

SLOVENSKI STANDARD

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Nadomešča:

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Aeronavtika - Konektorji, električni, okrogli, zaščiten kontakt, hitra spojka z navojem, stalna delovna temperatura 175 °C ali 200 °C - 001. del: Tehnična specifikacija

Aerospace series - Connectors, electrical, circular, scoop-proof, triple start threaded coupling, operating temperature 175 °C or 200 °C continuous - Part 001: Technical specification

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Luft- und Raumfahrt - Elektrische Rundsteckverbinder, kontaktgeschützt, dreigängige Gewinde-Schnellkupplung, Betriebstemperatur 175 °C oder 200 °C konstant - Teil 001: Technische Lieferbedingungen

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Série aéronautique - Connecteurs électriques circulaires, à contacts protégés, à accouplement par filetage, à pas rapide à trois filets, température d'utilisation 175 °C ou 200 °C continu - Partie 001 : Spécification technique

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49.060	Letalska in vesoljska električna oprema in sistemi	Aerospace electric equipment and systems

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**Aerospace series - Connectors, electrical, circular, scoop-
proof, triple start threaded coupling, operating
temperature 175 °C or 200 °C continuous - Part 001:
Technical specification**

Série aérospatiale - Connecteurs électriques
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kontaktgeschützt, dreigängige Gewinde-
Schnellkupplung, Betriebstemperatur 175 °C oder 200
°C konstant - Teil 001: Technische Lieferbedingungen

This European Standard was approved by CEN on 22 November 2021.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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EN 3645-001:2022 (E)**European foreword**

This document (EN 3645-001:2022) 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 document 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 document shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by March 2023, and conflicting national standards shall be withdrawn at the latest by March 2023.

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

This document supersedes EN 3645-001 :2019.

The main changes with respect to the previous edition are listed in the following table.

Table X — Main changes introduced

prEN/EN Number	Edition	Publication Date	Modification
prEN 3645-001	P5	2021-12-01	Introduction of Hexavalent Chromium free (in both manufacturing process and final product) plating classes and related compatibility testing with legacy Cadmium plated items
			Addition of optional marking for insulators according to MIL standard

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

Introduction

This family of connectors is derived from MIL-DTL-38999 series III, with which it is intermateable and interchangeable. It is particularly suitable for use in zones of severe environmental conditions on board aircraft, applying EN 2282.

These connectors are distinguishable from MIL-DTL-38999 by:

- a compatibility with size 8 power and quadrax contacts;
- self-extinguishing materials;
- compatibility with reduced diameter cables;
- additional reinforced fuel resistant insert type;
- additional insert with grounded cavities.

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EN 3645-001:2022 (E)

1 Scope

This document 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, intended for use in a temperature range from -65 °C to 175 °C continuous or 200 °C continuous according to the classes.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 2267-002, *Aerospace series — Cables, electrical, for general purpose — Operating temperatures between -55 °C and 260 °C — Part 002: General*

EN 2346 (all parts), *Aerospace series — Cable, electrical, fire resistant — Operating temperatures between -65 °C and 260 °C*

EN 2591-*, *Aerospace series — Elements of electrical and optical connection — Test methods*

EN 3155-001:2016, *Aerospace series — Electrical contacts used in elements of connection — Part 001: Technical specification*

EN 3197, *Aerospace series — Design and installation of aircraft electrical and optical interconnection systems* ¹⁾

EN 3645-002, *Aerospace series — Connectors, electrical, circular, scoop-proof, triple start threaded coupling, operating temperature 175 °C or 200 °C continuous — Part 002: Specification of performance and contact arrangements*

EN 3909, *Aerospace series — Test fluids and test methods for electrical and optical components and sub-assemblies*

ISO 68-1, *ISO general purpose screw threads — Basic profile — Part 1: Metric screw threads* ²⁾

ISO 261, *ISO general purpose metric screw threads — General plan* ²⁾

ISO 262, *ISO general purpose metric screw threads — Selected sizes for screws, bolts and nuts* ²⁾

ISO 965-2, *ISO general purpose metric screw threads — Tolerances — Part 2: Limits of sizes for general purpose external and internal screw threads — Medium quality* ²⁾

ISO 27874, *Metallic and other inorganic coatings — Electrodeposited gold and gold alloy coatings for electrical, electronic and engineering purposes — Specification and test methods* ²⁾

* All parts quoted in this document.

¹⁾ Published as ASD-STAN Standard at the date of publication of this document by AeroSpace and Defence industries Association of Europe — Standardization (ASD-STAN), <https://www.asd-stan.org/>.

²⁾ Published by: ISO International Organization for Standardization <http://www.iso.ch/>.

