SLOVENSKI STANDARD
SIST EN 2997-1:2001

01-januar-2001

Aerospace series - Connectors, electrical, circular, coupled by threaded ring, fire-resistant or non fire-resistant, operating temperatures 175°C continuous, 200°C continuous, 260°C peak - Part 1: Technical specification

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Luft- und Raumfahrt - Elektrische Rundsteckverbinder mit Schraubkupplung, feuerbeständig oder nicht feuerbeständig, Betriebstemperaturen 175°C konstant, 200°C konstant, 260°C Spitze - Teil 1: Technische Lieferbedingungen

Série aérospatiale - Connecteurs électriques circulaires à accouplement par bague filetée, résistant au feu ou non, températures d'utilisation 175°C continu, 200°C continu, 260°C en pointe - Partie 1: Spécification technique

Ta slovenski standard je istoveten z: **EN 2997-1:1997**

ICS:

49.060	Letalska in vesoljska elektriļ na oprema in sistemi	Aerospace electric equipment and systems

SIST EN 2997-1:2001 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 2997-1

June 1997

ICS 49.060

Descriptors: aircraft industry, connecting equipment, electric connectors, specifications

English version

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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

The European Standards exist in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart,36 B-1050 Brussels

Foreword

This European Standard has been prepared by the European Association of Aerospace Manufacturers (AECMA).

After inquiries 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 AECMA, 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of an identical text or by endorsement, at the latest by December 1997, and conflicting national standards shall be withdrawn at the latest by December 1997.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

0 Introduction

This family of connectors is derived from MIL-C-83723 series III, type T with which it is intermateable and MIL-C-39029 for the contacts. It is particularly suitable for use on aircraft engines and in zones of severe environmental conditions on board aircraft, applying EN 2282.

These connectors are distinguishable from MIL-C-83723 by :

- the mechanical stop for coupling achieved manually;
- the coupling system with self-locking screw that features a greater resistance to decoupling;
- the variety of the functional classes and models.

1 Scope

This standard specifies the general characteristics, the conditions for qualification, acceptance and quality assurance, as well as the test programs and groups for threaded ring coupling circular connectors, fire-resistant or non fire-resistant, intended for use in a temperature range from – 65 °C to 175 °C continuous, 200 °C continuous or 260 °C peak according to the classes and models.

2 Normative references

This European Standard incorporates by dated or undated reference provisions from others publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

ISO 4524-1	Metallic coatings - Test methods for electrodeposited gold and gold alloy coatings - Part 1 : Determination of coating thickness
ISO 4524-5	Metallic coatings - Test methods for electrodeposited gold and gold alloy coatings - Part 5 : Adhesion tests
EN 2234	Aerospace series - Fire-resistant electrical cables - Technical specification [1]
EN 2267-002	Aerospace series - Cables, electrical, for general purpose - Operating temperatures between – 55 °C and 260 °C - Part 002 : General [1]
EN 2282	Aerospace series - Characteristics of aircraft electrical supplies
EN 2591 *	Aerospace series - Elements of electrical and optical connection - Test methods - General
EN 2997-002	Aerospace series - Connectors, electrical, circular, coupled by threaded ring, fire-resistant or non fire-resistant, operating temperatures 175 °C continuous, 200 °C continuous, 260 °C peak - Part 002 : Specification of performance and contact arrangements [1]
EN 2997-009	Aerospace series - Connectors, electrical, circular, coupled by threaded ring, fire-resistant or non fire-resistant, operating temperatures 175 °C continuous, 200 °C continuous, 260 °C peak - Part 009 : Protective cover for receptacle - Product standard [1]

