

# INTERNATIONAL STANDARD



Radio frequency connectors –  
Part 1: Generic specification – General requirements and measuring methods

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## CONTENTS

FOREWORD.....	5
1 Scope.....	7
2 Normative references .....	7
3 Terms and definitions .....	8
3.1 General, parts of connectors .....	8
3.2 Basic connector terms .....	9
3.3 Constructional terms .....	10
3.4 Sealing.....	11
3.5 Miscellaneous terms.....	11
3.6 General electrotechnical terms .....	12
4 Units, symbols and dimensions.....	12
4.1 Units and symbols .....	12
4.2 Dimensions .....	13
4.2.1 Details to be provided in relevant specifications .....	13
4.2.2 Dimensional units to be used in specifications .....	13
5 Standards ratings and characteristics .....	13
6 Classifications into climatic categories.....	13
7 IEC type designation .....	14
8 Testing .....	14
9 Test methods.....	14
9.1 Mechanical inspection .....	14
9.1.1 Visual inspection .....	14
9.1.2 Dimensions.....	15
9.2 Electrical tests and measuring procedures .....	15
9.2.1 Return loss.....	15
9.2.2 Power rating .....	19
9.2.3 Contact resistance, outer conductor and centre conductor continuity (mated cabled connectors) .....	20
9.2.4 Centre and outer conductor contact continuity under severe mechanical conditioning .....	22
9.2.5 Insulation resistance.....	22
9.2.6 Voltage proof.....	23
9.2.7 Screening effectiveness.....	24
9.2.8 Discharge test (corona test).....	24
9.2.9 Intermodulation level (PIM).....	25
9.2.10 Surge withstand.....	26
9.3 Mechanical tests and measuring procedures .....	26
9.3.1 General .....	26
9.3.2 Soldering.....	26
9.3.3 Vibration.....	26
9.3.4 Insertion force (resilient contacts).....	27
9.3.5 Centre contact captivation .....	28
9.3.6 Engagement and separation forces and torques .....	28
9.3.7 Effectiveness of clamping device against cable rotation (nutation of cable end) .....	29
9.3.8 Effectiveness of clamping device against cable pulling .....	29

9.3.9	Effectiveness of clamping device against cable bending .....	30
9.3.10	Effectiveness of clamping device against cable torsion .....	31
9.3.11	Strength of coupling mechanism .....	32
9.3.12	Safety wire hole pull-out bending moment (and shearing force) .....	32
9.3.13	Bump .....	33
9.3.14	Shock .....	34
9.3.15	Mechanical endurance .....	35
9.4	Climatic conditionings and tests .....	35
9.4.1	Conditionings .....	35
9.4.2	Climatic sequence .....	36
9.4.3	Damp heat, steady state .....	37
9.4.4	Change of temperature .....	37
9.4.5	High temperature endurance .....	38
9.4.6	Low temperature endurance .....	39
9.4.7	Sealing non-hermetic sealed connectors .....	40
9.4.8	Hermetically sealed connectors .....	40
9.4.9	Water immersion test .....	41
9.4.10	Salt mist .....	43
9.4.11	Resistance to solvents and contaminating fluids .....	43
9.4.12	Sulphur dioxide test .....	45
10	Quality assessment .....	46
10.1	General .....	46
10.2	Quality assessment steps .....	46
10.2.1	Primary stage of manufacture .....	46
10.2.2	Structurally similar components .....	46
10.2.3	General principle for obtaining quality conformance .....	46
10.3	Test schedule and inspection requirements .....	46
10.3.1	Acceptance tests .....	46
10.3.2	Periodic tests .....	48
10.4	Procedures for quality conformance .....	49
10.4.1	Quality conformance inspection .....	49
10.4.2	Quality conformance and its maintenance .....	49
10.5	Test and measurement procedures .....	49
10.5.1	General .....	49
10.5.2	Schedule of basic test groupings for acceptance and periodic tests .....	50
10.6	Specifications .....	50
10.6.1	Specification structures .....	50
10.6.2	Sectional specification (SS) .....	50
10.6.3	Detail specification (DS) .....	50
10.6.4	Blank detail specification .....	51
10.6.5	Blank detail specification pro-forma for XXXX connectors .....	52
11	Marking .....	57
11.1	Marking of component .....	57
11.2	Marking and contents of package .....	57
Annex A (informative)	Simulated sea-water solution for use with salt mist test (marine environment, see 9.4.10.3) .....	58
Bibliography	.....	59

