

BS EN 4652-411:2015



BSI Standards Publication

## **Aerospace series — Connectors, coaxial, radio frequency**

Part 411: Type 4, C interface — Clamp  
nut assembly version — Right angle  
plug — Product standard

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EUROPEAN STANDARD

**EN 4652-411**

NORME EUROPÉENNE

EUROPÄISCHE NORM

December 2015

ICS 49.060

English Version

**Aerospace series - Connectors, coaxial, radio frequency -  
Part 411: Type 4, C interface - Clamp nut assembly version  
- Right angle plug - Product standard**

Série aérospatiale - Connecteurs coaxiaux pour radio  
fréquences - Partie 411 : Type 4, interface C - Version à  
presse étoupe - Fiche coudée - Norme de produit

Luft- und Raumfahrt - Koaxiale Hochfrequenz-  
Steckverbinder - Teil 411: Typ 4, C-Anschluss -  
Klemmverbindung - freier Steckverbinder, 90°  
abgewinkelt - Produktnorm

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EUROPÄISCHES KOMITEE FÜR NORMUNG

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

<b>Contents</b>		Page
<b>European foreword .....</b>		<b>3</b>
<b>1</b>	<b>Scope.....</b>	<b>4</b>
<b>2</b>	<b>Normative references.....</b>	<b>4</b>
<b>3</b>	<b>Terms and definitions .....</b>	<b>4</b>
<b>4</b>	<b>Required characteristics .....</b>	<b>4</b>
<b>5</b>	<b>Test methods .....</b>	<b>8</b>
<b>6</b>	<b>Qualification.....</b>	<b>10</b>
<b>7</b>	<b>Quality assurance.....</b>	<b>11</b>
<b>8</b>	<b>Designation .....</b>	<b>11</b>
<b>9</b>	<b>Marking.....</b>	<b>11</b>
<b>10</b>	<b>Packaging.....</b>	<b>11</b>
<b>11</b>	<b>Storage .....</b>	<b>11</b>

## **European foreword**

This document (EN 4652-411:2015) 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 European 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of an identical text or by endorsement, at the latest by June 2016, and conflicting national standards shall be withdrawn at the latest by June 2016.

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## 1 Scope

This European Standard specifies the characteristics of bayonet coupling (C interface) coaxial right angle plugs – 50 ohms. The cable to connector assembly is a clamp technology.

## 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 <sup>1)</sup>, *Aerospace series — Elements of electrical and optical connection — Test methods*

EN 2812, *Aerospace series — Stripping of electric cables*

EN 4652-001, *Aerospace series — Connectors, coaxial, radio frequency — Part 001: Technical specification*

EN 4652-412, *Aerospace series — Connectors, coaxial, radio frequency — Part 412: Type 4, C interface — Clamp nut assembly version — Square flange receptacle — Product standard*

EN 4652-413, *Aerospace series — Connectors, coaxial, radio frequency — Part 413: Type 4, C interface — Clamp nut assembly version — Bulkhead receptacle — Product standard*

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

TR 6058, *Aerospace series — Cable code identification list* <sup>2)</sup>

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 4652-001 apply.

## 4 Required characteristics

- The connection technology shall comply to required tests described in Clause 5.
- Interface shall comply to EN 4652-001.
- Water ingress resistance is required in unmated condition for cable group A.

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1) All parts quoted in this standard.

