



SLOVENSKI STANDARD SIST EN 4165-001:2009

01-februar-2009

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Aerospace series - Connectors, electrical, rectangular, modular - Operating temperature
175 °C continuous - Part 001: Technical specification

Luft- und Raumfahrt - Elektrische Rechtecksteckverbinder in modularer Bauweise -
Betriebstemperatur 175 °C konstant - Teil 001: Technische Lieferbedingungen

Série aérospatiale - Connecteurs électriques modulaires - Températures d'utilisation
175°C continu - Partie 001 : Spécification technique

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ICS:

49.060 Š^æ\ æš Ą^• [|b\ æ Aerospace electric
^|\ dā} æ [] !^ { æš Ą ã c^ { ã equipment and systems

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EUROPEAN STANDARD

EN 4165-001

NORME EUROPÉENNE

EUROPÄISCHE NORM

April 2007

ICS 49.060

English Version

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This European Standard was approved by CEN on 30 September 2005.

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This European Standard exists 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 CEN Management Centre has the same status as the official versions.

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Foreword

This document (EN 4165-001:2007) 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of an identical text or by endorsement, at the latest by October 2007, and conflicting national standards shall be withdrawn at the latest by October 2007.

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.

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, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

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EN 4165-001:2007 (E)**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 rectangular connectors with multiple removable modules, intended for use in a temperature range from – 55 °C to 175 °C continuous.

This family of connectors is particularly suitable for aeronautic use in zones of severe environmental conditions on board aircraft, applying EN 2282.

2 Normative references

The following referenced documents are indispensable for the application 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.

ISO 263, *ISO inch screw threads — General plan and selection for screws, bolts and nuts — Diameter range 0,06 to 6 in.*

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 2424, *Aerospace series — Marking of aerospace products*

EN 2591-100*, *Aerospace series — Elements of electrical and optical connection — Test methods — Part 100: General.*

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

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

EN 4165-002, *Aerospace series — Connectors, electrical, rectangular, modular — Operating temperature 175 °C continuous — Part 002: Specification of performance and contact arrangements.*

EN 4165-020, *Aerospace series — Connectors, electrical, rectangular, modular — Operating temperature 175 °C continuous — Part 020: Coupling system keyway for receptacle — Product standard.*

EN 9133, *Aerospace series — Quality management systems — Qualification Procedure for aerospace standard parts.*

MIL-PRF-87937D, *Cleaning Compound, Aerospace equipment.*²⁾

MIL-H-5606H, *Hydraulic Fluid, Petroleum Base; Aircraft; Missile and Ordnance.*²⁾

MIL-PRF-7808L, *Lubricating Oil, Aircraft Turbine Engine, Synthetic Base.*²⁾

MIL-PRF-7870C, *Lubricating Oil: General Purpose, Low Temperature.*²⁾

* All its parts quoted in this standard.

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

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

MIL-PRF-23699F, *Lubricating Oil, Aircraft Turbine Engine, Synthetic Base, NATO code number O-156.*²⁾

MIL-HDBK-454A, *General Guidelines for Electronic Equipment.*²⁾

SAE-AS1241C, *Fire Resistant Phosphate Ester Hydraulic Fluid for Aircraft.*³⁾

SAE-AMS1424D, *Fluid, deicing/anti-icing, aircraft, SAE type I.*³⁾

3 Terms and definitions

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

4 Description

4.1 General

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

These connectors have rectangular housings, removable modules and contacts. They can be fitted with cable outlets. Male or female modules can be inserted or intermixed in plug or receptacle housings. The connectors are mated and unmated by a centre coupling screw, which provides when the connectors are fully mated a shell to shell bottoming between plug and receptacle.

The plug contains a coupling screw and the receptacle a coupling nut.

This family of connectors provides two housing sizes (2 or 4 modules), two series (series 2 and scoop proof series 3) and two mating-unmating systems (screw or rack and panel).

The connectors are polarized by centre keying mechanism; polarization shall be obtained before the male contacts enter the module of the female contacts and before the coupling system is engaged. Keying mechanism shall provide 36 position keying capabilities.

These connectors use different types of contacts (signal, power, coaxial, ...) defined in EN 3155-002.

4.2 Receptacle

The receptacle may be attached by:

- rectangular flange with two mounting holes;
- two end flanges with transversal holes (panel mounting) and lateral holes (stackable mounting).