Figure 1 – graphical symbols .....	16
Figure 2 – General principle.....	16
Figure 3 – Measuring set-up for two-connector procedure.....	17
Figure 4 – Example of a time domain reflectometer measurement recording .....	18
Figure 5 – Equipment set-up for the measurement of reflection in time domain .....	19
Figure 6 – Possible test arrangements .....	23
Figure 7 – Measuring circuit for the discharge test.....	25
Figure 8 – Test arrangement for nutation .....	29
Figure 9 – Test arrangement for pulling .....	30
Figure 10 – Bending.....	31
Figure 11 – Cable torsion.....	31
Figure 12 – Temperature curve profile .....	41
Figure 13 – Container/jumper arrangement.....	42
Table 1 – Preferred climatic categories (see IEC 60068-1).....	13
Table 2 – Dielectric materials ratings .....	20
Table 3 – Severities for vibration.....	27
Table 4 – Recommended severities for bump.....	33
Table 5 – Recommended severities for shocks .....	34
Table 6 – Recommended severities for low temperature tests.....	39
Table 7 – Fuels, lubricants, hydraulic fluids and anti-freeze agents.....	44
Table 8 – Cleaning agents and moisture repellents .....	44
Table 9 – Acceptance tests.....	47
Table 10 – Periodic tests .....	48

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**RADIO FREQUENCY CONNECTORS –****Part 1: Generic specification –  
General requirements and measuring methods**

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International Standard IEC 61169-1 has been prepared by subcommittee 46F: R.F. and microwave passive components, of IEC technical committee 46: Cables, wires, waveguides, R.F. connectors, R.F. and microwave passive components and accessories.

This second edition cancels and replaces the first edition, published in 1992, its Amendments 1 (1996) and 2 (1997). This edition constitutes a technical revision.

With respect to the previous edition, tests methods have been updated as well as terminology.

The text of this standard is based on the following documents:

CDV	Report on voting
46F/216/CDV	46F/226/RVC

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all the parts in the IEC 61169 series, published under the general title *Radio frequency connectors*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

The contents of the corrigendum of February 2016 have been included in this copy.

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## RADIO FREQUENCY CONNECTORS –

### Part 1: Generic specification – General requirements and measuring methods

#### 1 Scope

This part of IEC 61169, which is a generic specification, relates to radio frequency connectors for r.f. transmission lines for use in telecommunications, electronics and similar equipment.

It provides the basis for the sectional standards, which apply to individual connector types. It is intended to establish uniform concepts and procedures concerning:

- terminology;
- standard ratings and characteristics;
- testing and measuring procedures concerning electrical, mechanical and climatic properties;
- classification of connectors with regard to climatic testing procedures involving temperature and humidity.

The test methods and procedures of this standard are intended for acceptance and type approval testing.

#### 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.

[IEC 61169-1:2013](https://standards.iteh.ai/IEC/61169-1/2013)

[IEC 60027](https://standards.iteh.ai/IEC/60027/all-parts/2013) (all parts), *Letter symbols to be used in electrical technology*

IEC 60050 (all parts), *International Electrotechnical Vocabulary* (available from: <http://www.electropedia.org>)

IEC 60068-1, *Environmental testing – Part 1: General and guidance*

IEC 60068-2-1:1990, *Environmental testing – Part 2-1: Tests – Test A: Cold*<sup>1</sup>

IEC 60068-2-2:1974, *Environmental testing – Part 2-2: Tests – Test B: Dry heat*<sup>2</sup>

IEC 60068-2-6, *Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal)*

IEC 60068-2-11, *Environmental testing – Part 2-11: Tests – Test Ka: Salt mist*

IEC 60068-2-13, *Environmental testing – Part 2-13: Tests – Test M: Low air pressure*

IEC 60068-2-14:2009, *Environmental testing – Part 2-14: Tests – Test N: Change of temperature*

IEC 60068-2-17, *Environmental testing – Part 2-17: Tests – Test Q: Sealing*

<sup>1</sup> This publication has been withdrawn.

<sup>2</sup> This publication has been withdrawn.

