

INTERNATIONAL STANDARD



**Multi-channel radio-frequency connectors –
Part 2: Sectional specification for MQ4 series circular connectors**

IECNORM.COM : Click to view the full PDF of IEC 63138-2:2023 RLV



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2023 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Secretariat
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, ...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch

Discover our powerful search engine and read freely all the publications previews. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 300 terminological entries in English and French, with equivalent terms in 19 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IECNORM.COM : Click to view the full PDF of IEC 61131-2:2023 RVV

INTERNATIONAL STANDARD



Multi-channel radio-frequency connectors – Part 2: Sectional specification for MQ4 series circular connectors

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 33.120.30

ISBN 978-2-8322-7710-2

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD.....	4
1 Scope.....	7
2 Normative references	7
3 Terms and definitions	7
4 Mating face and gauge information	8
4.1 Mating face dimensions	8
4.1.1 MQ4 socket connector	8
4.1.2 MQ4 plug connector	10
4.1.3 Mating face of RF channel	14
4.2 Gauges	17
4.2.1 Gauge for RF channel.....	17
4.2.2 Gauge rings for plug outer contact.....	19
4.2.3 Gauge for MQ4 socket connector.....	20
4.2.4 Gauge for MQ4 plug connector	21
5 Quality assessment procedure.....	23
5.1 General.....	23
5.2 Rating and characteristics.....	23
5.3 Quality assessment.....	25
5.3.1 General	25
5.3.2 Inspection procedure	25
5.3.3 Lot-by-lot inspection	27
5.3.4 Periodic inspections.....	28
6 Instructions for preparation of detail specifications	30
6.1 General.....	30
6.2 Identification of the detail specification.....	30
6.3 Identification of the component	30
6.4 Performance	30
6.5 Marking, ordering information and related matters	31
6.6 Selection of tests, test conditions and severities	31
6.7 Blank detail specification pro forma for MQ4 series circular connectors	31
7 Marking	36
7.1 Marking of components	36
7.2 Marking and contents of package.....	36
Figure 1 – MQ4 socket connector	9
Figure 2 – MQ4 quick-lock plug connector	11
Figure 3 – MQ4 threaded plug connector	13
Figure 4 – Mating face of RF channel	16
Figure 5 – Gauge for socket contact of RF channel.....	18
Figure 6 – Gauge for plug outer contact.....	19
Figure 7 – Gauge for MQ4 socket connector	20
Figure 8 – Gauge for MQ4 plug connector	22
Table 1 – Dimensions of MQ4 socket connector.....	10
Table 2 – Dimensions of MQ4 quick-lock plug connector.....	12

Table 3 – Dimensions of MQ4 threaded plug connector	14
Table 4 – Dimensions of RF channel.....	17
Table 5 – Dimensions of gauge for socket contact	18
Table 6 – Dimensions of gauge for ~~plug~~ outer contact.....	19
Table 7 – Dimensions of gauge for MQ4 socket connector	21
Table 8 – Dimensions of gauge for MQ4 plug connector	23
Table 9 – Rating and characteristics	24
Table 10 – Qualification inspection	26
Table 11 – Lot-by-lot inspection	28
Table 12 – Sampling plans for mechanical compatibility and return loss inspection	28
Table 13 – Periodic inspection	29

IECNORM.COM : Click to view the full PDF of IEC 63138-2:2023 RLV

INTERNATIONAL ELECTROTECHNICAL COMMISSION

MULTI-CHANNEL RADIO-FREQUENCY CONNECTORS –

Part 2: Sectional specification for MQ4 series circular connectors

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at <https://patents.iec.ch> shall not be held responsible for identifying any or all such patent rights.

This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC 63138-2:2020. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

IEC 63138-2 has been prepared by subcommittee 46F: RF and microwave passive components, of IEC technical committee 46: Cables, wires, waveguides, RF connectors, RF and microwave passive components and accessories. It is an International Standard.

This second edition cancels and replaces the first edition published in 2020. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) change the supplementary key and groove position degree from 0,1 to 0,05 in Figure 1, Figure 2, Figure 3, Figure 7 and Figure 8;
- b) change dimension q from min.1,60 to min.1,65 in Table 1;
- c) add an electrical reference plane in Figure 4;
- d) add dimensions in Table 1;
- e) change dimension n from max.1,55 to max.1,50 in Table 2, Table 3 and Table 7;
- f) update some dimensions in Figure 4 and Table 4;
- g) change dimension a from min.7,50 to min.7,52, and max.7,60 to max. 7,58 in Table 7;
- h) update some dimensions in Figure 8 and Table 8;
- i) change mechanical compatibility from 50 N to 60 N in 4.2.3 and 4.2.4.

The text of this International Standard is based on the following documents:

Draft	Report on voting
46F/644/FDIS	46F/651/RVD

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

This document is to be read with IEC 63138-1:2019.

A list of all parts in the IEC 63138 series, published under the general title *Multichannel radio-frequency connectors*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

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

IMPORTANT – The "colour inside" logo on the cover page of this document indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

IECNORM.COM : Click to view the full PDF of IEC 63138-2:2023 RLV

MULTI-CHANNEL RADIO-FREQUENCY CONNECTORS –

Part 2: Sectional specification for MQ4 series circular connectors

1 Scope

This part of IEC 63138, which is a sectional specification (SS), provides information and rules for the preparation of detail specifications (DS) for MQ4 series circular connectors with four RF channels, as well as a detailed specification of the blank format.

An MQ4 series circular connector with 50 Ω nominal impedance has four RF channels which can be engaged and disengaged at the same time. There are two versions of plug connectors, one is a quick-lock version, and the other is a threaded version. The socket connector provides two coupling mechanisms, a quick-lock and a threaded coupling.

MQ4 series circular connectors can be used in mobile communication systems and in other communication equipment.

This document also specifies the mating face dimensions and gauging information of MQ4 series circular connectors, and tests selected from IEC 63138-1, applicable to all detail specifications relating to MQ4 series circular connectors.

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.

IEC 63138-1:2019, *Multi-channel radio frequency connectors – Part 1: Generic specification – General requirements and test methods*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 63138-1 apply.