* Including all its parts

1) Published as AECMA Prestandard at the date of publication of this standard

EN 2997-010	Aerospace series - Connectors, electrical, circular, coupled by threaded ring, fire-resistant or non fire-resistant, operating temperatures 175 °C continuous, 200 °C continuous, 260 °C peak - Part 010 : Protective cover for plug - Product standard 1)
EN 2997-011	Aerospace series - Connectors, electrical, circular, coupled by threaded ring, fire-resistant or non fire-resistant, operating temperatures 175 °C continuous, 200 °C continuous, 260 °C peak - Part 011 : Dummy receptacle - Product standard 1)
EN 3042	Aerospace series - Quality assurance - EN aerospace products - Qualification procedure
EN 3155-001	Aerospace series - Electrical contacts used in elements of connection - Part 001 - Technical specification 1)
EN 3197	Aerospace series - Installation of aircraft electrical and optical interconnection systems 1)
EN 3660-001	Aerospace series - Cable outlet accessories for circular and rectangular electrical and optical connectors - Part 001 : Technical specification 1)
EN 3660-003	Aerospace series - Cable outlet accessories for circular and rectangular electrical and optical connectors - Part 003 : Grommet nut, type A, 003 - Product standard 1)
EN 3660-004	Aerospace series - Cable outlet accessories for circular and rectangular electrical and optical connectors - Part 004 : Cable outlet, type A, 004, straight, unsealed, with clamp strain relief - Product standard 1)
EN 3660-005	Aerospace series - Cable outlet accessories for circular and rectangular electrical and optical connectors - Part 005 : Cable outlet, type A, 005, 90°, unsealed, with clamp strain relief - Product standard 1)
MIL-A-8243D	Anti-icing and de-icing-defrosting fluids 2)
MIL-C-25769J	Cleaning compound, aircraft surface, alkaline water base 2)
MIL-C-39029D	Contacts, electrical connector, general specification for 2)
MIL-C-83723D	Connectors, electrical, (circular, environment resisting), receptacles and plugs, general specification for 2)
MIL-H-5606E	Hydraulic fluid, petroleum base, aircraft, missile and ordnance 2)
MIL-L-7808J	Lubricating oil, aircraft turbine engine, synthetic base, NATO code number O-148 2)
MIL-L-7870A	Lubricating oil, general purpose, low temperature 2)
MIL-L-23699C	Lubricating oil, aircraft turbine engine, synthetic base 2)
MIL-STD-454M	Electronic equipment, standard general requirements for 2)
AS 1241A	Fire resistant phosphate ester hydraulic fluid for aircraft 3)
FED-STD-H28 : 1978	Screw thread standards for federal services 2)
TR 4257	Aerospace series - Elements of electrical and optical connection - Relationship between the numbering systems for parts of EN 2591 4)

1) Published as AECMA Prestandard at the date of publication of this standard

2) Published by : Department of Defense (DOD), the Pentagon, Washington, D.C. 20301 USA

3) Published by : Society of Automotive Engineers, Inc. (SAE) 400 Commonwealth Drive, Warrendale, PA 15096-001 USA

4) Published as AECMA Technical Report at the date of publication of this standard

3 Terminology

See EN 2591.

4 Description

Different variants of materials, housings and contact arrangements are provided according to the models depending on the service conditions.

These connectors use crimp or solder contacts of sizes 20, 16, 12 and only contacts of size 10 are triaxial.

The receptacles and plugs contain either male contacts or female contacts.

The contacts fitted in the model Y and YE receptacles are exclusively of the male solder type.

The connectors are polarized by means of keyways and keys ; polarization shall be obtained before the male contacts enter the insert of the female contacts and before the coupling ring is engaged. The position of the keying arrangement is given in table 5.

The visual check of coupling is obtained by masking of a blue colour band on the receptacle.

4.1 Receptacle

The receptacle may be attached by :

- square flange;
- nut, with sealing by O-ring at the attachment;
- round soldered or brazed flange for model Y and YE connectors.

The receptacle contains five keyways in which the keys of the plug engage. The main keyway is fixed and is wider than the others. Polarization is ensured by the different positions which the secondary keyways may take. The position of the insert is fixed relative to the main keyway.

4.2 Plug

The plug contains five keys which engage in the keyways of the receptacle. The main key is wider than the others. Polarization is ensured by the different positions which the secondary keys may take. The position of the insert is fixed relative to the main key.

The coupling ring permanently fitted on the plug enables the connectors to be coupled and uncoupled. The screwing up torque shall be lower than the unscrewing torque. The internal thread of the coupling ring may be treated with a suitable lubricant compatible with the performance required in this standard.

