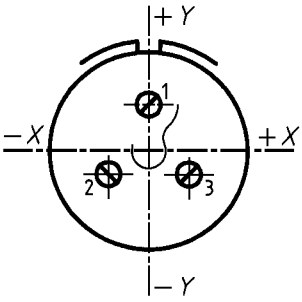


Figure 8

12-12
12 contacts size 20

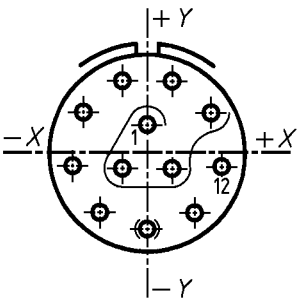


Figure 9

12-21
21 contacts size 22

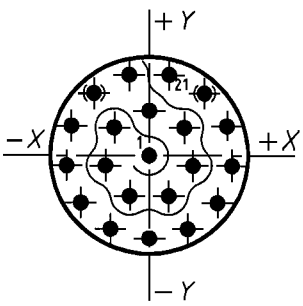


Figure 10

14-04
4 contacts size 12

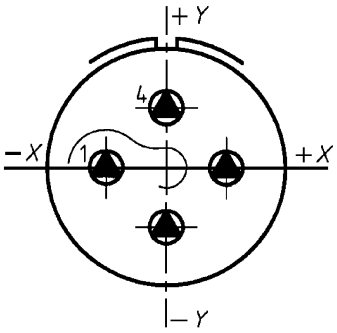


Figure 11

14-07
7 contacts size 16

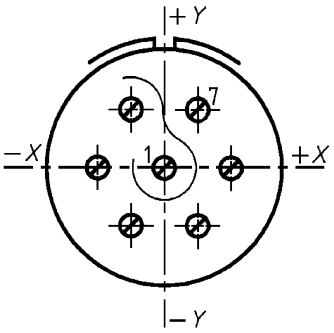


Figure 12

14-12
9 contacts size 20
3 contacts size 16

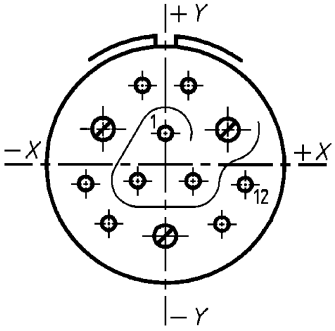


Figure 13

14-15
15 contacts size 20

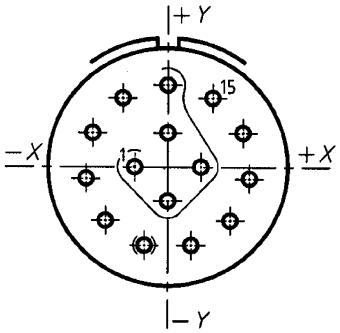


Figure 14

16-10
10 contacts size 16

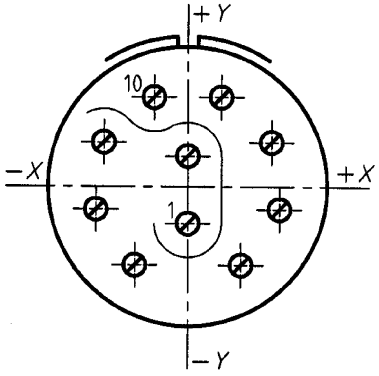