MIL-DTL-38999, *Connectors, electrical, circular, miniature, high density, quick disconnect (bayonet, threaded, and breech coupling), environment resistant, removable crimp and hermetic solder contacts, general specification for* ³⁾

MIL-DTL-38999/62, *Sealing boot, size 8, pin or socket, shielded crimp contacts, electrical connector, circular, metric* ³⁾

MIL-HDBK-454, *General guidelines for electronic equipment* ³⁾

MIL-STD-1373, *Screw-thread, modified, 60°, stub, double* ³⁾

MIL-STD-1560, *Defence logistics agency: Insert Arrangements for MIL-DTL-38999, MIL-DTL-27599, and SAE-AS29600 Series A Electrical Circular Connectors* ³⁾

TR 4865, *Aerospace series — Suitable cable outlet to be mated on EN 3645 connector (layout type: 21R48) for the qualification of electrical contact product standards EN 3155-065 and EN 3155-083* ⁴⁾

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 2591-100 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

4 Description

4.1 General

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

The pair of connectors is characterized:

- by shell-to-shell bottoming;
- by its triple threaded and self-locking coupling system;
- by plugs with shielding ring providing protection against radioelectrical interference;
- by the scoop-proof shells.

These connectors use the following contacts:

- crimped sizes 22, 20, 16, 12, 10 and 8;
- soldered (model Y) sizes 22, 20, 16 and 12;

³⁾ Published by: DEFENSE LOGISTICS AGENCY DLA Land and Maritime (US)
<https://landandmaritimeapps.dla.mil/Programs/MilSpec/DocSearch.aspx>.

⁴⁾ Published as ASD-STAN Technical Report at the date of publication of this document by AeroSpace and Defence industries Association of Europe — Standardization (ASD-STAN), <http://www.asd-stan.org/>.

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- coaxial crimped or soldered sizes 16, 12 and 8;
 - triaxial crimped or soldered size 8;
 - quadrax crimped size 8.
- } For arrangements comprising the letter G or Q, all contacts are grounded to the receptacle housing

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

The contacts fitted in the class Y 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 7.

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

4.2 Receptacle

The receptacle housing may be attached:

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

4.3 Plug

The coupling ring is permanently fitted to the plug and allows coupling and uncoupling of the connectors. The lanyard release version may also be uncoupled by pulling on the lanyard.

The plug is fitted with a self-locking mechanism and a grounding spring device ensuring electrical continuity between the coupled connector housings.

An anti-decoupling device shall be provided to maintain complete coupling.

4.4 Materials and surface treatment**4.4.1 General**

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 (see EN 3197).

4.4.2 Housing

The material of the housings for the connectors and fittings may be either aluminium alloy, passivated stainless steel or composite. Aluminium alloy and composite shall be plated as defined by the class (composite coupling rings and Hex nut may be unplated) (see EN 3645-002).

4.4.3 Contacts

Unless otherwise specified, the non-removable contacts shall be in ferrous alloy for class Y and in copper alloy for the other classes.

They shall be gold-plated on an appropriate undercoat. Selective protection is authorised provided that it is sufficient to ensure that the specified performance is achieved.

Measurement of the thickness of the protective plating shall be effected in accordance with ISO 27874.

NOTE In the past, the determination of coating thickness was described in ISO 4524-1, which has been withdrawn.

For removable contacts, see EN 3645-002.

4.4.4 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.

4.4.5 Surfaces treatments

Label chrome 6 free (not applicable for class W & I):

None of the hexavalent chromium compounds listed hereafter shall be added by any actor of the Supply Chain or used in the manufacturing process.

The manufacturing process begins with the creation of the materials from which the design is made. Manufacturing processes include treating (such as heat treating or plating), machining, moulding or reshaping the material.

Table 2 — Hexavalent chromium compound list ⁵⁾

Substance name	CAS number
Acids generated from chromium trioxide and their oligomers. Names of the acids and their oligomers: chromic acid, dichromic acid, oligomers of chromic acid and dichromic acid.	7738-94-5 13530-68-2
Chromium trioxide	1333-82-0
Potassium dichromate	7778-50-9
Sodium chromate	7775-11-3
Sodium dichromate	7789-12-0 10588-01-9
Dichromium tris(chromate)	24613-89-6
Pentazinc chromate octahydroxide	49663-84-5
Potassium hydroxyoctaoxodizincatedichromate	11103-86-9
Strontium chromate	7789-06-2

5 Design

5.1 Housings

The connector housings shall be one-piece. They shall contain teeth at the rear over their entire periphery and shall accommodate the rear accessories. The receptacle shall be fitted with a seal for sealing the coupled housings.

Jam-nut receptacles shall contain an O-ring seal. The nut shall have holes for the passage of locking wire.

During coupling the grounding spring shall be engaged a minimum of 1,02 mm in the receptacle before the contacts engage.