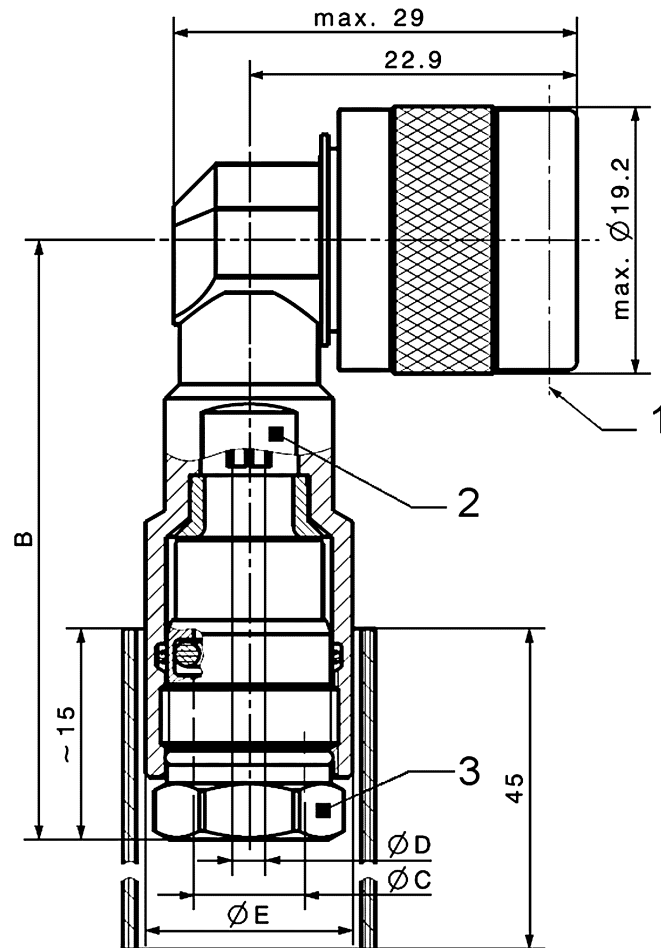
2) Published as ASD-STAN Technical Report at the date of publication of this standard. <http://www.asd-stan.org/>

#### 4.1 Configuration, dimension and mass

Mass without heat shrink tubing.

See Figure 1 and Table 1.

Dimensions in millimetres



#### Key

- 1 Marking
- 2 Flat 10
- 3 HEX. F

Figure 1 — C right angle plug

Marking: see Clause 9.

**Table 1 — C right angle plug dimensions and mass**

<b>Cable group</b>	<i>B</i> max.	$\varnothing C$ (cable jacket) max.	$\varnothing D$ (cable conductor)	$\varnothing E$ max.	HEX. <i>F</i>	<b>Mass</b> g max.
A	44	7,8	2,3	15	12	60
B	34	5,55	1,4	13	8	48

## 4.2 Materials and finish

Centre contact ..... : Copper alloy gold plated over nickel undercoat

Insulators ..... : PTFE

Sealings ..... : Silicone rubber or silicone fluoride

Body ..... : Copper alloy, nickel plated

Heat shrink tube ..... : Polyolefin

Coupling nut, rear screw and other parts' materials shall have mechanical and electrical characteristics consistent with the requirements of this product standard.

## 4.3 Temperature

Operating temperature shall be between – 65 °C and 165 °C.

## 4.4 Electrical characteristics

Impedance ..... : 50 Ω

Maximum operating frequency ..... : 6 GHz

VSWR ..... : 1,3 up to 6 GHz

Insertion loss ..... : 0,07√*f* dB max., *f* in GHz

Contact resistance (initial centre contact) ..... : 2,0 mΩ max.

Insulation resistance ..... : 5 000 MΩ min.

Withstand voltage ..... : 1 500 Veff (at sea level)

## 4.5 General characteristics

Force to engage or disengage

— Longitudinal force ..... : 20 N

— Torque ..... : 0,45 Nm max.

Service life ..... : 500 cycles



Retention of centre contact ..... : 27 N

Retention of cable ..... : see Table 2.

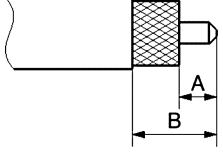
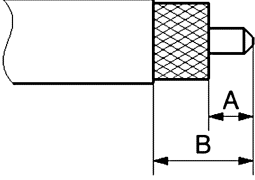
**Table 2 — Retention of cable**

Cable group	Retention of cable N min.
A	180
B	180

#### 4.6 Admissible cables, tools and stripping lengths

See Table 3 to Table 5.

**Table 3 — Stripping lengths**

Cable group	Cable code (see TR 6058)	Stripping lengths mm
A	KW	
B	KX	

**Table 4 — Stripping lengths cable group A**

A		B	
min. mm	max. mm	min. mm	max. mm
4,6	5,4	8,6	9,4

**Table 5 — Stripping lengths cable group B**

A		B	
min. mm	max. mm	min. mm	max. mm
3,6	4,4	7,6	8,4

For stripping, see EN 2812.