Figure 15

16-24
24 contacts size 20

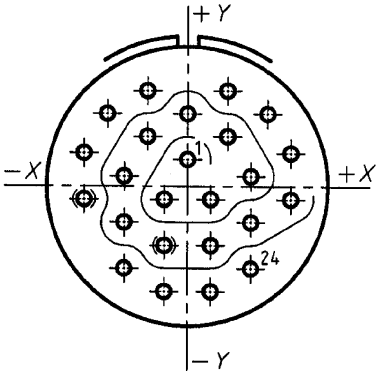


Figure 16

18-08
8 contacts size 12

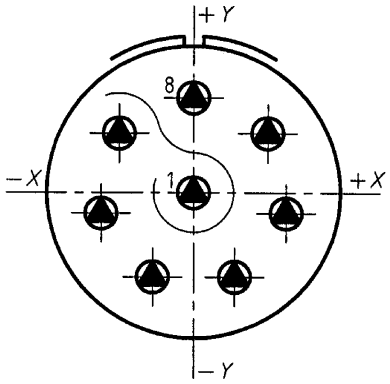


Figure 17

18-14
14 contacts size 16

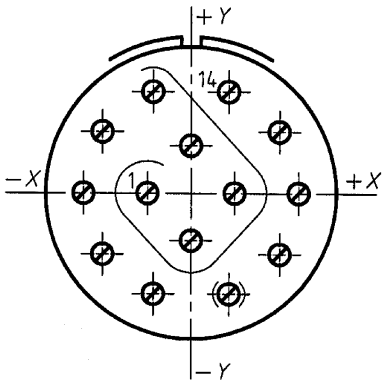


Figure 18

18-31
31 contacts size 20

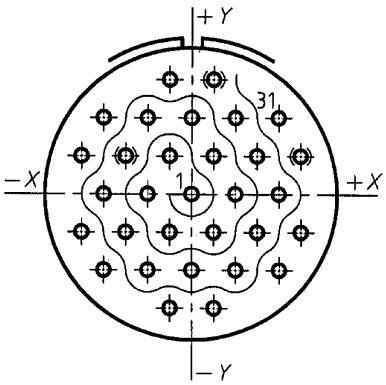


Figure 19

20-16
16 contacts size 16

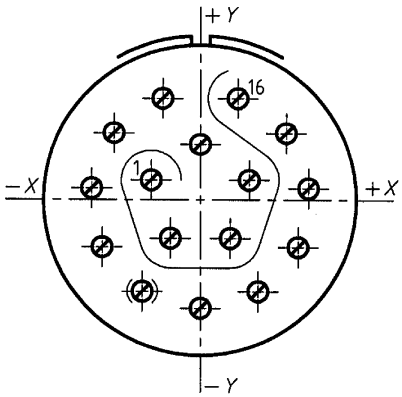


Figure 20

20-25
19 contacts size 20
6 contacts size 12

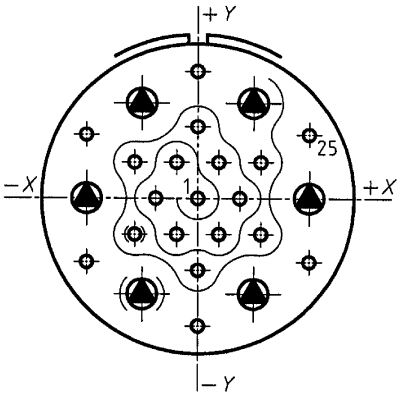


Figure 21

20-28
24 contacts size 20
4 contacts size 12

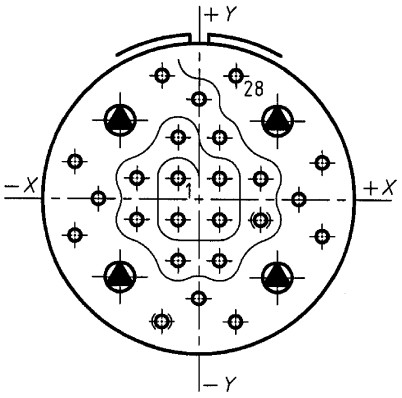


Figure 22

20-39