IEC 60068-2-20, *Environmental testing – Part 2-20: Tests – Test T: Test methods for solderability and resistance to soldering heat of devices with leads*

IEC 60068-2-27, *Environmental testing – Part 2-27: Tests – Test Ea and guidance: Shock*

IEC 60068-2-29, *Environmental testing – Part 2: Tests – Test Eb and guidance: Bump*

IEC 60068-2-30, *Environmental testing – Part 2-30: Tests – Test Db: Damp heat, cyclic (12 h + 12 h cycle)*

IEC 60068-2-42, *Environmental testing – Part 2-42: Tests – Test Kc: Sulphur dioxide test for contacts and connections*

IEC 60068-2-52:1996, *Environmental testing – Test Kb: Salt mist, cyclic (sodium, chloride solution)*

IEC 60068-2-54, *Environmental testing – Part 2-54: Tests – Test Ta: Solderability testing of electronic components by the wetting balance method*

IEC 60068-2-61:1991, *Environmental testing – Part 2-61: Test methods – Test Z/ABDM: Climatic sequence*

IEC 60068-2-78, *Environmental testing – Part 2-78: Tests – Test Cab: Damp heat, steady state*

IEC 60457-1, *Rigid precision coaxial lines and their associated precision connectors – Part 1: General requirements and measuring methods*

IEC 60617, *Graphical symbols for diagrams* (available from: <http://std.iec.ch/iec60617>)

IEC 62153 (all parts), *Metallic communication cables test methods*

IEC 61726, *Cable assemblies, cables, connectors and passive microwave components – Screening attenuation measurement by the reverberation chamber method*

IEC 62037 (all parts), *Passive RF and microwave devices, intermodulation level measurement*

ISO 1000, *SI units and recommendations for the use of their multiples and of certain other units*<sup>3</sup>

### 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

NOTE Some of the terms defined are not used in the present document, but may be used in the different sectional specifications.

#### 3.1 General, parts of connectors

##### 3.1.1

##### **contact (electrical)**

state in which individual electrically conductive parts are in such close mechanical touch as to provide a low resistance path to electrical current in either direction

##### 3.1.2

##### **contact**

conductive element in a component which mates with a corresponding element to provide an electrical path (to provide electrical contact)

---

<sup>3</sup> This publication has been withdrawn.

**3.1.3****male (pin) contact**

contact intended to make electrical engagement on its outer surface and which will enter a female (socket) contact

**3.1.4****female (socket) contact**

contact intended to make electrical engagement on its inner surface and which will accept entry of a male (pin) contact

**3.1.5****hermaphroditic contact**

contact which is intended to mate with an identical contact

**3.1.6****resilient contact**

contact having elastic properties to provide a force to its mating part

**3.2 Basic connector terms****3.2.1****connector**

component normally attached to a cable or mounted on a piece of apparatus (excluding an adaptor) for electrically joining separable parts of a transmission line system

**3.2.2****connector pair**

two connectors having complementary mating faces and locking means, so as to be mateable and interlockable

**3.2.3****series type**

terms characterizing the particular mating faces and locking means of a connector pair with regard to construction and dimension

Note 1 to entry: The term "series" is sometimes used as an approximate synonym of 'type' for designating the entirety of connector styles with identical mating face and locking means.

**3.2.4****style**

particular form or shape of connector, as well as a combination of connectors of the same type

Note 1 to entry: For "adaptor", see 3.5.1 to 3.5.5: a 'within-type adaptor' may also be considered as a particular style of a given type.

Note 2 to entry: Examples are: free and fixed connectors, both straight and right angle, within-type adaptors straight and right angle.

**3.2.5****variant**

variation of a style, in particular details, such as cable-entry dimensions

**3.2.6****grade**

qualification of a connector with regard to mechanical and electrical precision in particular with respect to a defined return loss

**3.2.7****general purpose connector: Grade 2**

connector making use of the widest permitted dimensional deviations (tolerances) so as still to guarantee minimum stated performance and intermateability

Note 1 to entry: A requirement for the return loss may or may not be specified.

### 3.2.8

#### **high performance connector: Grade 1**

connector for which limits of return loss are specified as a function of frequency.

Note 1 to entry: No tighter dimensional tolerances than those applicable to Grade 2 are normally specified. The manufacturer is responsible, however, for choosing tighter tolerances where necessary to ensure that the return loss requirements are met.

### 3.2.9

#### **standard test connector: Grade 0**

precisely made connector of a particular type used to carry out return loss measurements on Grade 1 and Grade 2 connectors, contributing only negligible errors to the measuring result

Note 1 to entry: The standard test connector is often part of an inner-type adaptor which allows connection with a precision connector forming part of the measuring equipment.

### 3.2.10

#### **precision connector**

connector that has coincident mechanical and electrical reference planes, air dielectric, and has the property of making connections with a high degree of repeatability without introducing significant reflections, loss or leakage

Note 1 to entry: It is intended for mounting on air-lines and instruments. Precision connectors can be of the hermaphroditic type, flange type or of the pin and socket type as stated in IEC 60457-1.