The receptacle contains a centre coupling nut which also ensures the polarization function (coding pin) by external keys. The main key is fixed and is wider than the other. Polarization is ensured by the different positions which the secondary key may take and the different positions in which the coding pin may be fixed in the housing.

The module cavities are identified on the housing of the receptacle by letter A, B, C, D for size 4 (four modules) and letter A, B for size 2 (two modules). The cavities are polarized by two keyways location.

3) Published by: Society of Automotive Engineers, Inc. (SAE), 400 Commonwealth Drive, Warrendale, PA 15096-0001, USA.

EN 4165-001:2007 (E)**4.3 Plug**

The plug contains a centre coupling screw and a clipped centre coding socket with internal keyways. The main keyway is wider than the others. Polarization is ensured by the different positions which the secondary keyway may take and the different positions which the centre coding socket may take, clipped in the housing.

The coupling screw 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 module cavities are identified on the housing of the plug by letter A, B, C, D for size 4 (four modules) and letter A, B for size 2 (two modules). The cavities are polarized by two keyway locations.

The plug can be fitted with a grounding device ensuring electrical continuity between the coupled connector housings.

The letter G defines the difference between plugs with or without a grounding system (see product standard). The models J and M are always equipped with a grounding system.

4.4 Plug (rack and panel)

The plug contains a clipped centre coding socket clipped with internal keyways. Polarization is ensured by the different positions which the secondary keyway may take and the different positions which the centre coding socket may take, clipped in the housing.

The centre coupling screw is replaced by a centre guide pin. The floating fixation with coupling spring ensures the alignment and the metal to metal bottoming between plug and receptacle.

4.5 Rear accessories

The rear accessories used with this family are specified in product standards (see EN 4165-002).

4.6 Modules

The module assembly shall be single-block type design complete with contact retention systems and appropriate seals.

The female modules use female contacts and male modules use male contacts. These modules use crimp or solder contacts of sizes 22, 20, 16, 12 and 8. They are rear release and held in the housing by two retention fins. They are removed from the rear with a specific tool.

The modules have two keys which engage in the keyways of the housing. Polarization is ensured by the different positions which the secondary keys may take. The modules are identified by letter A, B, C, D or N (universal).

A blank module is installed in a cavity where no contacts are required. This module is a male module with a universal polarization (N) installable in all coding cavities (A, B, C, D) and in all housing types (plug or receptacle).

Modules shall be interchangeable in cavities of housing with different configurations.

4.7 Keying mechanism**4.7.1 Coding pin (receptacle)**

Keying mechanism shall provide 36 position keying capabilities. These 36 positions are given with 6 different coding pins, identified by colour code. The main key is wider than the other, polarization is ensured by the

different positions which the secondary key may take. Universal coding pin is compatible with all polarization codes. Coding pin shall be interchangeable between different housing models. They are fitted in the housing with a specific tool and the modification of coding position shall be made from the front face of the connector with specific tool.

4.7.2 Clipped coding socket (plug)

Keying mechanism shall provide 36 position keying capabilities. These 36 positions are given with 6 different coding sockets, identified by colour code. The main keyway is wider than the other, polarization is ensured by the different positions which the secondary keyway may take. Universal coding socket is compatible with all polarization codes. Coding socket shall be interchangeable between different housing models. They are front clipped in the housing without specific tool and the modification of coding position shall be made from the front face of the connector with a new coding pin (a removed coding socket is not reusable).

4.8 Materials and surface treatment

4.8.1 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.

4.8.2 Housings

The material of the housing for the connectors shall be aluminium alloy or composite, protected against corrosion by nickel or cadmium plating (see EN 4165-002). Non conductive black anodized protection over aluminium material is also available.

4.8.3 Contacts

Removable contacts (see EN 3155-002). [SIST EN 4165-001:2009
https://standards.iteh.ai/catalog/standards/sist/d43e7ad9-e8b0-4e12-ac2d-8d286a383222/sist-en-4165-001-2009](https://standards.iteh.ai/catalog/standards/sist/d43e7ad9-e8b0-4e12-ac2d-8d286a383222/sist-en-4165-001-2009)

4.8.4 Non-metallic materials

The materials used for module, seals and grommets shall have mechanical characteristics consistent with the required use.

5 Design

5.1 Housings

The connector housings shall be a one piece construction. They shall accommodate the rear accessories and other fittings defined in this specification (see EN 4165-002). The rectangular flange receptacle can furthermore be fitted with a conductive gasket ensuring electrical continuity between the connector housing and panel.

The threads shall conform to ISO 263.