37 contacts size 20
2 contacts size 16

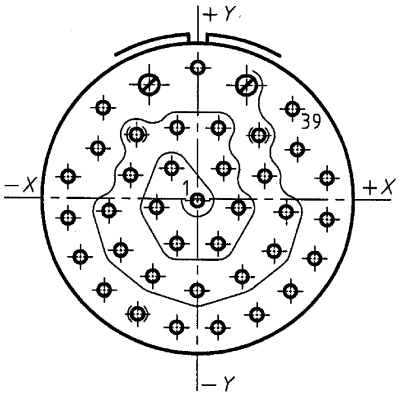


Figure 23

20-41
41 contacts size 20

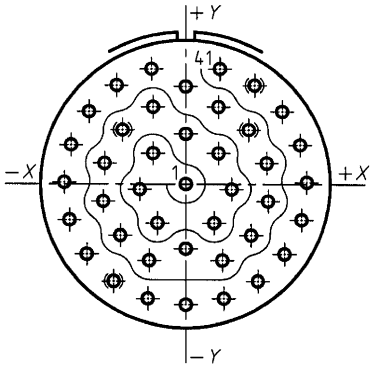


Figure 24

22-12
12 contacts size 12

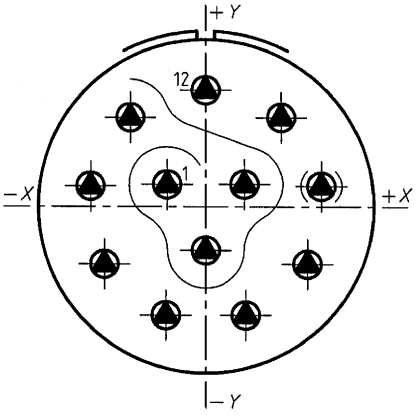


Figure 25

22-19
19 contacts size 16

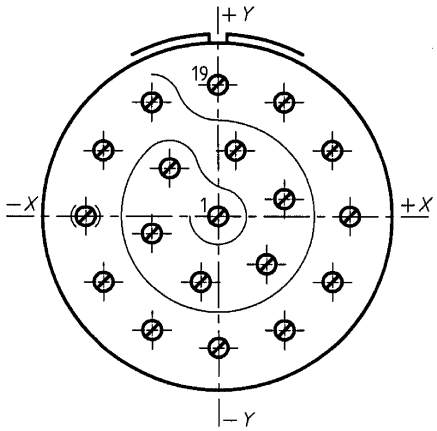
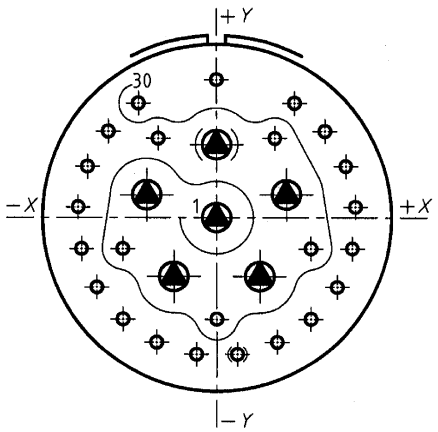


Figure 26

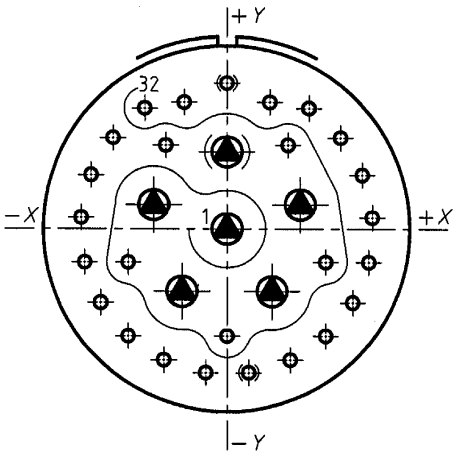
22-30
24 contacts size 20
6 contacts size 16



This arrangement is not available for new design.

Figure 27

22-32
26 contacts size 20
6 contacts size 12



This arrangement is not available for new design.