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

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

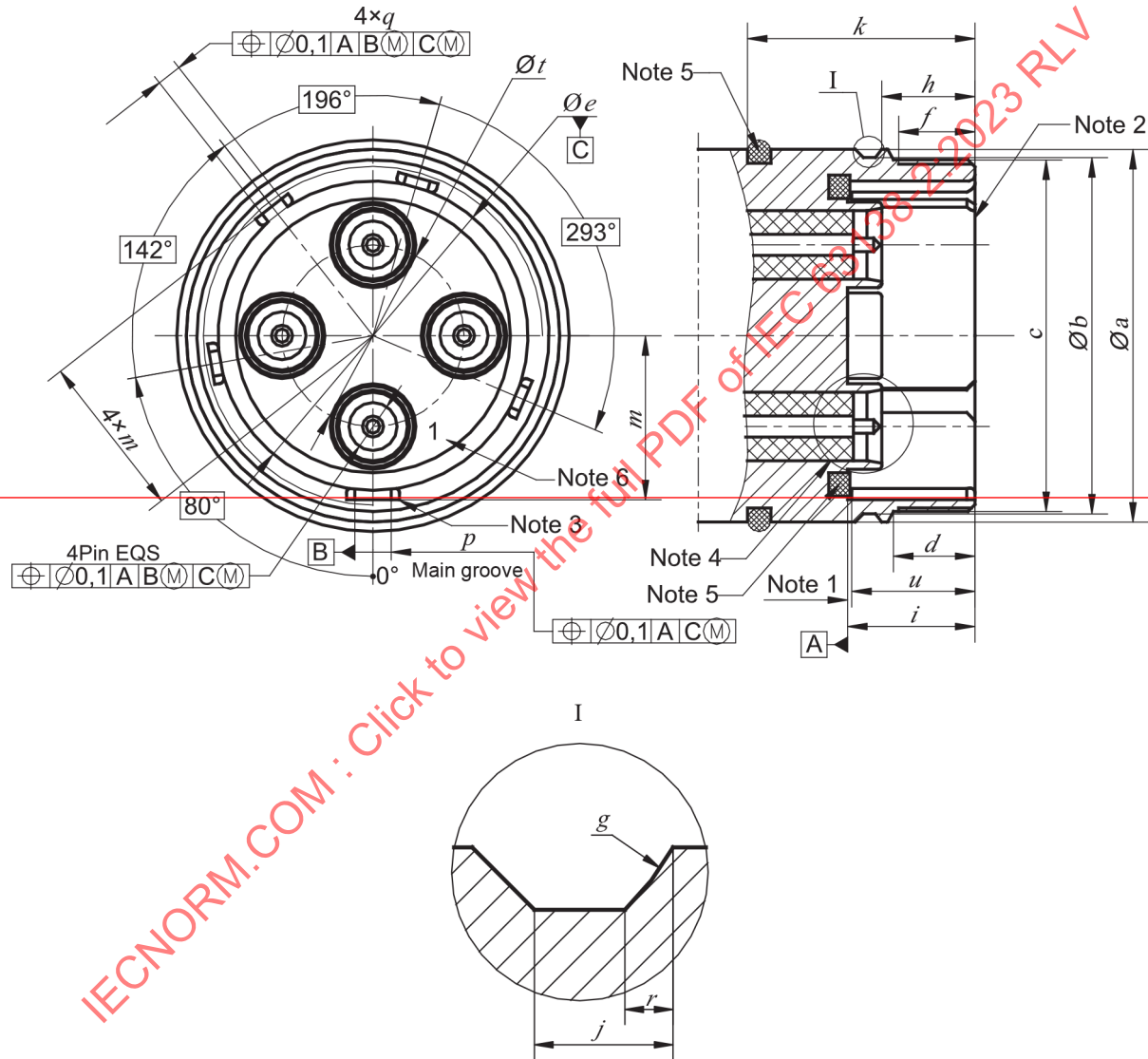
4 Mating face and gauge information

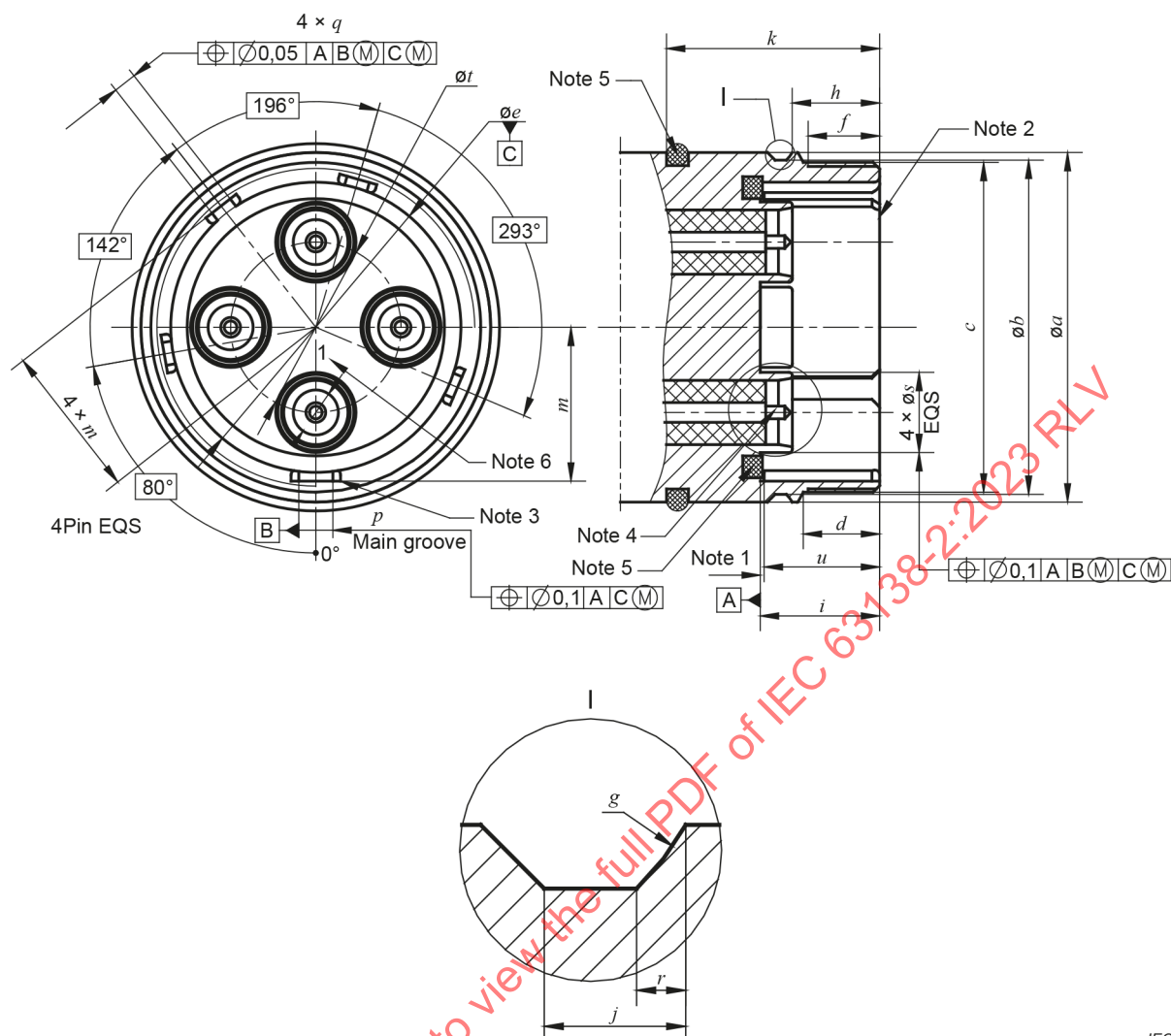
4.1 Mating face dimensions

4.1.1 MQ4 socket connector

The mating face of MQ4 socket connectors is shown in Figure 1 and its dimensions are shown in Table 1.

NOTE Metric dimension are original dimensions. All undimensioned pictorial configurations are for reference purpose only.





NOTE 1 Mechanical reference plane.

NOTE 2 Chamfer of the four supplementary grooves is optional.

NOTE 3 Chamfer of the main groove is optional.

NOTE 4 The mating face of the RF channel with pin contact is shown in Figure 4a) and its dimensions are shown in Table 4.

NOTE 5 The shape of seal ring is optional.

NOTE 6 The initial position number of the RF channel with pin contact and the other positions numbered clockwise.

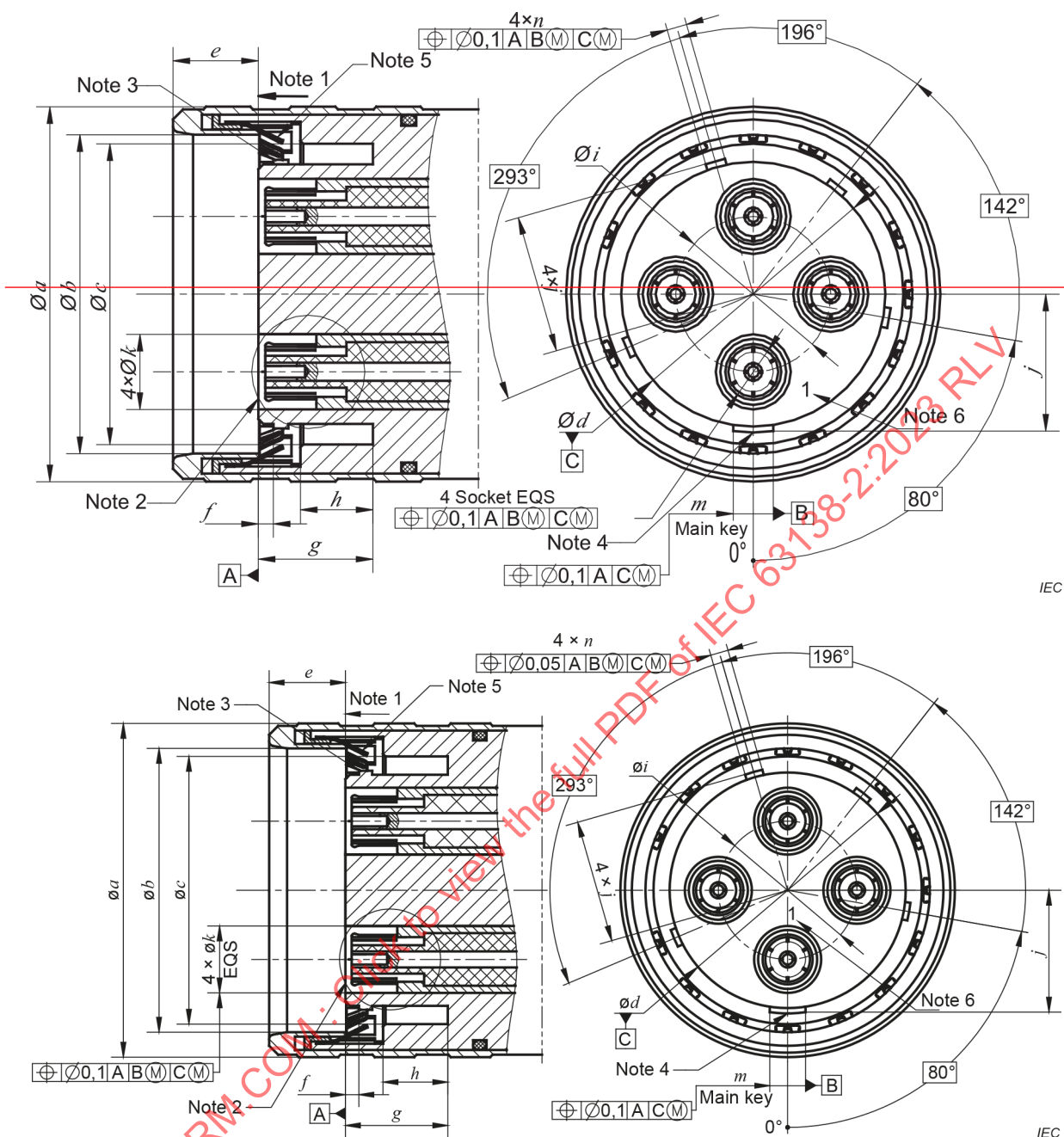
Figure 1 – MQ4 socket connector

Table 1 – Dimensions of MQ4 socket connector

Ref.	Dimensions	
	mm	
	Min.	Max.
<i>a</i>	31,75	31,80
<i>b</i>	30,35	30,40
<i>c</i>	M30 × 1 tolerance 6 g	
<i>d</i>	6,80	7,00
<i>e</i>	26,42	26,48
<i>f</i>	6,00	--
<i>g</i>	R3,0 nom.	
<i>h</i>	7,95	8,05
<i>i</i>	10,95	11,00
<i>j</i>	1,50	1,80
<i>k</i>	19,30	19,45
<i>m</i>	13,90	14,00
<i>p</i>	3,20	3,35
<i>q</i>	~~1,60~~ 1,65	1,75
<i>r</i>	0,50	0,60
<i>s</i>	7,28	7,32
<i>t</i>	15,48	15,52
<i>u</i>	10,30	10,90

4.1.2 MQ4 plug connector**4.1.2.1 MQ4 quick-lock plug connector**

The mating face of the MQ4 connector with quick-lock type is shown in Figure 2 and its dimensions are shown in Table 2.



NOTE 1 Mechanical reference plane.

NOTE 2 The mating face of the RF channel with socket contact is shown in Figure 4b) and its dimensions are shown in Table 4.

NOTE 3 The shape of the four supplementary keys is optional.

NOTE 4 The shape of the main key is optional.

NOTE 5 The shape of the spring finger is optional.

NOTE 6 The initial position number of the RF channel with socket contact and the other positions numbered anticlockwise.

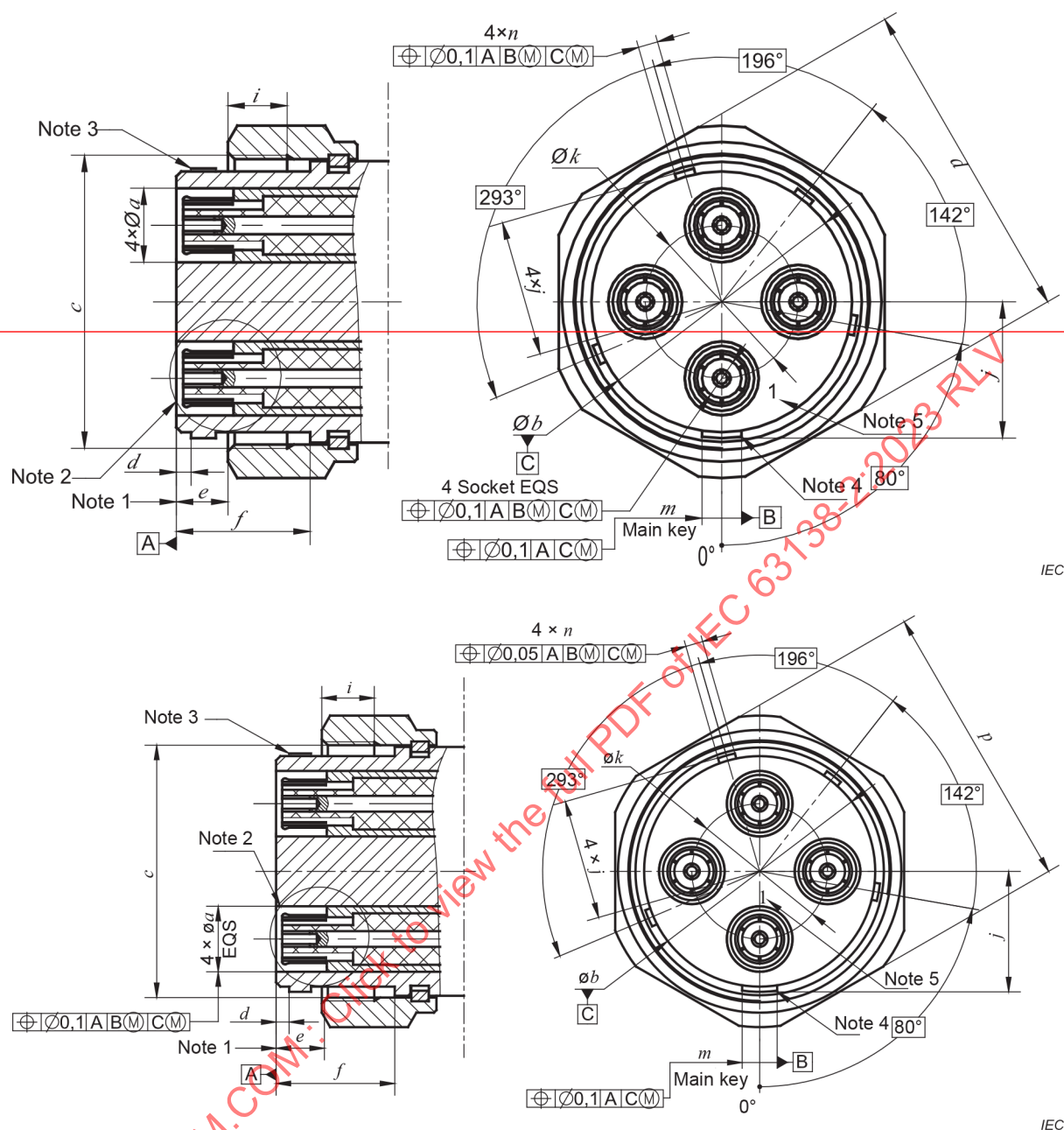
Figure 2 – MQ4 quick-lock plug connector

Table 2 – Dimensions of MQ4 quick-lock plug connector

Ref.	Dimensions	
	mm	
	Min.	Max.
<i>a</i>	--	42,00
<i>b</i>	31,80	31,90
<i>c</i>	30,05	30,15
<i>d</i>	26,30	26,40
<i>e</i>	8,40	8,60
<i>f</i>	1,20	1,50
<i>g</i>	11,00	11,10
<i>h</i>	6,60	6,80
<i>i</i>	15,48	15,52
<i>j</i>	13,70	13,80
<i>k</i>	7,52	7,58
<i>m</i>	3,00	3,15
<i>n</i>	1,40	~~1,55~~ 1,50

4.1.2.2 MQ4 threaded plug connector

The mating face of the MQ4 threaded plug connector is shown in Figure 3 and its dimensions are shown in Table 3.