⁵⁾ The CAS Registry Number, also referred to as CASRN or CAS Number, is a unique numerical identifier assigned by the Chemical Abstracts Service, a division of the American Chemical Society.

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Except for the triple start threads, which shall conform to standard MIL-STD-1373, threads shall conform to standards ISO 68-1, ISO 261, ISO 262 and ISO 965-2.

The coupling ring shall be designed so that the male and female contacts engage when it is turned in a clockwise direction and disengage when turned anticlockwise. The coupling threads may have a lubricant applied during manufacture.

Full locking of the connectors shall occur at about 360°. On completion of tightening of the coupling ring, mechanical contact shall exist between the receptacle and plug housings. A red band shall be located on the receptacle so as to be visible when unmated and fully covered when completely mated.

The receptacle has five keyways which engage with corresponding keys on the plug. The major key is fixed and is wider than the others. Polarization is ensured by the different positions which the minor keys may take. The position of the insert is fixed relative to the major key.

A blue-coloured band indicating that the crimped contacts of the connectors are rear-releasable shall be provided:

- in front of the flange on square flange receptacles;
- on the flange of jam-nut receptacles;
- on the coupling ring of plugs.

This band shall be positioned so that at least one is visible when the connectors are fitted and when they are mated or unmated. Hermetic receptacles do not require blue colour band.

5.2 Inserts

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 3645-002 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 contact product standards.

Contact position identification shall be permanent and contrasted on the front face of the insert or the interfacial seal and on the rear face of the grommet as indicated in 6.6.

The marking shall not be recessed or raised on the surfaces providing a seal.

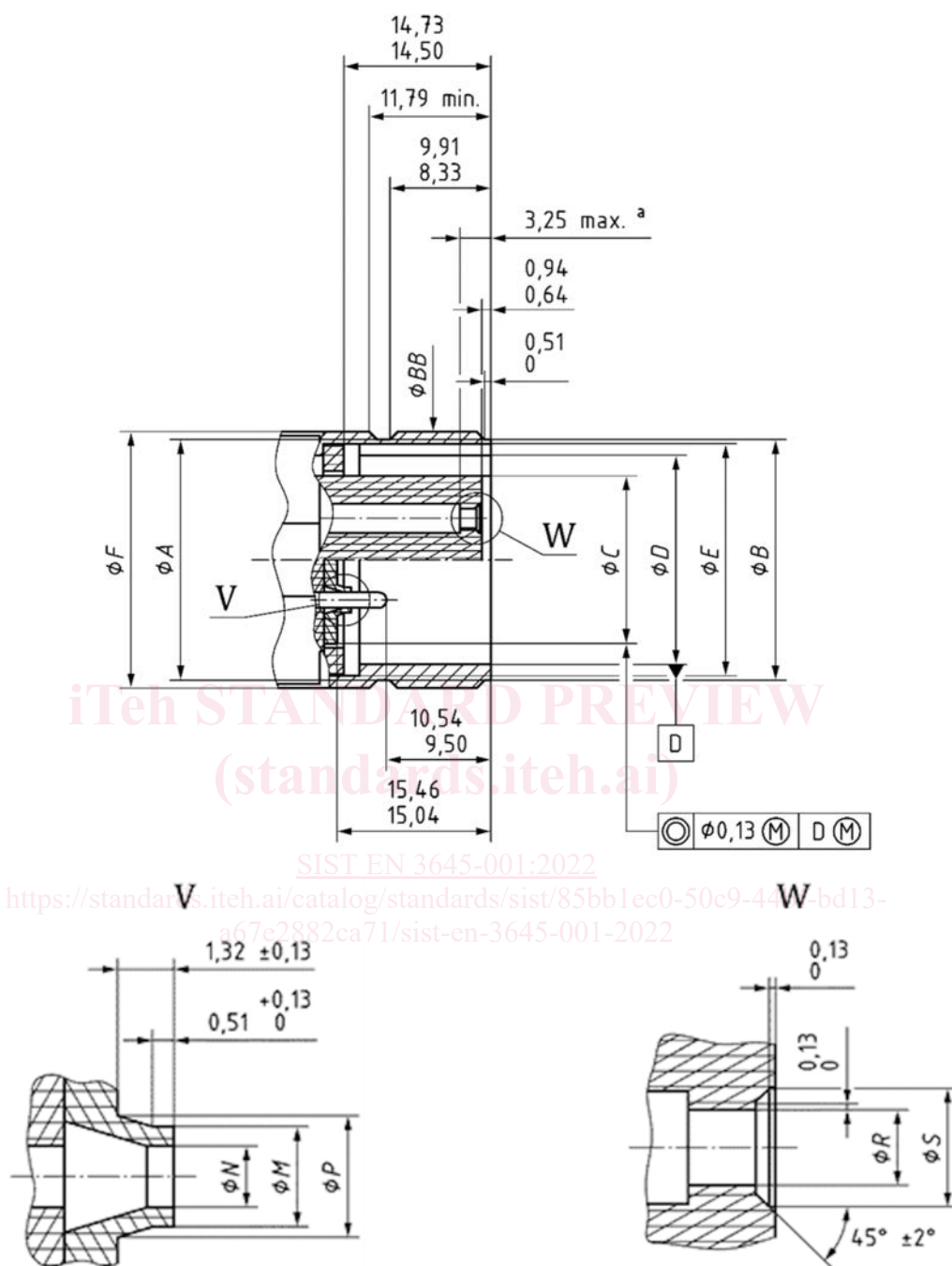
6 Definition drawings and masses**6.1 General**