The plug of models S, SE, RS and WS is fitted with a grounding spring device ensuring electrical continuity between the coupled connector housings.

4.3 Materials and surface treatment

When dissimilar metals are in close contact, adequate protection against corrosion shall be used for the electromotive force of the cell not to exceed 0,25 V.

4.3.1 Housings

The material of the housing for the connectors and for the fittings may either be passivated stainless steel or light alloy protected against corrosion by nickel or cadmium plating (see EN 2997-002).

4.3.2 Contacts

Unless otherwise specified, the contacts shall be in ferrous alloy for models Y and YE and in copper alloy for the other models.

They shall be gold-plated on an appropriate undercoat. Selective protection is authorized provided that it is sufficient to ensure that performance is respected.

Measurement of the thickness of the protective treatment shall be effected in accordance with ISO 4524-1.

4.3.3 Non-metallic materials

The materials used for insert, seals and grommets shall have a hardness and mechanical and electrical characteristics consistent with the required use.

5 Design

5.1 Housings

The connector housings shall be in one unit. They shall contain teeth at the rear over the entire periphery and shall accommodate the back shells and other fittings. The receptacle shall furthermore be fitted with an O-ring seal for sealing the coupled housings.

Receptacles for attachment by nut shall contain an O-ring seal. The nut shall have holes for the passage of locking wire.

The threads shall conform to FED-STD-H28.

The coupling ring shall be designed so that the male and female contacts engage when it is screwed to the right and disengage when it is unscrewed to the left. The coupling ring shall be knurled.

On completion of tightening of the coupling ring, mechanical contact shall exist between the receptacle and the plug. Masking of the colour band (see figure 1) shall show that the connectors are correctly coupled.

The rear fittings shall compress the grommet of the connectors without twisting it.

A blue colour band indicating that the crimp contacts of the connectors are intended for rear removal shall be provided :

- behind the flange of the receptacles with square flange;
- on the flange of receptacles for nut attachment;
- on the coupling ring of the plugs.

The position of the colour bands shall be such that at least one of them is visible when the connectors are fitted and when they are coupled or uncoupled.

5.2 Inserts

The insert carrying the male and female contacts shall be in hard material and have a cross section and radii such that no cracks, flaking or breaks can occur in normal operation.

The insert for contacts shall be non-removable ; it shall be mechanically held in the housing. Sealing shall be provided between the housing and insert.

The front face of the insert shall be such that sealing is ensured when the connectors are coupled. The interfacial seal of the insert of the male contacts shall be bonded on the hard insert.

The grommet shall permit sealing for all cable diameters indicated in EN 2997-002 and shall not be removable.

The mechanical contacts retention system shall be integrated in the hard insert.

The design of non-hermetic connectors shall permit individual installation of the contacts without removal of the insert or grommet. Fitting and removal of the contacts shall be from the rear with the tools specified in the product standards.

6 Definition drawings and masses

The general dimensions and the masses of receptacles, plugs and protective covers are given in the product standards.

6.1 Receptacle mating dimensions

The mating dimensions of receptacles are shown in figure 1 including details A, B, C and D as well as in tables 1 and 2.

Dimensions and tolerances are in millimeters.