NOTE 1 Mechanical reference plane.

NOTE 2 The mating face of the RF channel with socket contact is shown in Figure 4b) and its dimensions are shown in Table 4.

NOTE 3 The shape of the four supplementary keys is optional.

NOTE 4 The shape of the main key is optional.

NOTE 5 The initial position number of the RF channel with socket contact and the other positions numbered anti-clockwise.

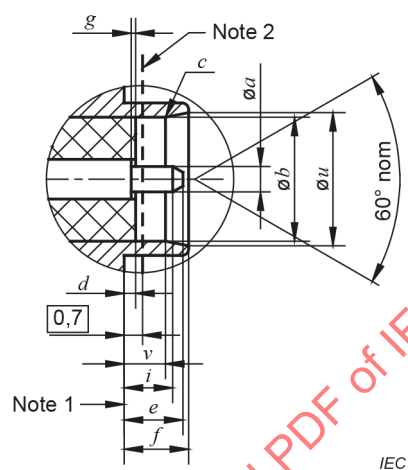
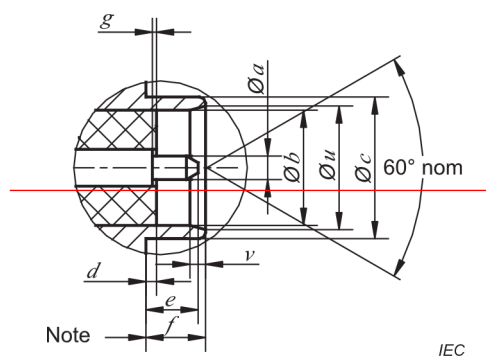
Figure 3 – MQ4 threaded plug connector

Table 3 – Dimensions of MQ4 threaded plug connector

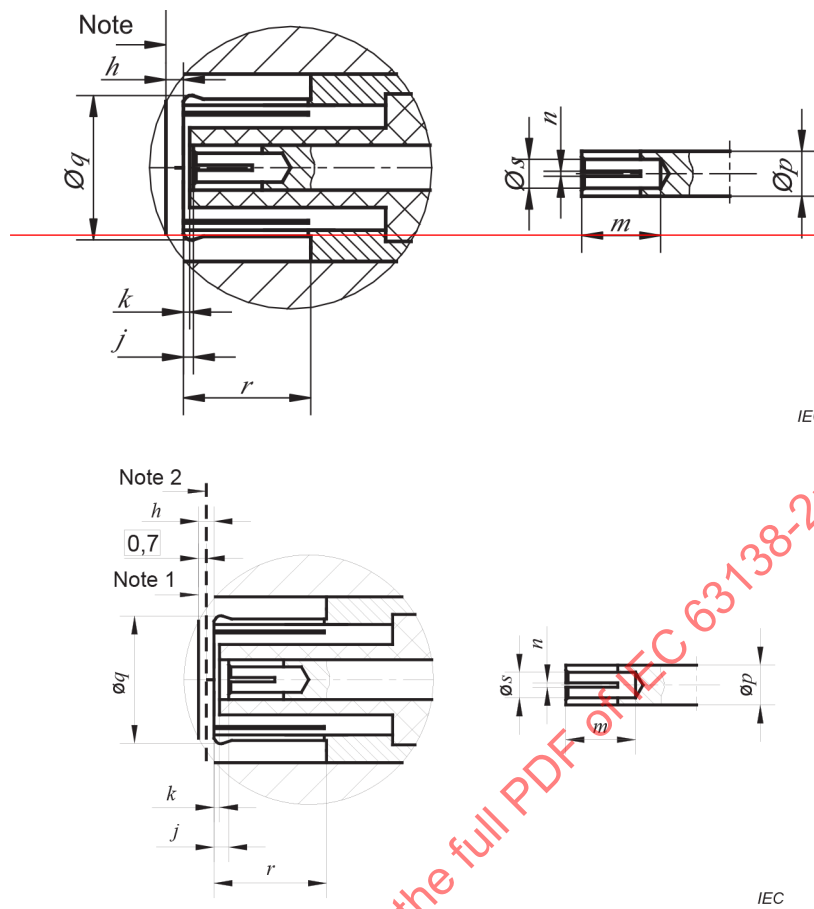
Ref.	Dimensions	
	mm	
	Min.	Max.
<i>a</i>	7,52	7,58
<i>b</i>	26,35	26,40
<i>c</i>	M30 × 1 tolerance 6 H	
<i>d</i>	1,20	1,50
<i>e</i>	5,20	5,60
<i>f</i>	11,20	--
<i>i</i>	7,00	--
<i>j</i>	13,70	13,80
<i>k</i>	15,48	15,52
<i>m</i>	3,00	3,15
<i>n</i>	1,40	1,55
<i>p</i>	32,0 nom.	

4.1.3 Mating face of RF channel

The mating face of the RF channel with pin contact is shown in Figure 4a), the mating face of the RF channel with socket contact is shown in Figure 4b), and their dimensions are shown in Table 4.



a) RF channel with pin contact



b) RF channel with socket contact

NOTE 1 Mechanical reference plane.

NOTE 2 Electrical reference plane.

Figure 4 – Mating face of RF channel

Table 4 – Dimensions of RF channel

Ref.	Dimensions	
	mm	
	Min.	Max.
<i>a</i>	1,17	1,23
<i>b</i>	5,90	5,93
<i>c</i>	~~7,25~~ R1,00 nom ~~7,35~~	
<i>d</i>	0,35	0,65
<i>e</i>	2,60	2,90
<i>f</i>	~~2,90~~ 3,30	3,70
<i>g</i>	0	0,25
<i>h</i>	0,75	1,00
<i>i</i>	1,70	
<i>j</i>	0	0,25
<i>k</i>	0	~~0,20~~ 0,25
<i>m</i>	3,00	--
<i>n</i> ^a	--	--
<i>p</i>	1,8 nom	
<i>q</i> ^b	--	~~6,45~~ 6,40
<i>r</i>	3,80	--
<i>u</i>	~~6,50~~ 6,60	6,70
<i>v</i>	~~1,55~~ 2,00	~~1,65~~ 2,20
<i>s</i> ^a		--
^a Slot design optional when mating with a pin with $\phi 1,17$ mm to $\phi 1,23$ mm. It should meet the requirements of mechanical and electrical performance. ^b Expand to meet the requirements with gauge rings for socket outer contact.		

4.2 Gauges

4.2.1 Gauge for RF channel

4.2.1.1 Socket centre contact

4.2.1.2 Dimensions of gauge

The gauge for the socket contact of the RF channel is shown in Figure 5 and its dimensions are shown in Table 5.

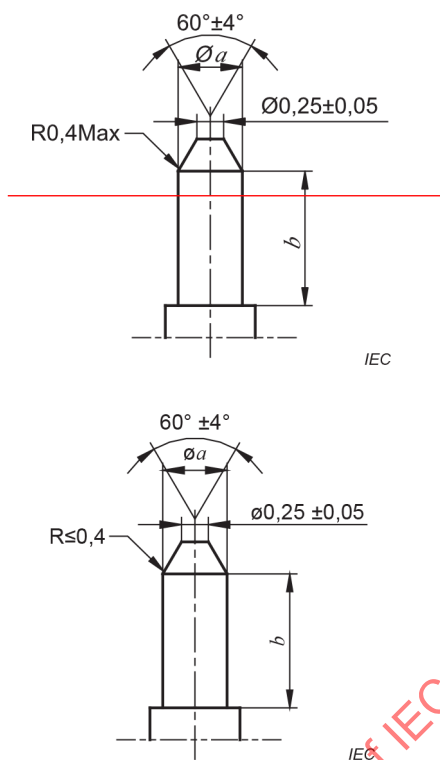


Figure 5 – Gauge for socket contact of RF channel

Table 5 – Dimensions of gauge for socket contact

Ref.	Gauge A (For sizing purpose)		Gauge B (For insertion purpose)		Gauge C (For retention purpose) Mass of gauge : 40^{+2}_0 g	
	mm		mm		mm	
	Min.	Max.	Min.	Max.	Min.	Max.
<i>a</i>	1,235	1,240	1,230	1,235	1,165	1,170
<i>b</i>	0,700	1,000	0,900	1,200	0,900	1,200

Material: Polished steel, cylindrical surface roughness of diameter *a*: $R_a \leq 0,4 \mu\text{m}$.

4.2.1.3 Test procedure

Test procedure as follows:

a) Sizing test

Insert gauge A into centre contact three times, the depth of insertion is not less than 0,7 mm; this is a sizing operation.

b) Insertion test

After sizing operation, insert gauge B into centre contact, the insertion force shall not ~~be less than~~ exceed 6 N.

c) Retention test

After the sizing or insertion operation, the gauge C shall be inserted into the socket centre contact. The contact shall retain the mass of the gauge C in a vertical downward position.

4.2.2 Gauge rings for plug outer contact

4.2.2.1 Dimensions of gauge

The gauge for the ~~plug~~ outer contact of the RF channel is shown in Figure 6 and its dimensions are shown in Table 6.

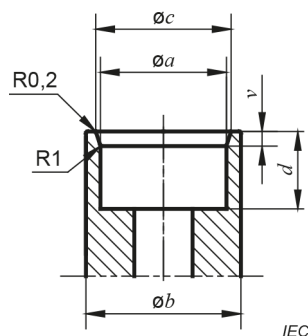


Figure 6 – Gauge for plug outer contact

Table 6 – Dimensions of gauge for ~~plug~~ outer contact

Ref.	Gauge A (For sizing purpose)		Gauge B (For insertion purpose)		Gauge C (For retention purpose) Mass of gauge : 400^{+2}_0 g	
	mm		mm		mm	
	Min.	Max.	Min.	Max.	Min.	Max.
<i>a</i>	5,880	5,885	5,895	5,900	5,930	5,935
<i>b</i>	7,250	7,350	7,250	7,350	7,250	7,350
<i>c</i>	6,700	6,800	6,700	6,800	6,700	6,800
<i>d</i>	2,700	3,000	2,700	3,000	2,700	3,000
<i>v</i>	1,55	1,65	1,55	1,65	1,55	1,65
Material: Polished steel, cylindrical surface roughness of diameter <i>a</i> : $R_a \leq 0,4 \mu\text{m}$.						

4.2.2.2 Test procedure

a) Sizing test

The gauge A should be inserted into the outer contact of RF channel three times, the depth of insertion is not less than 2,7 mm; this is a sizing operation.

b) Insertion test

After the sizing operation, if specified in the detail specification, the force necessary to insert gauge B fully into the outer contact shall be measured and it shall not exceed 15 N.