The coupling mechanism shall be designed so that the male and female contacts engage when it is rotated and disengaged when it is rotated counter-clockwise. The centre coupling screw shall be a hexagonal socket head screw and compatible with the coupling torque values defined in the product standard.

The accessories shall be fixed by screw or clip on the rear of connectors.

EN 4165-001:2007 (E)**5.2 Modules**

The module 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 module for contacts shall be removable; it shall be mechanically held in the housing by two retention tines. Peripheral sealing can be provided between the housing and modules.

The front face of the modules shall be such that sealing is ensured when the connectors are coupled. The interfacial seal of the module of the male contacts shall be permanently fastened on the hard module.

5.3 Connector mating

The mating sequence shall be:

- Face to face positioning;
- Keyways polarization guide;
- Central thread coupling;
- Grounding screening system;
- Electrical contact;
- Sealed interface compression;
- Metal/metal or composite shell to shell bottoming.

The grommet shall permit sealing for all cable diameters indicated in EN 4165-002 and shall not be removable.

Module insertion shall be from the rear without tools and removal of the module shall be from the rear with the tools specified in the product standards. Module design shall prevent mismating.

The mechanical contacts retention system shall be integrated in the hard module. The design of module shall permit individual installation of the contacts without grommet removal. Insertion and removal of the contacts shall be from the rear with the tools specified in the product standards.

5.4 Connector mating

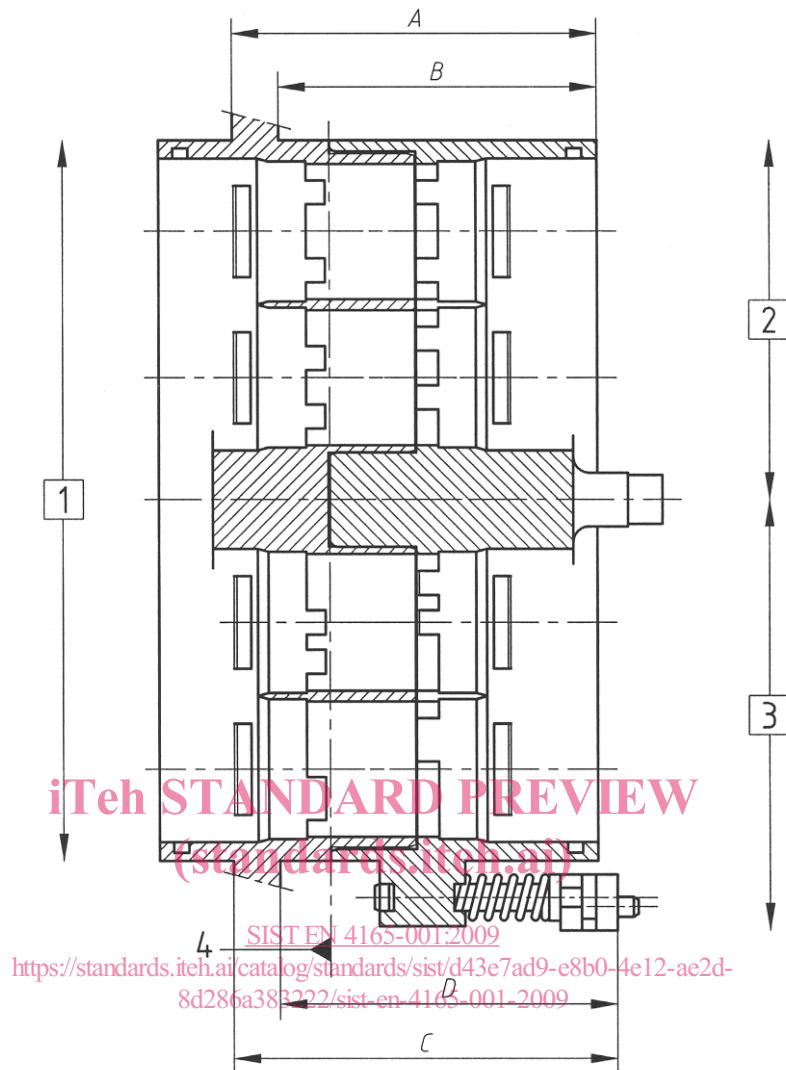
Housing design shall prevent mismating of the plug onto receptacle.

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 and plug mating dimensions**6.2.1 Connector mated conditions, series 2 and 3**

Dimensions and tolerances are in millimetres, see Figure 1.