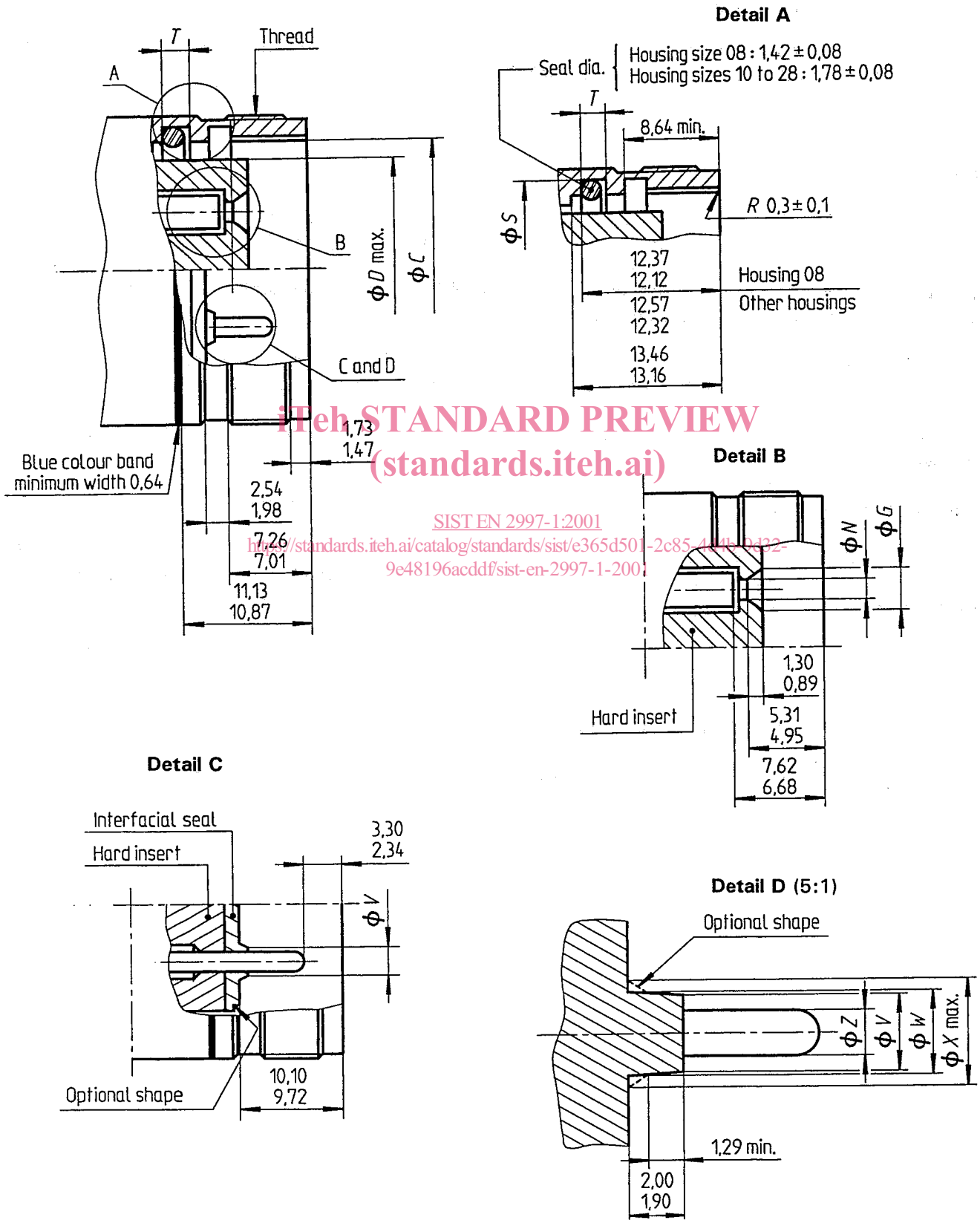


Figure 1

Table 1

Housing size	Thread, class 2A [1]	*C*	*D* max.	*S*	*T*
08	0,562 UNEF 24	10,62 10,49	7,37	12,58 12,45	1,93 1,80
10	0,688 UNEF 24	13,59 13,46	9,86	16,28 16,15	2,26 2,13
12	0,875 UNEF 20	17,91 17,78	14,17	20,60 20,47	
14	0,938 UNEF 20	19,66 19,53	15,93	22,35 22,22	
16	1,062 UNEF 18	22,89 22,76	19,61	25,58 25,45	
18	1,188 UNEF 18	25,58 25,45	21,84	28,27 28,14	
20	1,312 UNEF 18	28,75 28,63	25,02	31,45 31,32	
22	1,438 UNEF 18	31,93 31,80	28,19	34,62 34,49	
24	1,562 UNEF 18	35,10 34,98	31,37	37,80 37,67	
28	1,812 UN 16	41,45 41,32	37,52	44,15 44,02	