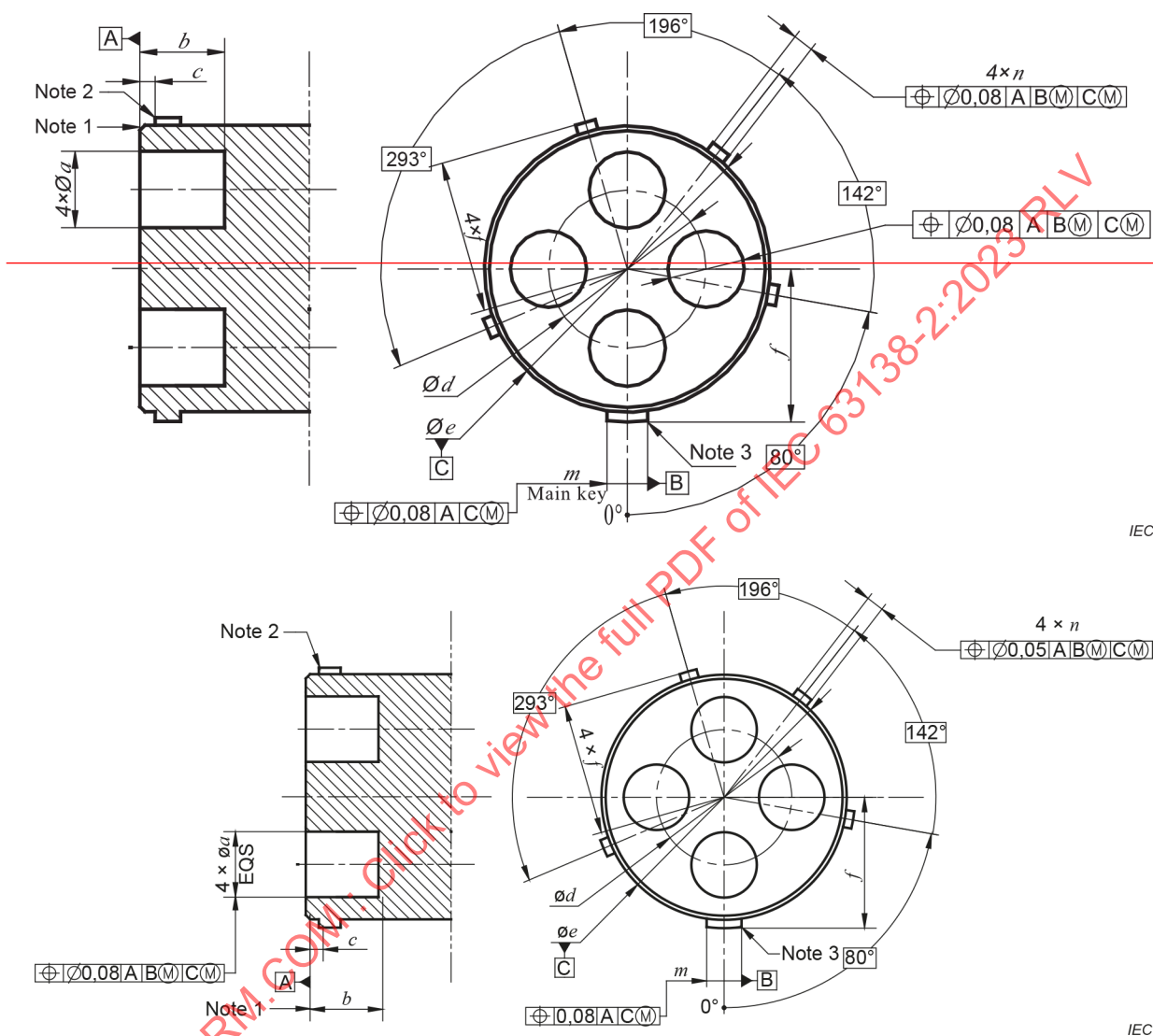
c) Retention test

After the sizing or insertion operation, the gauge C shall be inserted into the outer contact. The contact shall retain the mass of the gauge C in a vertical downward position.

4.2.3 Gauge for MQ4 socket connector

4.2.3.1 Dimensions of gauge

The gauge for the MQ4 socket connector is shown in Figure 7 and its dimensions are shown in Table 7.



NOTE 1 Mechanical reference plane.

NOTE 2 The shape of the four supplementary keys is optional.

NOTE 3 The shape of the main key is optional.

Figure 7 – Gauge for MQ4 socket connector

Table 7 – Dimensions of gauge for MQ4 socket connector

Ref.	Dimensions	
	mm	
	Min.	Max.
<i>a</i>	~~7,50~~ 7,52	~~7,60~~ 7,58
<i>b</i>	5,00	--
<i>c</i>	1,20	1,50
<i>d</i>	15,48	15,52
<i>e</i>	26,35	26,40
<i>f</i>	13,70	~~13,85~~ 13,80
<i>m</i>	3,00	3,15
<i>n</i>	1,40	~~1,55~~ 1,50

4.2.3.2 Test procedure

The gauge should be inserted into the MQ4 socket connector three times, and then the insertion force is measured; the insertion force should not be more than ~~50~~ 60 N.

4.2.4 Gauge for MQ4 plug connector**4.2.4.1 Dimensions of gauge**

The gauge for the MQ4 plug connector is shown in Figure 8 and its dimensions are shown in Table 8.

IECNORM.COM : Click to view the full PDF of IEC 63138-2:2023 RLV

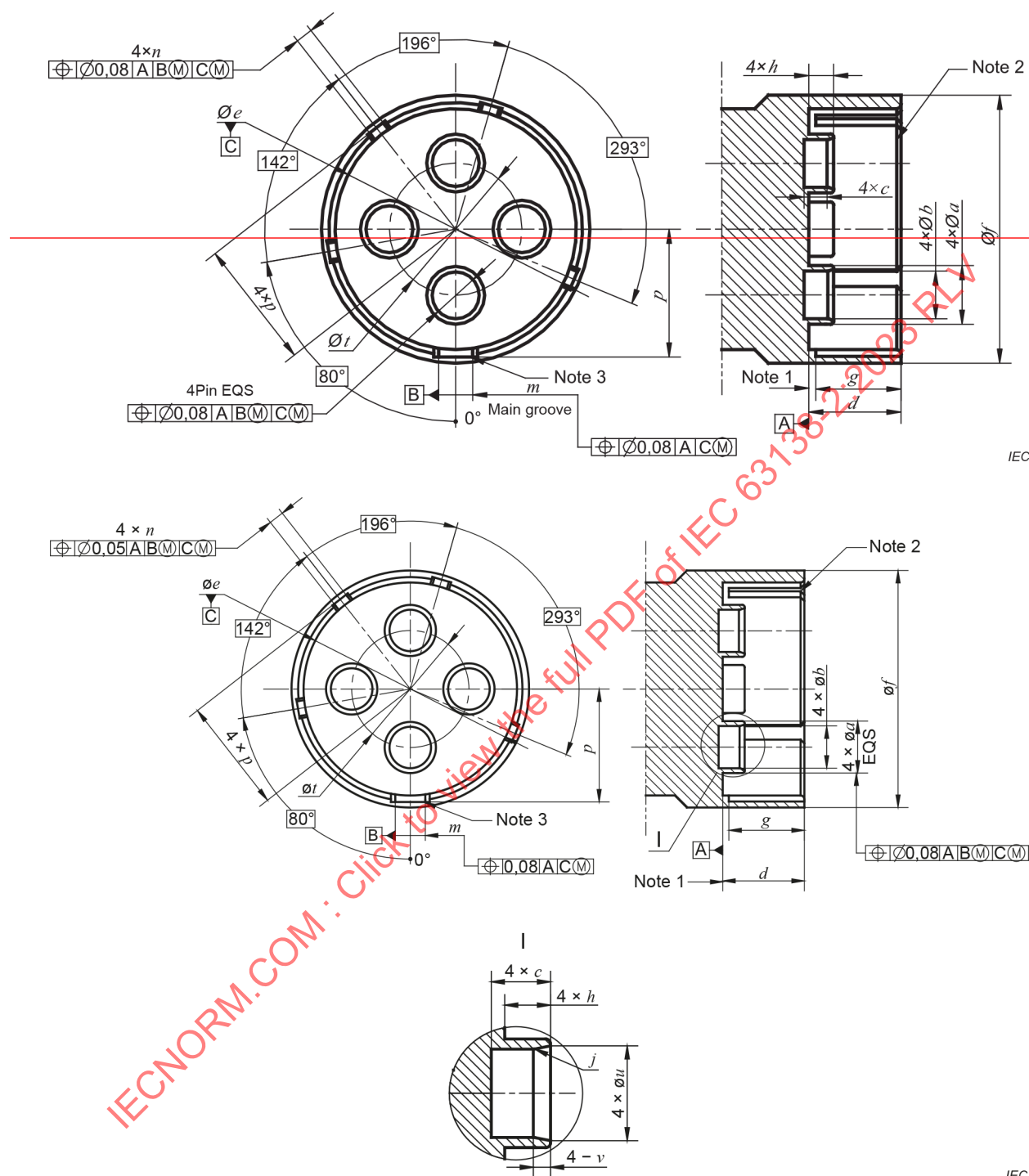


Figure 8 – Gauge for MQ4 plug connector

Table 8 – Dimensions of gauge for MQ4 plug connector

Ref.	Dimensions	
	mm	
	Min.	Max.
<i>a</i>	~~7,35~~ --	~~7,45~~ 7,30
<i>b</i>	5,88	5,90
<i>c</i>	~~2,50~~ 3,70	--
<i>d</i>	10,90	11,00
<i>e</i>	26,42	26,48
<i>f</i>	29,80	30,00
<i>g</i>	10,50	10,60
<i>h</i>	~~2,90~~ 3,30	~~3,00~~ 3,70
<i>j</i>	R1,00 nom	
<i>p</i>	~~14,00~~ 13,90	~~14,10~~ 14,00
<i>t</i>	15,48	15,52
<i>m</i>	3,20	3,35
<i>n</i>	~~1,60~~ 1,65	~~1,75~~
<i>u</i>	6,50	6,70
<i>v</i>	1,55	1,65

4.2.4.2 Test procedure

The gauge should be inserted into the MQ4 plug connector three times, and then the insertion force is measured; the insertion force should not be more than ~~50~~ 60 N.

5 Quality assessment procedure

5.1 General

Subclauses 5.2 to 5.3.4 provide the recommended rating, performance and test conditions to be considered when preparing a detail specification. They also specify the test schedules and procedure that suit the corresponding quality inspection level.

5.2 Rating and characteristics

The values indicated in Table 9 are recommended for MQ4 series circular connectors, and are given for the writer of the detail specification. They are applicable for the condition when the connectors are fully mated. The preferable characteristics can be seen in Table 9.

Certain tests are listed without any recommended values being given when they are not required. When such tests are required, appropriate values shall be entered in the detail specification at the discretion of the specification writer.

Table 9 – Rating and characteristics

Rating and characteristics	Test method IEC 63138-1:2019 Subclause	Value	Remarks, deviation from standard test method
Electrical			
Nominal impedance		50 Ω	
Frequency range ^a		DC~6 GHz	
Return loss	8.4.1	≥ 26 dB (DC to 3 GHz) ≥ 19 dB (3 GHz to 6 GHz)	Each RF channel tested separately
Centre contact resistance ^b	8.4.3		Each RF channel tested separately
– initial		$\leq 3,0$ m Ω	
– after conditioning		$\leq 5,0$ m Ω	
Outer conductor resistance	8.4.3		Each RF channel tested separately
– initial		$\leq 2,0$ m Ω	
– after conditioning		$\leq 3,0$ m Ω	
Insulation resistance ^b	8.4.4		Each RF channel tested separately
– initial		$\geq 5\,000$ M Ω	
– after conditioning		≥ 200 M Ω	
Proof voltage at sea level ^{c d}	8.4.5	1 000 V	(86~106) kPa, Test each RF channel separately
Screening effectiveness ^e	8.4.6	≥ 90 dB, up to 3 GHz ≥ 70 dB, 3 GHz to 6 GHz	$Z_t \leq 10$ m Ω , Each RF channel tested separately
RF power rating	8.4.10	150 W at 2 GHz, CW	
Discharge test	8.4.7	See DS	Each RF channel tested separately
Isolation	8.4.9	≥ 90 dB, 0,05 GHz~6 GHz	Test between two adjacent channels
Intermodulation level (PIM3)	8.4.8	≥ 160 dBc Frequency: 0 GHz to 2,7 GHz Power: 2×20 W	Each RF channel tested separately
Mechanical			
Centre contact captivation	8.5.2		Each RF channel tested separately
– axial force – axial torque		See DS	After the test, the centre contact shall meet the requirement for the dimension of mating face.
RF channel captivation	8.5.3		Test each RF channel with socket centre contact separately
– axial force		≥ 240 N	After the test, RF channels of the connector shall meet the requirement for the dimension of mating face.
Engagement and disengagement forces	8.5.4		
– axial force (engagement)		≤ 100 N (quick lock type)	