Key

- 1 Receptacle assembly
- 2 Plug assembly
- 3 Rack plug assembly
- 4 Mechanical bottoming plate

Figure 1

Table 1 — Engagement contacts

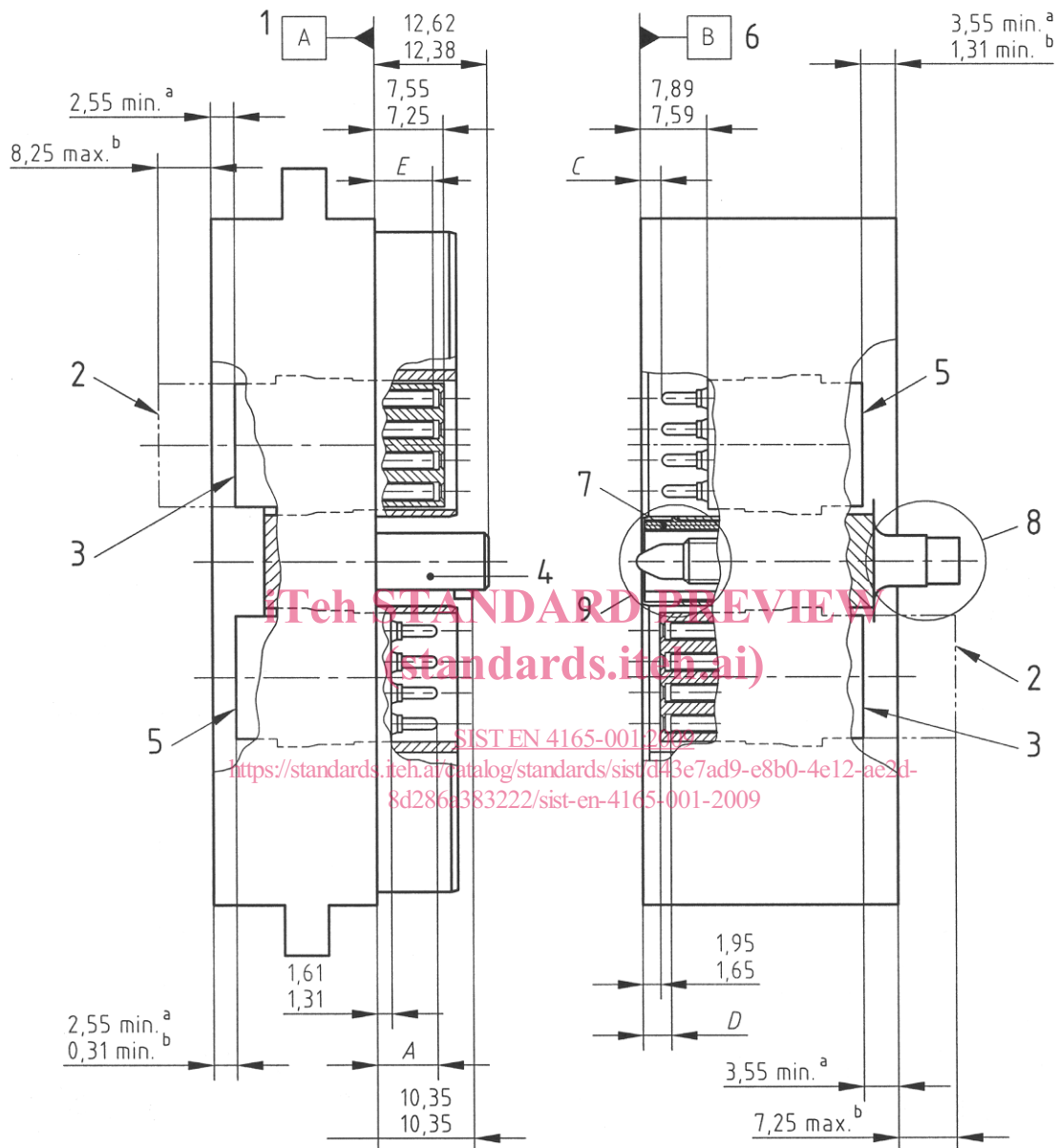
	A	B	C	D
Series 2	38,5	33,4	40,0	34,9
	37,8	32,9	36,0	30,9
Series 3	47,1	42,0	40,0	34,9
	46,4	41,5	36,0	30,9

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6.2.2 Plug and receptacle, series 2

Insert and contact position

Dimensions are in millimetres, see Figure 2.