Figure 28

22-39
27 contacts size 20
12 contacts size 16

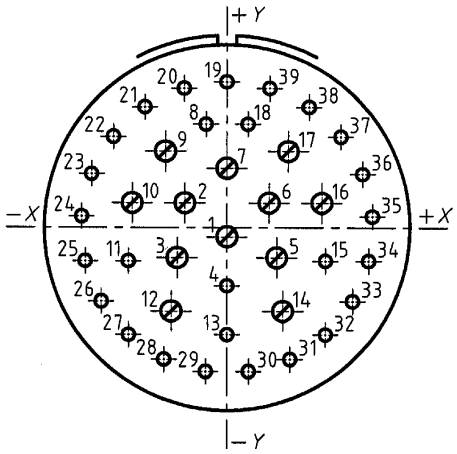


Figure 29

22-55
55 contacts size 20

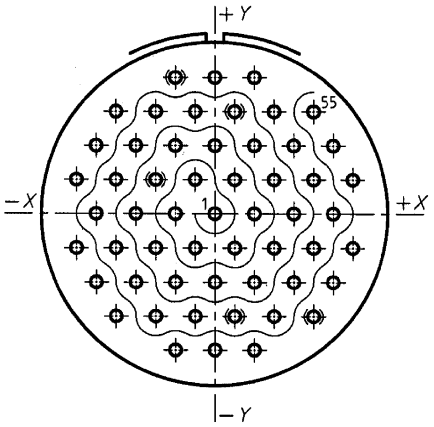


Figure 30

24-30
30 contacts size 16

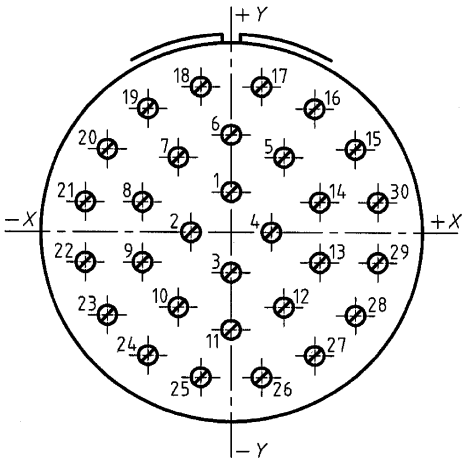


Figure 31

24-43
23 contacts size 20
20 contacts size 16

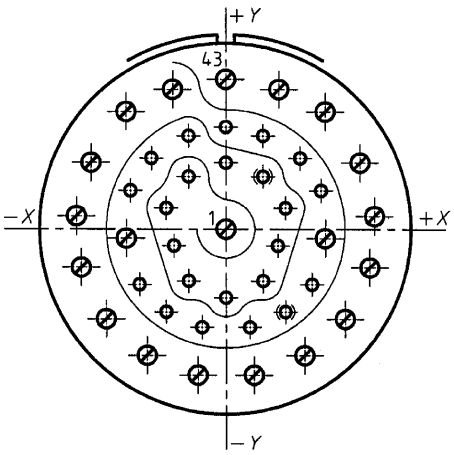


Figure 32

24-57
55 contacts size 20
2 contacts size 12

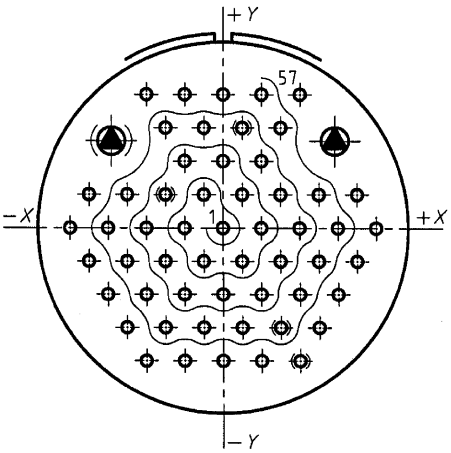


Figure 33

24-61
61 contacts size 20

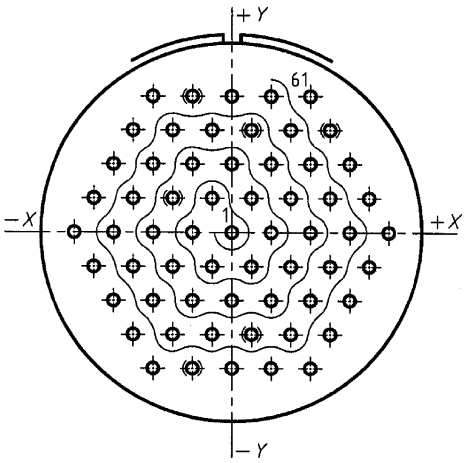


Figure 34

28-42
42 contacts size 16

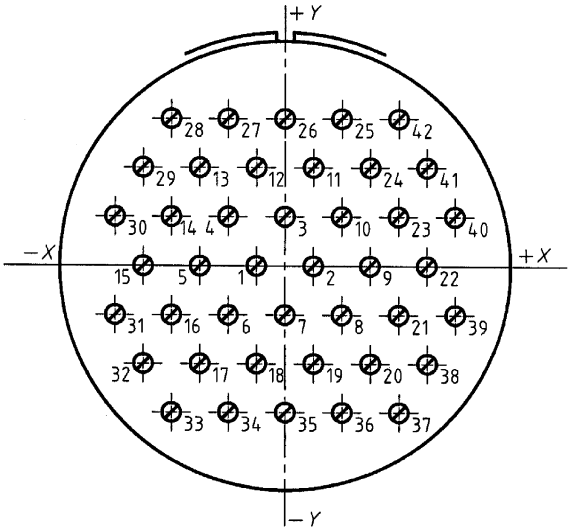


Figure 35

9 Contacts

Removable contacts which can be used with the various classes of connectors are indicated in EN 3155-002.

EXAMPLE 1 For 175 °C and 200 °C continuous classes:

— male contacts according to EN 3155-018;

— female contacts according to EN 3155-019.

EXAMPLE 2 For 260 °C peak class:

— male contacts according to EN 3155-004;

— female contacts according to EN 3155-005.

EXAMPLE 3 For 260 °C peak class high vibrations:

— male contacts according to EN 3155-080;

— female contacts according to EN 3155-081.

10 Sealing plugs

Sealing plugs defined in EN 4529-002 shall be used in the grommet cavities which correspond to unwired contacts.

11 Cable outlets

For details about cable outlets suitable for use if applicable with connectors listed herein refer EN 3660-002.

12 Tooling

The tooling for crimping, installing and extracting removable contacts is indicated in the standards for contacts.

13 Assembly and wiring instruction

See EN 3197.

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