Rating and characteristics	Test method IEC 63138-1:2019 Subclause	Value	Remarks, deviation from standard test method
– axial force (disengagement)		≤ 100 N (quick lock type)	
– torque		≥ 25 N·m (threaded type)	
Gauge retention (resilient contacts)	8.5.5		
– centre contact		≥ 0,4 N	See 4.2.1
– outer contact		≥ 4 N	See 4.2.2
Mechanical compatibility	8.3.4	Insertion force ≤ ~~50~~ 60 N	See 4.2.3 to 4.2.4
Mechanical test for cable clamping device			
– cable rotation (nutating of cable end)	8.5.6	See DS	
– cable pulling	8.5.7	See DS	
– cable bending	8.5.8	See DS	
– cable torsion	8.5.9	See DS	
Strength of coupling mechanism	8.5.10	Axial force: ≥ 450 N Coupling torque resistance: ≥ 30 N·m (threaded type)	
High frequency vibration	8.5.12	100 m/s ² (10 to 2 000) Hz	
Shock	8.5.13	500 m/s ² , 1/2 sine wave, 11 ms	
Environmental			
Climatic category ^f		A:40/85/21	
Hermetic sealed	8.6.6	NA	
Leakage	8.6.5		
Salt mist	8.6.7	48 h	Duration of spraying, test after mating
Endurance			
Mechanical endurance	8.5.14	100 operations	
^a These values apply to the basic connector. In practice, these ~~may~~ can be influenced by the cable used and reference should always be made to the actual values given in the DS. ^b Values for a single pair of RF channels. ^c Voltages are RMS values of AC at 40 Hz to 65 Hz, unless otherwise specified. ^d Some cables usable with these connectors have ratings lower than the values given here. ^e When interfaces are fully mated. ^f For certain connectors, the upper temperature limit is restricted by the cable characteristics. Reference should be made to the relevant cable specification.			

5.3 Quality assessment

5.3.1 General

Quality assessment shall be performed according to IEC 63138-1, except for the provisions in 5.3.2 to 5.3.4.

5.3.2 Inspection procedure

Table 10 describes the qualification inspection tests to be performed.

Table 10 – Qualification inspection

Test	IEC 63138-1:2019 Subclause	Number of specimens
Group 1		
Visual ~~examination~~ inspection	8.2	6
Marking	8.2	
Workmanship	8.2	
Dimensions and interchangeability	8.3	
RF channel interface dimensions	8.3.1	
Connector interface dimensions	8.3.2	
Outline dimensions	8.3.3	
Mechanical compatibility	8.3.4	
Engagement and disengagement forces	8.5.4	
Gauge retention force ^a	8.5.5	
Hermetic seal	8.6.6	
Leakage	8.6.5	
Insulation resistance	8.4.4	
Group 2		
Centre contact captivation	8.5.2	2
RF channel captivation	8.5.3	
Salt mist	8.6.7	
Group 3		
Return loss	8.4.1	2
Insertion loss	8.4.2	
Isolation	8.4.9	
Screening effectiveness	8.4.6	
Passive intermodulation level (PIM)	8.4.8	
RF power rating ^b	8.4.10	
High temperature endurance	8.6.3	
Low temperature endurance	8.6.4	
Mechanical endurance	8.5.14	
Safety wire hole pull-out	8.5.15	

Test	IEC 63138-1:2019 Subclause	Number of specimens
Group 4		
Contact resistance	8.4.3	2
Voltage proof	8.4.5	
Discharge test	8.4.7	
Low frequency vibration	8.5.11	
High frequency vibration	8.5.12	
Shock	8.5.13	
Thermal shock	8.6.2	
Damp heat, steady state	8.6.1	
Effectiveness against cable rotation	8.5.6	
Effectiveness against cable pulling	8.5.7	
Effectiveness against cable bending	8.5.8	
Effectiveness against cable torsion	8.5.9	
Strength of coupling mechanism	8.5.10	
Group 5		
Solderability ^c	8.5.1	
^a The sample size of RF channels for test for gauge retention force is 3 sets of RF channels. ^b The tests are performed only for initial qualification approval if the qualified connectors have no change in design and manufacturing processes. ^c The test shall be performed using 3 sets of piece-parts individually taken from the lot before being assembled into connectors.		

5.3.3 Lot-by-lot inspection

The group A and B test shall be subject to the inspections specified in Table 11 and in the order given in the said table. ~~Sampling plans for mechanical compatibility and return loss inspection shall comply with Table 12.~~

Table 11 – Lot-by-lot inspection

Test	IEC 63138-1: 2019 Subclause	Number of specimens
Group A		
Visual ~~examination~~ inspection	8.2	100 %
Marking	8.2	
Workmanship	8.2	
Dimensions and interchangeability	8.3	
Interface dimensions for RF channels	8.3.1	
Interface dimensions for connectors	8.3.2	
Outline dimensions	8.3.3	
Mechanical compatibility	8.3.4	
Engagement and disengagement forces	8.5.4	
Gauge retention force ^a	8.5.5	
Hermetic seal	8.6.6	
Leakage	8.6.5	
Insulation resistance	8.4.4	
Group B		
Mechanical compatibility	8.3.4	See Table 12
Return loss	8.4.1	
^a Sample size of RF channels for test for gauge retention force is 3 sets of RF channels.		

Table 12 – Sampling plans for mechanical compatibility and return loss inspection

Lot size	Sample size for mechanical compatibility inspection	Sample size for return loss inspection
1 to 100	2 ^a	1
101 to 1 200	5	2
1 201 to above	10	3
^a When lot size is 1, the corresponding sample size is also 1.		

5.3.4 Periodic inspections

Table 13 describes the periodic tests to be performed.

Table 13 – Periodic inspection

Test	IEC 63138-1:2019 Subclause	Sample size
Group D1		1
Centre contact captivation	8.5.2	
RF channel captivation	8.5.3	
Salt mist	8.6.7	
Group D2		1
Return loss	8.4.1	
Insertion loss	8.4.2	
Isolation	8.4.9	
Screening effectiveness	8.4.6	
Passive intermodulation level (PIM)	8.4.8	
RF power rating ^a	8.4.10	
High temperature endurance	8.6.3	
Low temperature endurance	8.6.4	
Mechanical endurance	8.5.14	
Safety wire hole pull-out	8.5.15	
Group D3		1
Contact resistance	8.4.3	
Discharge test	8.4.7	
Low frequency vibration	8.5.11	
High frequency vibration	8.5.12	
Shock	8.5.13	
Thermal shock	8.6.2	
Damp heat, steady state	8.6.1	
Effectiveness against cable rotation	8.5.6	
Effectiveness against cable pulling	8.5.7	
Effectiveness against cable bending	8.5.8	
Effectiveness against cable torsion	8.5.9	
Strength of coupling mechanism	8.5.10	
Group D4		
Solderability ^b	8.5.1	
^a The tests are performed only for initial qualification approval if the qualified connectors have no change in design and manufacturing processes.		
^b The test shall be performed using 3 sets of piece-parts individually taken from the lot before being assembled into connectors.		

6 Instructions for preparation of detail specifications

6.1 General

Detail specification (DS) writers shall use the appropriate blank detail specification (BDS). Clause 6 comprises the BDS dedicated for use with MQ4 series circular connectors. As such, the BDS will already have information entered on it in relation to:

- the basic specification number applicable to all the detail specifications covering connector styles of the series covered by the sectional specification;
- the connector series designation.

The specification writer should enter the details relating to the connector style to be covered by the BDS, as indicated. The numbers in brackets in the BDS correspond to the following indications, which shall be given.

6.2 Identification of the detail specification

- 1) The name of the National Authorized Institution (NAI) under whose authority the DS is published and, if applicable, the organization from whom the DS is available.
- 2) The number allocated to the DS by the relevant National Authorized Institution immediately preceded by the ISO two letter national identity code or "XX" when the DS is produced by an IEC technical subcommittee.
- 3) The number and issue number of the generic specification and, when applicable, the sectional specification; also the national reference if different.
- 4) If different from the IEC number, the national number of the DS, the date of issue and any further information required by the national system, together with any amendment numbers.

6.3 Identification of the component

- 5) Enter the following details:
 - style: the style designation of the connector including type of fixing and sealing, if applicable;
 - attachment: by deletion of the inapplicable options of cable/wire given for centre and outer conductors;
 - special features and markings: as applicable;
 - series designation: in bold characters/digits ~~approximately~~ 15 mm high.
- 6) Enter details of assessment level and the climatic category.
- 7) A reproduction of the outline drawing and details of the panel piercing (if applicable). It shall provide the maximum envelope dimensions, the position of the reference plane and, in the case of a fixed connector, the position of the mounting plane relative to the front face of the connector.

Any maximum panel thickness limitations for fixed connectors shall be stated.

- 8) Particulars of all variants covered by the DS. As appropriate, the information shall include:
 - cable types (or sizes) applicable to each variant;
 - alternative plated or protective finishes;
 - details of alternative mounting flanges having either tapped or plain mounting holes;
 - details of alternative solder spills or solder buckets including, when applicable, those for use with microwave integrated circuit (MIC) components.

6.4 Performance

- 9) Performance data listing the most important characteristics of the connector in accordance with the requirements of the relevant sectional specification. Deviations from the minimum requirements shall be clearly indicated. Non-applicable parameters shall be marked "na".

6.5 Marking, ordering information and related matters

- 10) Insert marking and ordering information as appropriate, together with details of related documents and any invoked structural similarity.

6.6 Selection of tests, test conditions and severities

"na" shall be used to indicate non-applicable tests. All tests marked "a" by the detail specification writer shall be mandatory.

When using the normal procedure with a dedicated BDS, the letter "a" – for applicable – shall be entered in the "test required" column opposite each of the tests indicated as being mandatory in the test schedule of the relevant sectional specification. Any additional test required at the discretion of the specification writer shall also be indicated by an "a".

The specification writer shall also indicate, when necessary, details of deviations from the standard test methods and conditions including any relevant deviations given in the test schedule of the sectional specification.

6.7 Blank detail specification pro forma for MQ4 series circular connectors

Subclause 6.7 contains the complete BDS.

IECNORM.COM : Click to view the full PDF of IEC 63138-2:2023 RLV

(1)			(2) Page 1 of		
(3) ELECTRONIC COMPONENT OF ASSESSED QUALITY IN ACCORDANCE WITH: GENERIC SPECIFICATION: IEC 63138-1 SECTIONAL SPECIFICATION: IEC 63138-2			(4) Issue		
(5) Detail specification for radio frequency coaxial connector of assessed quality			Type MQ4		
Style			Special features and markings		
Method of cable/wire+ attachment		Centre conductor – solder/crimp+ Outer conductor – solder/clamp/crimp+ +Delete as appropriate			
(6) Assessment level	Characteristic impedance ...Ω		Climatic category .../.../...		
(7) Outline and maximum dimensions			Panel piercing and mounting details		
(8) Variants					
Variant No	Description of variant	IEC 63138-2			
01					
Information about manufacturers who have components qualified under the IECQ Conformity Assessment System is available through the IECQ on-line certificate system.					