Key

- | | | | |
|---|--|---|---------------------------|
| 1 | Mechanical bottom of receptacle | 6 | Mechanical bottom of plug |
| 2 | Female insert assembly (size 8) | 7 | See EN 4165-020. |
| 3 | Female insert assembly (sizes 22 – 20 – 16 – 12) | 8 | See Figure 6. |
| 4 | See EN 4165-019. | 9 | See Figures 4 and 5. |
| 5 | Male insert assembly (all sizes) | | |
| a | For sizes 22 – 20 – 16 – 12 inserts | b | For size 8 insert |

Figure 2

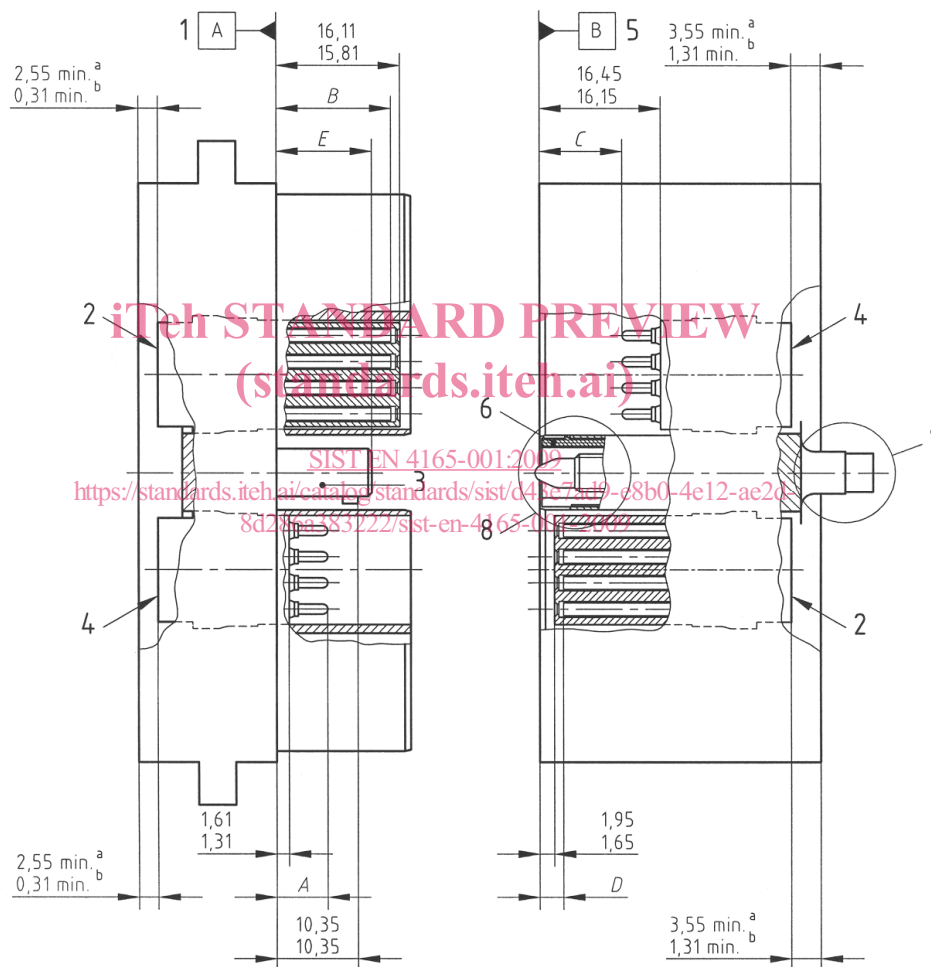
Table 2

	A	B	C	D
Sizes 22 – 20 – 16 – 12	6,66	6,38	3,00	3,27
	6,20	5,93	2,54	2,82
Size 8	6,79	6,51	2,87	3,27
	6,33	5,93	2,41	2,69

6.2.3 Plug and receptacle, series 3

Insert and contact position

Dimensions are in millimetres, see Figure 3.



Key

- | | | | |
|--------------|-------------------------------------|---|---------------------------|
| 1 | Mechanical bottom of receptacle | 5 | Mechanical bottom of plug |
| 2 | Female insert assembly (all sizes) | 6 | See EN 4165-020. |
| 3 | See EN 4165-019. | 7 | See Figure 6. |
| 4 | Male insert assembly (all sizes) | 8 | See Figures 4 and 5. |
| ^a | For sizes 22 – 20 – 16 – 12 inserts | | |
| ^b | For size 8 insert | | |

Figure 3