## 5 Test methods

See Table 6.

**Table 6 — Test methods**

EN 2591-	Designation of the test	Details															
101	Visual examination	Applicable															
102	Examination of dimensions and mass	See 4.1.															
201	Contact resistance - low level	Applicable on centre contact															
202	Contact resistance at rated current	2,0 mΩ max. = initial centre contact, and 2,5 mΩ max after test For nickel plated connectors: 0,4 mΩ max. = initial external contact, and 1,5 mΩ max after test															
204	Discontinuity of contacts in the microsecond range	Duration of micro discontinuity: ≤ 1 μs Method B Test time: throughout duration of tests EN 2591-402 and EN 2591-403															
206	Measurement of insulation resistance	5 000 MΩ min.															
207	Voltage proof test	Method A <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Pressure</th> <th>Mated <sup>a</sup></th> <th>Unmated <sup>a</sup></th> </tr> </thead> <tbody> <tr> <td>Sea level</td> <td>1 500</td> <td>1 500</td> </tr> <tr> <td>12,1 kPa</td> <td>800</td> <td>550</td> </tr> <tr> <td>4,7 kPa</td> <td>375</td> <td>350</td> </tr> <tr> <td>2,7 kPa</td> <td>250</td> <td>200</td> </tr> </tbody> </table> <p><sup>a</sup> Values in Volts RMS.</p>	Pressure	Mated <sup>a</sup>	Unmated <sup>a</sup>	Sea level	1 500	1 500	12,1 kPa	800	550	4,7 kPa	375	350	2,7 kPa	250	200
Pressure	Mated <sup>a</sup>	Unmated <sup>a</sup>															
Sea level	1 500	1 500															
12,1 kPa	800	550															
4,7 kPa	375	350															
2,7 kPa	250	200															
212	Surface transfer impedance	Applicable (up to 100 MHz) 3 mΩ 1 MHz 1 mΩ 10 MHz 3 mΩ 30 MHz 5 mΩ 100 MHz															
214	Lightning strike, current and voltage pulse	10 kA wave form 5 A, 10 A RMS															
221	Voltage Standing Wave Ratio (VSWR)	Method B VSWR ≤ 1,3 up to 6 GHz															

EN 2591-	Designation of the test	Details
222	Insertion Loss (I.L.)	$0,07\sqrt{f}$ dB max., $f$ in GHz Measurement shall be performed with connector mated with EN 4652-412 or EN 4652-413 receptacle from same technology and cable group.
223	Measurement of characteristic impedance of a coaxial connector or contact	$50 \Omega \pm 5 \Omega$ at 200 MHz
224	RF leakage	– 50 dB for cable group A at 2 GHz to 3 GHz – 55 dB for cable group B at 2 GHz to 3 GHz
225	RF high potential withstanding voltage	1 000 V at 5 MHz
226	Corona level	Corona extinction voltage > 315 V rms at 4,4 kPa (70'000 feet altitude)
303	Cold/low pressure and damp heat	Five (5) cycles Minimum temperature – 60 °C
305	Rapid change of temperature	Mated connectors $T_A = \begin{pmatrix} 165 & +5 \\ & 0 \end{pmatrix} \text{ } ^\circ\text{C};$ $T_B = \begin{pmatrix} -65 & 0 \\ & -5 \end{pmatrix} \text{ } ^\circ\text{C}.$
307	Salt mist	The connectors shall be suspended in the test chamber with non-metallic cords, so that no accumulation of condensed saline solution can occur. The connectors shall be: <ul style="list-style-type: none"> <li>— subjected to 50 cycles of mating and unmating at a rate <math>\leq 5</math> cycles/min.;</li> <li>— exposed to the salt mist:               <ul style="list-style-type: none"> <li>— mated for 240 h</li> <li>— not exposed to the salt mist:                   <ul style="list-style-type: none"> <li>— unmated for 48 h.</li> </ul> </li> </ul> </li> </ul>
308	Sand and dust	The mated connectors shall be arranged so that their longitudinal axis is parallel to the wind direction, with the rear of the plug facing the wind. Wind velocity in the duct: $(3,5 \pm 0,5)$ m/s Number of cycles: one (1)
311	Low air pressure	Refer to test EN 2591-207.