(9) Performance (including limiting conditions of use)

Ratings and characteristics	Variant no. designation	IEC 63138-1:2019 Subclause	Value	Remarks including any deviations from standard test methods
Electrical				
Nominal impedance			50 Ω	
Frequency range			DC to 6 GHz	
Return loss	01	8.4.1	GHz GHz GHz GHz	Measurement frequency range
Centre contact resistance		8.4.3	$\leq$ m Ω $\leq$ m Ω	Initial After conditioning
Insulation resistance		8.4.4	$\geq$ G Ω $\geq$ G Ω	Initial After conditioning
+ Proof voltage at sea level	01	8.4.5	kV kV kV kV	86 kPa to 106 kPa
+ Proof voltage at 4,4 kPa	01	8.4.5	kV kV kV kV	kPa (if not 4,4 kPa)
Screening effectiveness	01	8.4.6	dB at GHz dB at GHz dB at GHz dB at GHz	$Z_t \leq$ m Ω $Z_t \leq$ m Ω $Z_t \leq$ m Ω $Z_t \leq$ m Ω
Discharge test (corona) at sea level	01	8.4.7	Extinction voltage $\geq$ V $\geq$ V $\geq$ V $\geq$ V	Atmospheric pressure
Isolation	01	8.4.9	$\geq$ dB	
Intermodulation level (PIM3)		8.4.8	dBm at GHz	Under 2 carries of +43 dBm
ADDITIONAL ELECTRICAL CHARACTERISTICS				

+ Voltage values are RMS values at 40 Hz to 65 Hz, unless otherwise specified.

Ratings and characteristics	Variant no. designation	IEC 63138-1:2019 Subclause	Value	Remarks including any deviations from standard test methods
Mechanical				
Soldering		8.5.1		
Gauge retention resilient contacts – inner contact – outer contact		8.5.5	N N	
Centre contact captivation – axial force – permitted displacement in each direction – torque		8.5.2	N mm N·m	
Outer contact captivation		8.5.3	N	
Engagement and separation forces and torques – axial force – torque		8.5.4	≤ N ≤ N·m	
Mechanical compatibility		8.3.4	≤ N	
Effectiveness of clamping device against cable rotation (nutation of cable end)	01	8.5.6	Rotations	Bend radius and number of revolutions mm No. mm No. mm No. mm No.
Effectiveness of clamping device against cable pulling	01	8.5.7	N N N N	Point of application and duration mm.....s mm.....s mm.....s mm.....s
Effectiveness of clamping device against cable bending	01	8.5.8	cycles cycles cycles cycles	Length of cable and mass mm.....Kg mm.....Kg mm.....Kg mm.....Kg
Effectiveness of clamping device against cable torsion	01	8.5.9	N·m N·m	Duration of applied torque s s s s
Strength of coupling mechanism		8.5.10	N	
High frequency vibration		8.5.12	m/s ² (to) Hz	(g _n acceleration)
Shock		8.5.13	m/s ² shape ms	(g _n acceleration)

Ratings and characteristics	Variant no. designation	IEC 63138-1:2019 Subclause	Value	Remarks including any deviations from standard test methods
ADDITIONAL MECHANICAL CHARACTERISTICS				
Environmental				
Climatic category			/ /	
Hermetic sealed		8.6.6	KPa·cm ³ / h (bar·cm ³ / h)	(100 to 110) kPa pressure differential
Leakage		8.6.5		
Salt mist		8.6.7	h	Duration of spraying
ADDITIONAL ENVIRONMENTAL CHARACTERISTICS				
Endurance				
Mechanical endurance		8.5.14	Operations	
High temperature endurance		8.6.3	h at °C	

(10) Supplementary information

– Marking of the component: in accordance with IEC 63138-1:2019, 10.1 in the following order of procedure 1) Identity of manufacturer 2) Manufacturing date code year / week 3) Component identification variant no. / designation identification
– Marking and contents of package: in accordance with IEC 63138-1:2019, 10.2 1) Information specified in IEC 63138-1:2019, 10.1 detailed above 2) Nominal characteristic impedance Ω 3) Assessment level code letter 4) Any additional marking required
– Ordering information: 1) Number of the detail specification / variant code 2) Assessment level code letter 3) Body finish (if more than one listed) 4) Any additional information or special requirements
– Related documents (if not included in IEC 63138-1 or sectional specification):
Relevant information on a basic style should be entered as variant 01.

7 Marking

7.1 Marking of components

Each component shall be legibly and durably marked, where space permits and in the following order of precedence, with:

- a) identity code of the manufacturer;
- b) manufacturer's connector identification code or IEC connector designation.

7.2 Marking and contents of package

The package shall be marked with the information specified in 7.1 and, in addition, the following information shall be given:

- a) nominal characteristic impedance;
- b) manufacturing date code;
- c) any additional marking required by the relevant specification.

When required by the relevant specification, the package shall also include instructions for assembling the connector(s) and instructions for the use of any special tools or materials, as necessary.

IECNORM.COM : Click to view the full PDF of IEC 63138-2:2023 RLV

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Multi-channel radio-frequency connectors –
Part 2: Sectional specification for MQ4 series circular connectors**

**Connecteurs radiofréquences multicanaux –
Partie 2: Spécification intermédiaire pour les connecteurs circulaires de
série MQ4**

IECNORM.COM : Click to view the full PDF of IEC 63138-2:2023 RLV

CONTENTS

FOREWORD	4
1 Scope	6
2 Normative references	6
3 Terms and definitions	6
4 Mating face and gauge information	7
4.1 Mating face dimensions	7
4.1.1 MQ4 socket connector	7
4.1.2 MQ4 plug connector	8
4.1.3 Mating face of RF channel	11
4.2 Gauges	12
4.2.1 Gauge for RF channel	12
4.2.2 Gauge rings for plug outer contact	13
4.2.3 Gauge for MQ4 socket connector	14
4.2.4 Gauge for MQ4 plug connector	15
5 Quality assessment procedure	17
5.1 General	17
5.2 Rating and characteristics	17
5.3 Quality assessment	19
5.3.1 General	19
5.3.2 Inspection procedure	19
5.3.3 Lot-by-lot inspection	20
5.3.4 Periodic inspections	21
6 Instructions for preparation of detail specifications	23
6.1 General	23
6.2 Identification of the detail specification	23
6.3 Identification of the component	23
6.4 Performance	23
6.5 Marking, ordering information and related matters	24
6.6 Selection of tests, test conditions and severities	24
6.7 Blank detail specification pro forma for MQ4 series circular connectors	24
7 Marking	29
7.1 Marking of components	29
7.2 Marking and contents of package	29
Figure 1 – MQ4 socket connector	7
Figure 2 – MQ4 quick-lock plug connector	9
Figure 3 – MQ4 threaded plug connector	10
Figure 4 – Mating face of RF channel	11
Figure 5 – Gauge for socket contact of RF channel	13
Figure 6 – Gauge for plug outer contact	14
Figure 7 – Gauge for MQ4 socket connector	15
Figure 8 – Gauge for MQ4 plug connector	16
Table 1 – Dimensions of MQ4 socket connector	8
Table 2 – Dimensions of MQ4 quick-lock plug connector	9

Table 3 – Dimensions of MQ4 threaded plug connector	10
Table 4 – Dimensions of RF channel.....	12
Table 5 – Dimensions of gauge for socket contact	13
Table 6 – Dimensions of gauge for outer contact	14
Table 7 – Dimensions of gauge for MQ4 socket connector	15
Table 8 – Dimensions of gauge for MQ4 plug connector	16
Table 9 – Rating and characteristics	17
Table 10 – Qualification inspection	19
Table 11 – Lot-by-lot inspection	21
Table 12 – Sampling plans for mechanical compatibility and return loss inspection	21
Table 13 – Periodic inspection	22

IECNORM.COM : Click to view the full PDF of IEC 63138-2:2023 RLV

INTERNATIONAL ELECTROTECHNICAL COMMISSION

MULTI-CHANNEL RADIO-FREQUENCY CONNECTORS –**Part 2: Sectional specification for MQ4 series circular connectors**

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at <https://patents.iec.ch> shall not be held responsible for identifying any or all such patent rights.

IEC 63138-2 has been prepared by subcommittee 46F: RF and microwave passive components, of IEC technical committee 46: Cables, wires, waveguides, RF connectors, RF and microwave passive components and accessories. It is an International Standard.

This second edition cancels and replaces the first edition published in 2020. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) change the supplementary key and groove position degree from 0,1 to 0,05 in Figure 1, Figure 2, Figure 3, Figure 7 and Figure 8;
- b) change dimension q from min.1,60 to min.1,65 in Table 1;
- c) add an electrical reference plane in Figure 4;

- d) add dimensions in Table 1;
- e) change dimension n from max.1,55 to max.1,50 in Table 2, Table 3 and Table 7;
- f) update some dimensions in Figure 4 and Table 4;
- g) change dimension a from min.7,50 to min.7,52, and max.7,60 to max. 7,58 in Table 7;
- h) update some dimensions in Figure 8 and Table 8;
- i) change mechanical compatibility from 50 N to 60 N in 4.2.3 and 4.2.4.

The text of this International Standard is based on the following documents:

Draft	Report on voting
46F/644/FDIS	46F/651/RVD

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

This document is to be read with IEC 63138-1:2019.

A list of all parts in the IEC 63138 series, published under the general title *Multichannel radio-frequency connectors*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

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

MULTI-CHANNEL RADIO-FREQUENCY CONNECTORS –

Part 2: Sectional specification for MQ4 series circular connectors

1 Scope

This part of IEC 63138, which is a sectional specification (SS), provides information and rules for the preparation of detail specifications (DS) for MQ4 series circular connectors with four RF channels, as well as a detailed specification of the blank format.

An MQ4 series circular connector with 50 Ω nominal impedance has four RF channels which can be engaged and disengaged at the same time. There are two versions of plug connectors, one is a quick-lock version, and the other is a threaded version. The socket connector provides two coupling mechanisms, a quick-lock and a threaded coupling.

MQ4 series circular connectors can be used in mobile communication systems and in other communication equipment.

This document also specifies the mating face dimensions and gauging information of MQ4 series circular connectors, and tests selected from IEC 63138-1, applicable to all detail specifications relating to MQ4 series circular connectors.

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.

IEC 63138-1:2019, *Multi-channel radio frequency connectors – Part 1: Generic specification – General requirements and test methods*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 63138-1 apply.

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

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

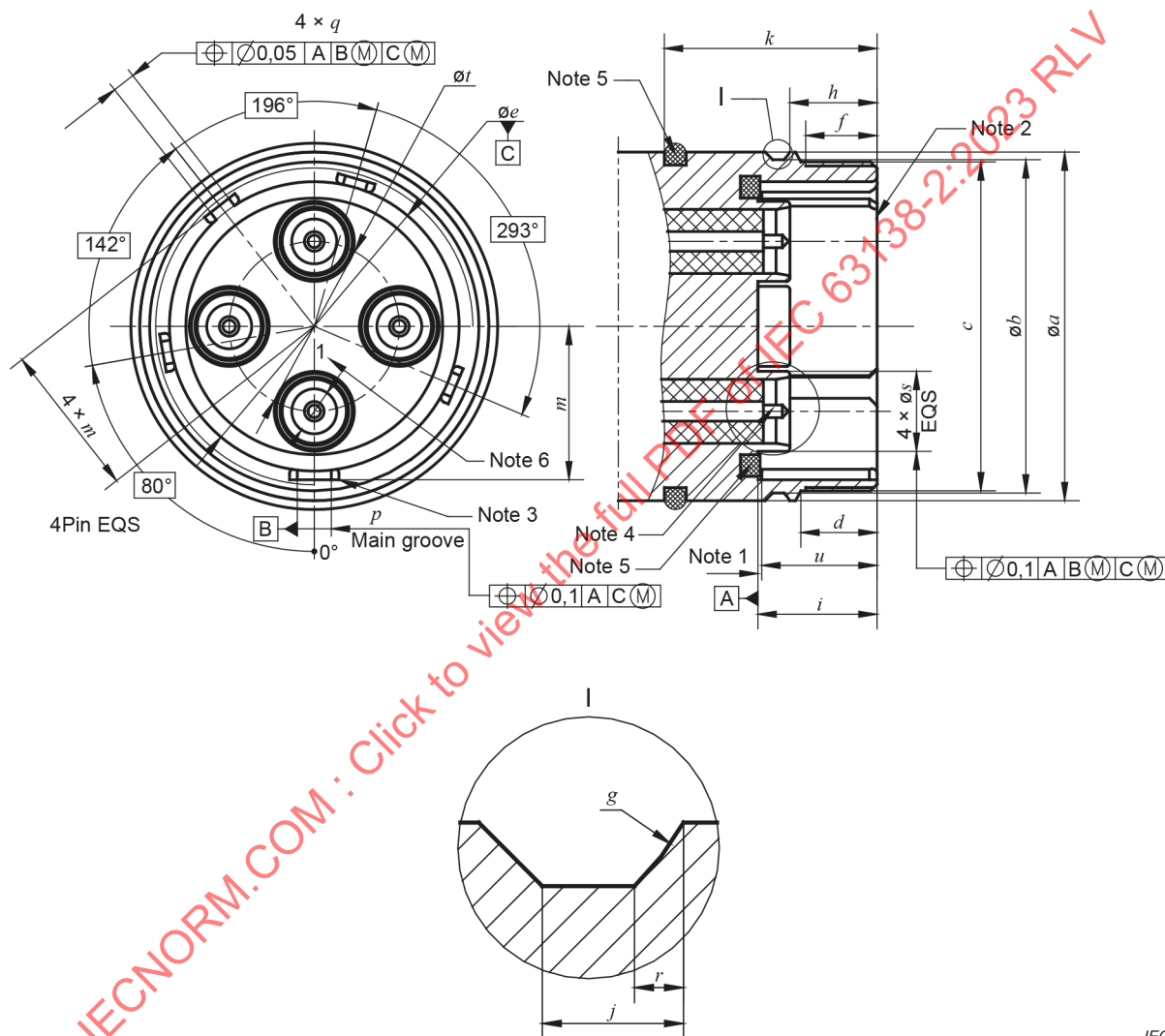
4 Mating face and gauge information

4.1 Mating face dimensions

4.1.1 MQ4 socket connector

The mating face of MQ4 socket connectors is shown in Figure 1 and its dimensions are shown in Table 1.