1) FED-STD-H28

Table 2

Contact size	*G* [1]	*M*	*N*	*U* [2]	*V*	*W*	*X* [1] max.	*Z*
20	3,00 2,90	1,50 1,24	1,50 1,24	1,17 1,07	2,28 2,14	2,38 2,28	3,00	1,04 0,99
16	3,81 3,71	2,06 1,80	2,06 1,80	1,75 1,65	2,88 2,73	2,98 2,88	3,81	1,61 1,56
12	5,33 5,22	2,84 2,54	2,84 2,59	2,57 2,46	3,85 3,68	3,95 3,85	5,33	2,41 2,36

1) For contact arrangement 08-03, $G = \begin{matrix}2,44\\2,34\end{matrix}$, X max. = 2,44

2) Dimension *U* does not apply to hermetic receptacles.

6.2 Plug mating dimensions

The mating dimensions of plugs are shown in figure 2 including details A, B, C, in detail D of figure 1 and in tables 2 and 3.

Dimensions and tolerances are in millimeters.

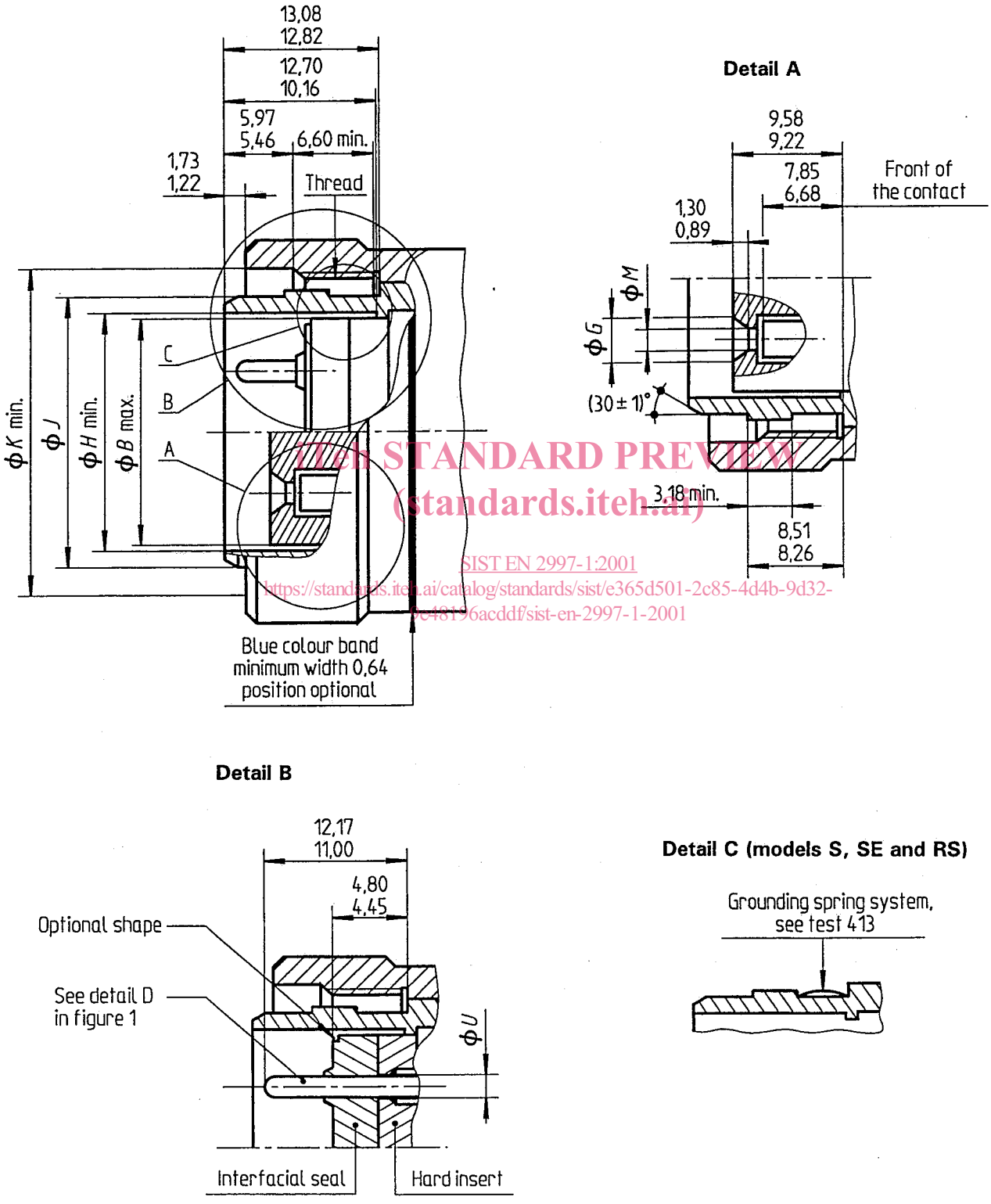


Figure 2

Table 3

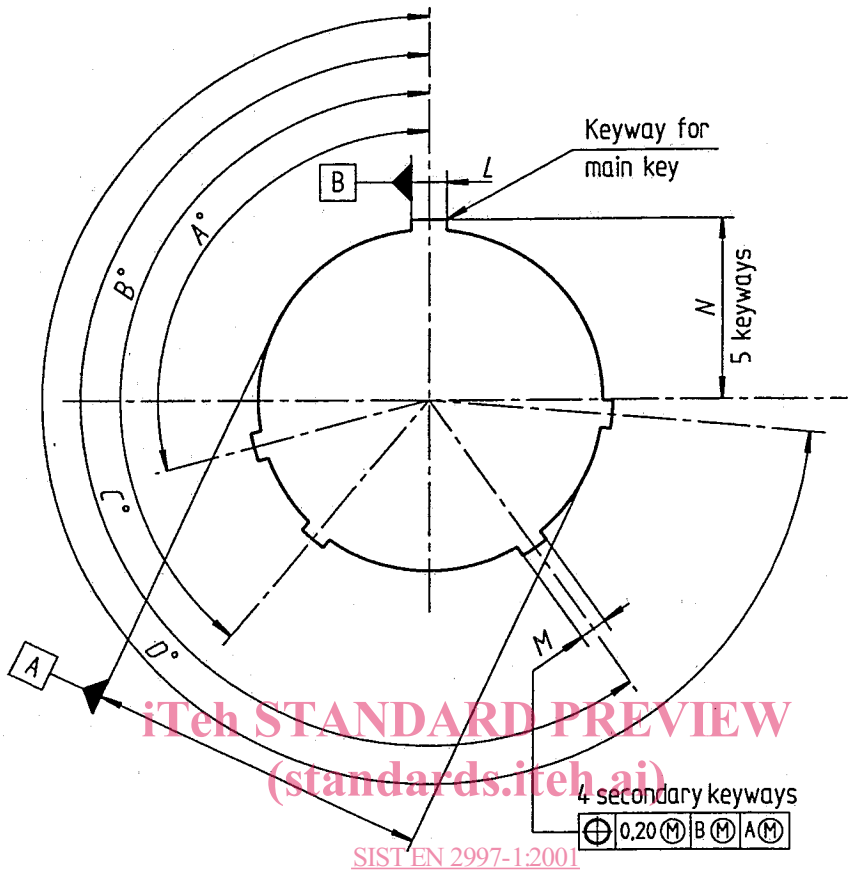
Housing size	Thread, class 2B [1]	*B* max.	*H* min.	*J*	*K* min.
08	0,562 UNEF 24	7,37	7,47	10,29 10,16	14,61
10	0,688 UNEF 24	9,86	10,87	13,36 13,23	17,96
12	0,875 UNEF 20	14,17	15,19	17,68 17,55	22,73
14	0,938 UNEF 20	15,93	16,94	19,43 19,30	24,31
16	1,062 UNEF 18	19,61	20,17	22,66 22,53	27,53
18	1,188 UNEF 18	21,84	22,86	25,35 25,22	30,71
20	1,312 UNEF 18	25,02	26,04	28,52 28,40	33,88
22	1,438 UNEF 18	28,19	29,21	31,70 31,57	37,06
24	1,562 UNEF 18	31,37	32,38	34,87 34,75	40,23
28	1,812 UN 16	37,52	38,73	41,22 41,09	46,58