EN 2591-	Designation of the test	Details
314	Immersion at low air pressure	Specimen without heat shrinkable tube. In unmated condition (applicable only for cable group A connector). After the three (3) cycles, remove the specimen from salt water, clean the interface with soft paper. In mated condition: not applicable
315	Fluid resistance	See EN 4652-001.
317	Flammability	Method A
402	Shock	Method A, half sine Severity 30 g, duration 11 ms Number of shocks: one (1) in each way for each of the three (3) axis (six (6) shocks in all)
403	Sinusoidal and random vibration	Method A: sinusoidal vibration with the following individual modalities: Level 2 50 Hz to 70 Hz      1,5 mm double amplitude 70 Hz to 2 000 Hz    15 g Three (3) axis or two (2) axis (straight connectors) Duration 4 h per axis at ambient temperature
404	Transverse load	Applicable on rear of plug; torque moment = 5 Nm
406	Mechanical endurance	500 cycles
408	Mating and unmating forces	0,45 Nm max.
409	Contact retention in insert	27 N min., applicable on cabled specimen
417	Tensile strength (crimped connection)	See Table 2.
418	Gauge insertion/extraction forces (female contacts)	Not applicable
507	Plating porosity	Applicable
508	Measurement of thickness of coating on contacts	Applicable
509	Adhesion of coating on contacts	Applicable
513	Magnetic permeability	≤ 2

## 6 Qualification

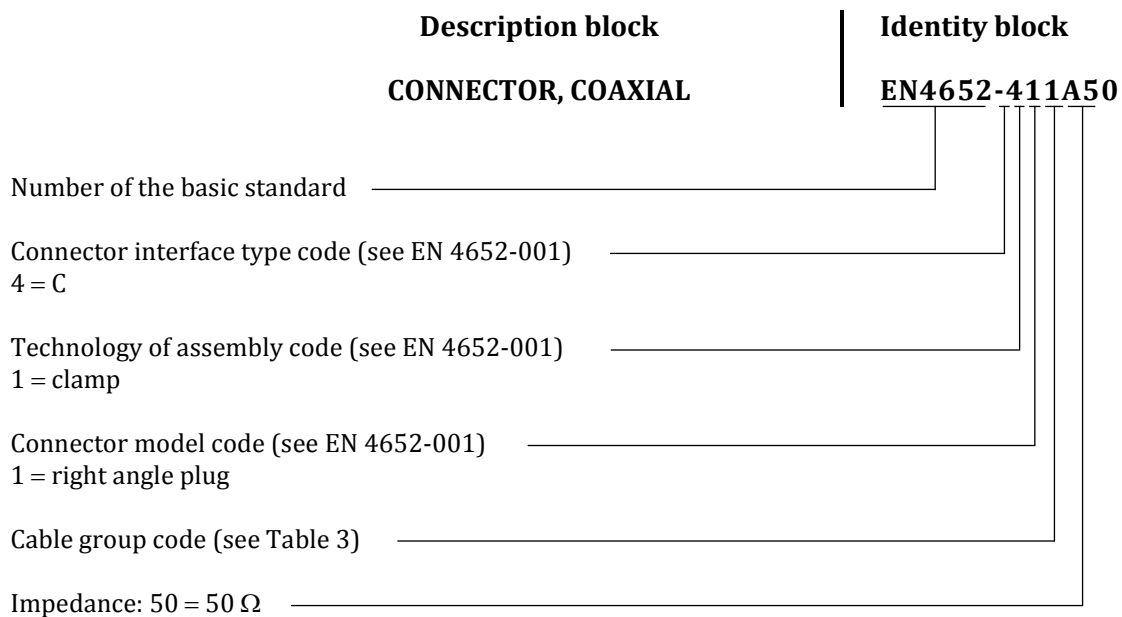
Qualification test programme: see EN 4652-001.

## 7 Quality assurance

See EN 9133.

## 8 Designation

EXAMPLE



NOTE If necessary, the code I9005 shall be placed between the description block and the identity block.

## 9 Marking

See EN 4652-001.

## 10 Packaging

See EN 4652-001.

## 11 Storage

See EN 4652-001.





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