NOTE Metric dimension are original dimensions. All undimensioned pictorial configurations are for reference purpose only.



NOTE 1 Mechanical reference plane.

NOTE 2 Chamfer of the four supplementary grooves is optional.

NOTE 3 Chamfer of the main groove is optional.

NOTE 4 The mating face of the RF channel with pin contact is shown in Figure 4a) and its dimensions are shown in Table 4.

NOTE 5 The shape of seal ring is optional.

NOTE 6 The initial position number of the RF channel with pin contact and the other positions numbered clockwise.

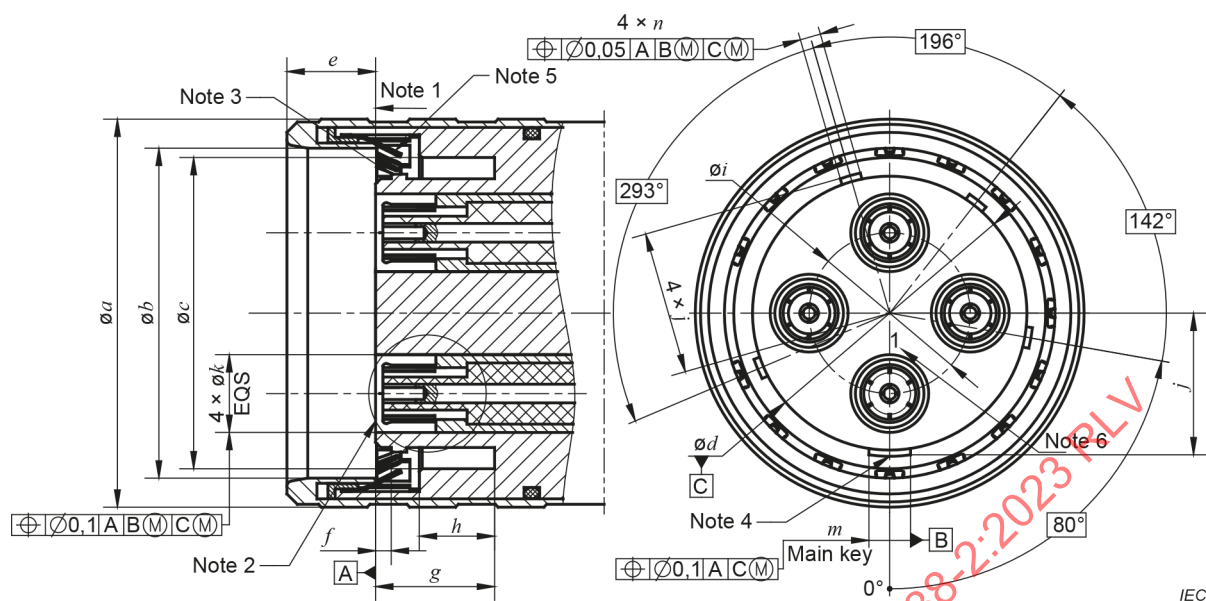
Figure 1 – MQ4 socket connector

Table 1 – Dimensions of MQ4 socket connector

Ref.	Dimensions	
	mm	
	Min.	Max.
<i>a</i>	31,75	31,80
<i>b</i>	30,35	30,40
<i>c</i>	M30 × 1 tolerance 6 g	
<i>d</i>	6,80	7,00
<i>e</i>	26,42	26,48
<i>f</i>	6,00	--
<i>g</i>	R3,0 nom.	
<i>h</i>	7,95	8,05
<i>i</i>	10,95	11,00
<i>j</i>	1,50	1,80
<i>k</i>	19,30	19,45
<i>m</i>	13,90	14,00
<i>p</i>	3,20	3,35
<i>q</i>	1,65	1,75
<i>r</i>	0,50	0,60
<i>s</i>	7,28	7,32
<i>t</i>	15,48	15,52
<i>u</i>	10,30	10,90

4.1.2 MQ4 plug connector**4.1.2.1 MQ4 quick-lock plug connector**

The mating face of the MQ4 connector with quick-lock type is shown in Figure 2 and its dimensions are shown in Table 2.



NOTE 1 Mechanical reference plane.

NOTE 2 The mating face of the RF channel with socket contact is shown in Figure 4b) and its dimensions are shown in Table 4.

NOTE 3 The shape of the four supplementary keys is optional.

NOTE 4 The shape of the main key is optional.

NOTE 5 The shape of the spring finger is optional.

NOTE 6 The initial position number of the RF channel with socket contact and the other positions numbered anticlockwise.

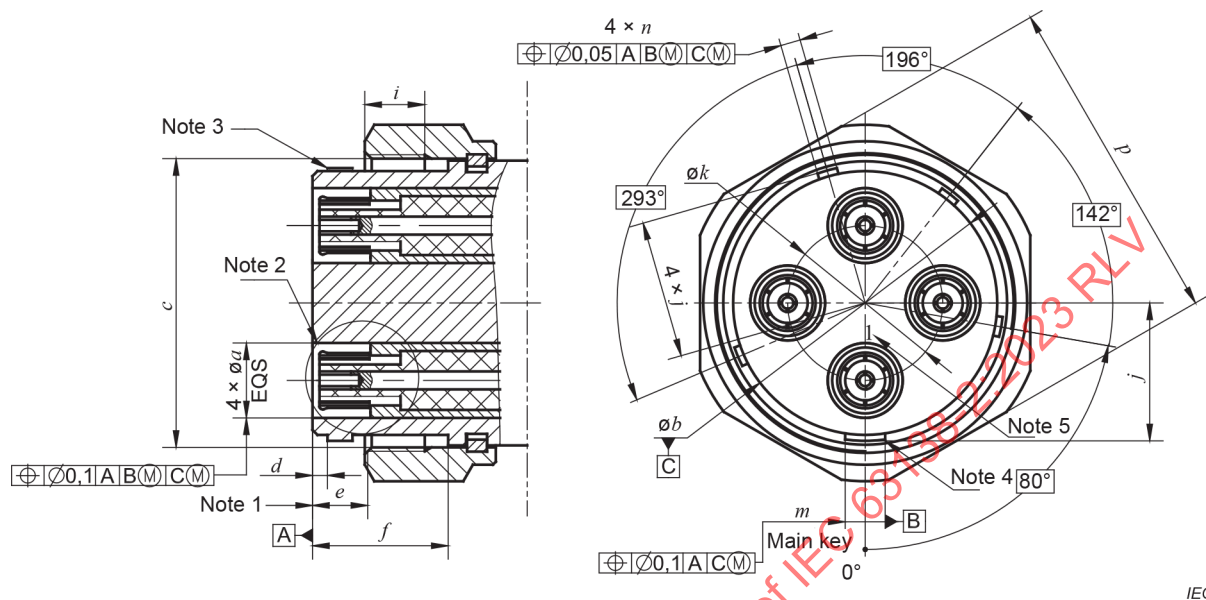
Figure 2 – MQ4 quick-lock plug connector

Table 2 – Dimensions of MQ4 quick-lock plug connector

Ref.	Dimensions	
	mm	
	Min.	Max.
<i>a</i>	--	42,00
<i>b</i>	31,80	31,90
<i>c</i>	30,05	30,15
<i>d</i>	26,30	26,40
<i>e</i>	8,40	8,60
<i>f</i>	1,20	1,50
<i>g</i>	11,00	11,10
<i>h</i>	6,60	6,80
<i>i</i>	15,48	15,52
<i>j</i>	13,70	13,80
<i>k</i>	7,52	7,58
<i>m</i>	3,00	3,15
<i>n</i>	1,40	1,50

4.1.2.2 MQ4 threaded plug connector

The mating face of the MQ4 threaded plug connector is shown in Figure 3 and its dimensions are shown in Table 3.



NOTE 1 Mechanical reference plane.

NOTE 2 The mating face of the RF channel with socket contact is shown in Figure 4b) and its dimensions are shown in Table 4.

NOTE 3 The shape of the four supplementary keys is optional.

NOTE 4 The shape of the main key is optional.

NOTE 5 The initial position number of the RF channel with socket contact and the other positions numbered anti-clockwise.

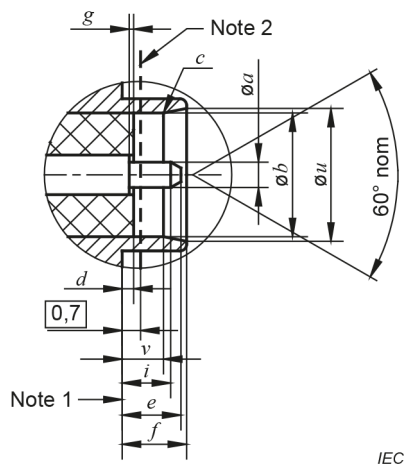
Figure 3 – MQ4 threaded plug connector

Table 3 – Dimensions of MQ4 threaded plug connector

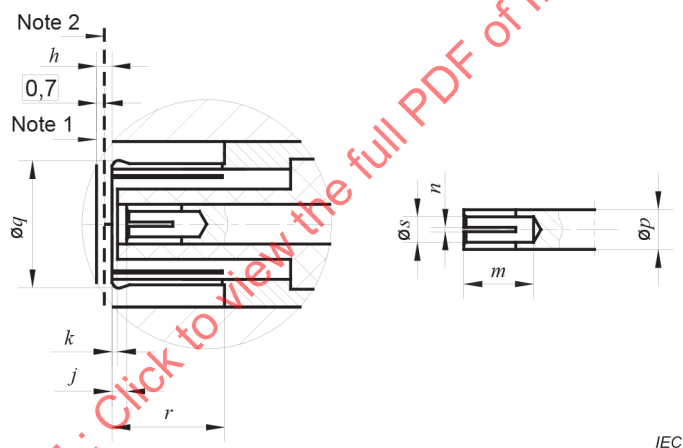
Ref.	Dimensions	
	mm	
	Min.	Max.
<i>a</i>	7,52	7,58
<i>b</i>	26,35	26,40
<i>c</i>	M30 × 1 tolerance 6 H	
<i>d</i>	1,20	1,50
<i>e</i>	5,20	5,60
<i>f</i>	11,20	--
<i>i</i>	7,00	--
<i>j</i>	13,70	13,80
<i>k</i>	15,48	15,52
<i>m</i>	3,00	3,15
<i>n</i>	1,40	1,50
<i>p</i>	32,0 nom.	