### 3.2.11

#### **laboratory precision connector**

##### **LPC**

precision connector without dielectric support for the centre conductor

### 3.2.12

#### **general precision connector**

##### **GPC**

precision connector with self-contained dielectric support capable of supporting the unsupported centre conductor of an LPC and standard air-line which it is mated

## 3.3 Constructional terms

### 3.3.1

#### **male connector/pin connector**

connector containing a male (pin) centre contact

### 3.3.2

#### **female connector/socket connector**

connector containing a female (socket) centre contact

### 3.3.3

#### **plug connector**

connector featuring the active part of the coupling mechanism, i.e. the nut or bayonet ring, and which normally is a free contact

Note 1 to entry: Depending on the particular type, a plug may be a male or female connector.

### 3.3.4

#### **socket**

connector complimentary to the plug

### 3.3.5

#### **hermaphroditic connector**

connector which mates with an identical connector

### 3.3.6

#### **free connector**

connector for attachment to a free end of a cable

Note 1 to entry: If not specified as fixed, a connector is assumed to be free.

**3.3.7****fixed connector**

connector with provision for attachment to a mounting surface

**3.3.8****triaxial**

transmission line comprising three concentric conductors having a common axis and with each conductor insulated from the other two

**3.4 Sealing****3.4.1****sealed connector**

connector employing a seal capable of fulfilling specified gas-, moisture- or liquid tightness requirements

**3.4.2****barrier seal**

seal preventing the passage of gases, moisture or liquids in an axial direction within the body shell of a connector

**3.4.3****panel seal**

seal preventing the passage of gases, moisture or liquids between the fixed connector or adaptor body shell and the panel via the mounting hole(s)

Note 1 to entry: The sealing member is often provided as a discrete item.

**3.4.4****mating face seal**

seal preventing the passage of gases, moisture or liquids into the interface space of a pair of mated connectors

**3.4.5****hermetic seal**

seal meeting the requirements specified on application of Test Qk of IEC 60068-2-17

**3.5 Miscellaneous terms****3.5.1****adaptor**

two-port device for joining two transmission lines having non-mating connectors

**3.5.2****fixed adaptor**

adaptor with provision for attachment to a mounting surface

Note 1 to entry: If not specified as fixed, an adaptor is assumed to be free.

**3.5.3****within-type adaptor**

adaptor for use between two or more connectors all of the same type

**3.5.4****inter-type adaptor**

adaptor for use between two or more connectors of different types

**3.5.5****standard test adaptor**

inter-type adaptor for test purposes, having a standard test connector at one end and a precision connector at the other end

**3.5.6****standard air line**

homogenous air dielectric transmission line having the smallest possible irregularities in diameter and straightness of conductors, no self-contained supports for the inner conductor and using non-magnetic material with good conductivity

**3.5.7****reference line**

air-line similar to the standard air-line but with dielectric support of the inner conductor, and with a design such that the internal return loss is kept at a minimum within the frequency range made use of for measurements

**3.5.8****proof coupling torque**

maximum torque to be applied to the screw-coupling mechanism of a specific connector series for testing the mechanical strength of the coupling mechanism

**3.5.9****normal coupling torque**

maximum/minimum values of torque to be applied in normal use to the coupling of screw type connectors

**3.5.10****engagement and separation torque**

torque required to overcome friction, compression of springs, etc. during the engagement and separation of connectors with rotary type coupling mechanisms before or after complete engagement

Note 1 to entry: This is intended to check for undue tightness of threads, burrs on bayonet-cams, freedom of rotation of coupling rings, etc.

**3.5.11****push-on**

connectors with interfaces that engage/disengage in an axial direction

**3.6 General electrotechnical terms** [IEC 61169-1:2013](https://standards.iteh.ai/catalog/standards/iec/a07e544a-4453-48d2-89b5-4dc84c1e47cc/iec-61169-1-2013)**3.6.1****nominal value**

typical value used to designate or identify a component, device or equipment

Note 1 to entry: It follows from the definition that a nominal value is not subject to tolerances.

Note 2 to entry: Typical and nominal are interchangeable.

**3.6.2****limiting value**

in a specification, the greatest and/or smallest admissible value of one of the quantities

**3.6.3****rated value**

operational values that are provided in the detailed specification

**4 Units, symbols and dimensions****4.1 Units and symbols**

Units, graphical symbols, letter symbols and terminology shall whenever possible, be taken from the following IEC publications:

60027: Letter symbols to be used in electrical technology.

60050: International Electrotechnical Vocabulary (IEV).

60617: Graphical symbols for diagrams.