1) FED-STD-H28

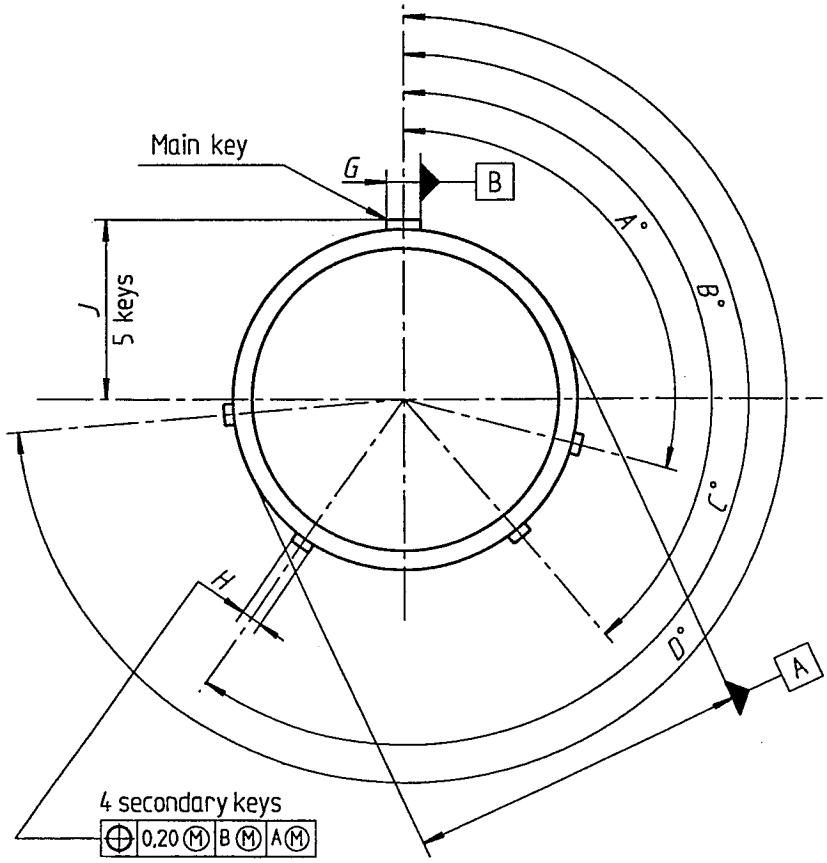
6.3 Receptacle and plug polarization

See figure 3 and tables 4 and 5.

Dimensions and tolerances are in millimeters.



Receptacle



Plug

Figure 3

Table 4 : Position of the keys and keyways

Position	Housing sizes - Values in degrees											
	08				10				12 to 28			
	A	*B*	*C*	*D*	*A*	*B*	*C*	*D*	*A*	*B*	*C*	*D*
N	105	140	215	265	105	140	215	265	105	140	215	265
6	102	132	248	320	102	140	248	320	18	149	192	259
7	80	118	230	312	80	118	230	312	92	152	222	342
8	35	140	205	275	35	140	205	275	84	152	204	334
9	64	155	234	304	64	155	234	304	24	135	199	240
Y	-	-	-	-	25	115	220	270	98	152	268	338

Table 5

Housing size	*G*	*H*	*J*	*L*	*M*	*N*
08			5,72 5,64			5,92 5,79
10	2,21 2,05		7,24 7,16	2,47 2,31		7,45 7,32
12			9,40 9,32			9,60 9,47
14			10,29 10,21			10,49 10,36
16	3,00 2,84	1,40 1,24	11,89 11,81	3,26 3,10	1,96 1,83	12,09 11,96
18			13,23 13,15			13,44 13,31
20			14,81 14,73			15,01 14,58
22			16,41 16,33			16,61 16,48
24			17,98 17,90			18,19 18,06
28			21,16 21,08			21,42 21,29