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

6.2 Receptacle mating dimensions

The mating dimensions of receptacles are shown in Figure 1 and details V and W as well as in Table 3 and Table 4.

Dimensions and tolerances are in millimetres.



Key

- a The distance between the front face of the shell and the point where the right end of a gauge with a diameter equal to the nominal diameter of a male contact comes into contact with the elastic part of the female contact.

Figure 1 — Receptacle — Coupling dimensions

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Table 3 — Receptacle — Dimensions (1 of 2)

Housing size	A dia. max.	B dia.	C dia. + 0,13 -0,25	D dia. (except classes J and M)	D dia. (classes J and M only)	E dia. (except classes J and M)	E dia. (classes J and M only)	F dia. max.
09	14,55	14,42 14,14	7,24	11,36 11,20	11,43 11,20	12,63 12,34	12,70 12,34	15,88
11	17,73	17,60 17,32	10,49	14,61 14,45	14,68 14,45	15,88 15,60	15,95 15,60	19,05
13	20,90	20,77 20,49	13,39	17,45 17,30	17,52 17,30	19,66 19,38	19,73 19,38	22,23
15	24,08	23,95 23,67	16,56	20,63 20,44	20,70 20,44	22,84 22,56	22,91 22,56	25,40
17	28,52	28,30 27,97	19,74	23,80 23,64	23,87 23,64	26,01 25,73	26,08 25,73	30,16
19	30,12	29,89 29,56	22,00	26,47 26,31	26,54 26,31	28,63 28,40	28,70 28,40	31,75
21	33,30	33,07 32,74	25,17	29,64 29,49	29,71 29,49	31,85 31,57	31,92 31,57	34,73
23	36,47	36,24 35,91	28,35	32,82 32,66	32,89 32,66	35,03 34,75	35,10 34,75	38,10
25	39,65	39,42 39,09	31,52	35,99 35,84	35,06 35,84	38,20 37,92	38,27 37,92	41,28

Table 3 — Receptacle — Dimensions (2 of 2)

Contact size	M dia.	N dia. max.	P dia.	R dia.	S dia.
22	1,35 1,27	0,71	1,88 1,75	0,97 0,89	1,70 1,60
20	1,91 1,83	0,97	2,44 2,31	1,32 1,24	2,26 2,16
16	2,49 2,41	1,52	3,02 2,90	1,88 1,80	2,84 2,74
12	3,30 3,23	2,34	3,84 3,71	2,69 2,62	3,66 3,56
10	4,09 4,01	3,12	4,62 4,50	3,48 3,40	4,45 4,34
8	6,50 6,38	5,49	7,06 6,93	5,84 5,77	6,81 6,71

Table 4 — Receptacle — Thread

BB - Thread										
Housing size	Designation ^a Class 2A thread			See Note ^b	External threading Class 2A					
	Thread size inch	Apparent pitch inch	Actual pitch inch		External diameter		Diameter on side		Diameter at thread end	
					max.	min.	max.	min.	max.	min.
09	0,625 0	0,100	0,300	0,038 1	15,83	15,63	15,17	14,97	14,41	14,05
11	0,750 0				19,01	18,80	18,35	18,14	17,58	17,23
13	0,875 0				22,18	21,98	21,52	21,32	20,76	20,41
15	1,000 0				25,36	25,15	24,70	24,49	23,94	23,58
17	1,187 5				30,11	29,80	29,24	28,99	28,28	27,82
19	1,250 0			0,050 8	31,69	31,39	30,83	30,58	29,87	29,41
21	1,375 0				34,87	34,56	34,01	33,75	33,05	32,59
23	1,500 0				38,04	37,74	37,18	36,93	36,22	35,76
25	1,625 0				41,22	40,91	40,36	40,10	39,40	38,94
^a According to MIL-STD-1373.										
^b Gauges for protected threads: it is permissible to increase the maximum limit for gauge diameters by the value specified in this column.										

6.3 Plug mating dimensions SIST EN 3645-001:2022

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The mating dimensions of plugs are shown in Figure 2 and detail X in details V and W of Figure 1 and in Table 5 and Table 6.