4.1.3 Mating face of RF channel

The mating face of the RF channel with pin contact is shown in Figure 4a), the mating face of the RF channel with socket contact is shown in Figure 4b), and their dimensions are shown in Table 4.



a) RF channel with pin contact



b) RF channel with socket contact

NOTE 1 Mechanical reference plane.

NOTE 2 Electrical reference plane.

Figure 4 – Mating face of RF channel

Table 4 – Dimensions of RF channel

Ref.	Dimensions	
	mm	
	Min.	Max.
<i>a</i>	1,17	1,23
<i>b</i>	5,90	5,93
<i>c</i>	R1,00 nom	
<i>d</i>	0,35	0,65
<i>e</i>	2,60	2,90
<i>f</i>	3,30	3,70
<i>g</i>	0	0,25
<i>h</i>	0,75	1,00
<i>i</i>	1,70	--
<i>j</i>	0	0,25
<i>k</i>	0	0,25
<i>m</i>	3,00	--
<i>n</i> ^a	--	--
<i>p</i>	1,8 nom	
<i>q</i> ^b	--	6,40
<i>r</i>	3,80	--
<i>u</i>	6,60	6,70
<i>v</i>	2,00	2,20
<i>s</i> ^a	--	--
^a Slot design optional when mating with a pin with $\Phi 1,17$ mm to $\Phi 1,23$ mm. It should meet the requirements of mechanical and electrical performance. ^b Expand to meet the requirements with gauge rings for socket outer contact.		

4.2 Gauges

4.2.1 Gauge for RF channel

4.2.1.1 Socket centre contact

4.2.1.2 Dimensions of gauge

The gauge for the socket contact of the RF channel is shown in Figure 5 and its dimensions are shown in Table 5.

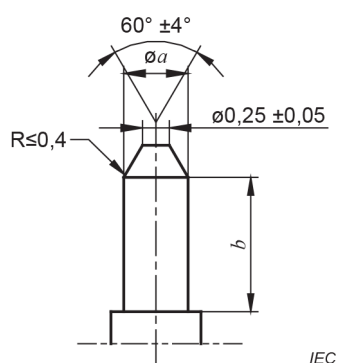


Figure 5 – Gauge for socket contact of RF channel

Table 5 – Dimensions of gauge for socket contact

Ref.	Gauge A (For sizing purpose)		Gauge B (For insertion purpose)		Gauge C (For retention purpose) Mass of gauge : 40^{+2}_0 g	
	mm		mm		mm	
	Min.	Max.	Min.	Max.	Min.	Max.
a	1,235	1,240	1,230	1,235	1,165	1,170
b	0,700	1,000	0,900	1,200	0,900	1,200
Material: Polished steel, cylindrical surface roughness of diameter a: $R_a \leq 0,4 \mu\text{m}$.						

4.2.1.3 Test procedure

Test procedure as follows:

a) Sizing test

Insert gauge A into centre contact three times, the depth of insertion is not less than 0,7 mm; this is a sizing operation.

b) Insertion test

After sizing operation, insert gauge B into centre contact, the insertion force shall not exceed 6 N.

c) Retention test

After the sizing or insertion operation, the gauge C shall be inserted into the socket centre contact. The contact shall retain the mass of the gauge C in a vertical downward position.

4.2.2 Gauge rings for plug outer contact

4.2.2.1 Dimensions of gauge

The gauge for the outer contact of the RF channel is shown in Figure 6 and its dimensions are shown in Table 6.

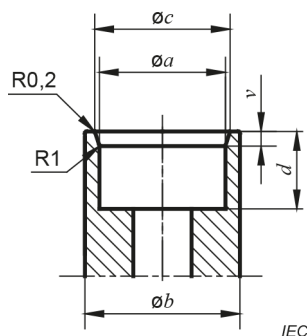


Figure 6 – Gauge for plug outer contact

Table 6 – Dimensions of gauge for outer contact

Ref.	Gauge A (For sizing purpose)		Gauge B (For insertion purpose)		Gauge C (For retention purpose) Mass of gauge : 400^{+2}_{-0} g	
	mm		mm		mm	
	Min.	Max.	Min.	Max.	Min.	Max.
<i>a</i>	5,880	5,885	5,895	5,900	5,930	5,935
<i>b</i>	7,250	7,350	7,250	7,350	7,250	7,350
<i>c</i>	6,700	6,800	6,700	6,800	6,700	6,800
<i>d</i>	2,700	3,000	2,700	3,000	2,700	3,000
<i>v</i>	1,55	1,65	1,55	1,65	1,55	1,65
Material: Polished steel, cylindrical surface roughness of diameter <i>a</i> : $R_a \leq 0,4 \mu\text{m}$.						

4.2.2.2 Test procedure

a) Sizing test

The gauge A should be inserted into the outer contact of RF channel three times, the depth of insertion is not less than 2,7 mm; this is a sizing operation.

b) Insertion test

After the sizing operation, if specified in the detail specification, the force necessary to insert gauge B fully into the outer contact shall be measured and it shall not exceed 15 N.

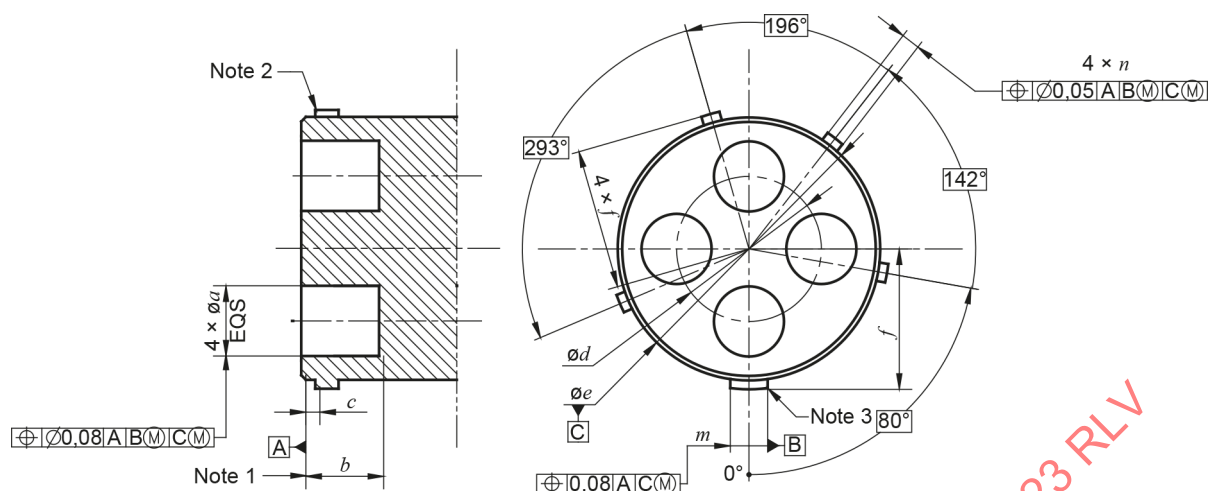
c) Retention test

After the sizing or insertion operation, the gauge C shall be inserted into the outer contact. The contact shall retain the mass of the gauge C in a vertical downward position.

4.2.3 Gauge for MQ4 socket connector

4.2.3.1 Dimensions of gauge

The gauge for the MQ4 socket connector is shown in Figure 7 and its dimensions are shown in Table 7.



IEC

NOTE 1 Mechanical reference plane.

NOTE 2 The shape of the four supplementary keys is optional.

NOTE 3 The shape of the main key is optional.

Figure 7 – Gauge for MQ4 socket connector

Table 7 – Dimensions of gauge for MQ4 socket connector

Ref.	Dimensions mm	
	Min.	Max.
<i>a</i>	7,52	7,58
<i>b</i>	5,00	--
<i>c</i>	1,20	1,50
<i>d</i>	15,48	15,52
<i>e</i>	26,35	26,40
<i>f</i>	13,70	13,80
<i>m</i>	3,00	3,15
<i>n</i>	1,40	1,50

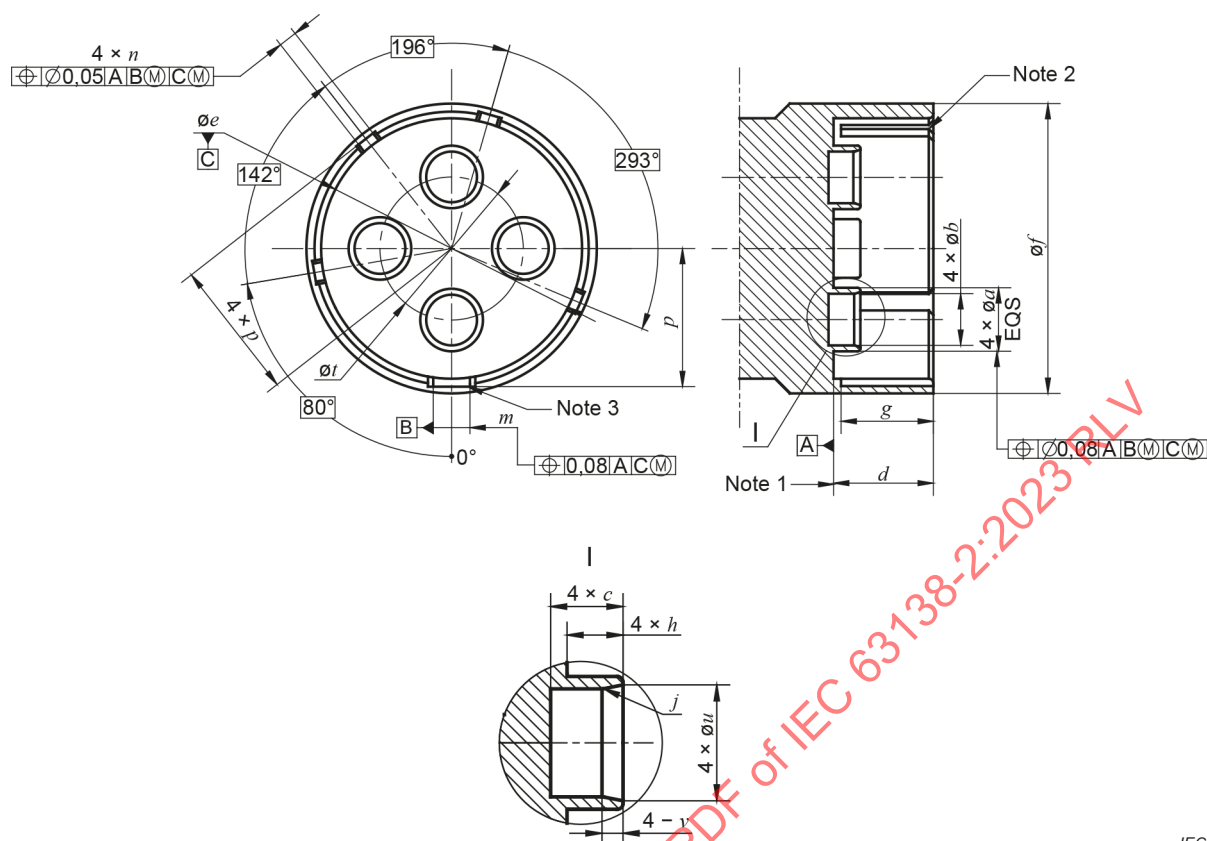
4.2.3.2 Test procedure

The gauge should be inserted into the MQ4 socket connector three times, and then the insertion force is measured; the insertion force should not be more than 60 N.

4.2.4 Gauge for MQ4 plug connector

4.2.4.1 Dimensions of gauge

The gauge for the MQ4 plug connector is shown in Figure 8 and its dimensions are shown in Table 8.



NOTE 1 Mechanical reference plane.

NOTE 2 Chamfer of the four supplementary grooves is optional.

NOTE 3 Chamfer of the main groove is optional.

Figure 8 – Gauge for MQ4 plug connector

Table 8 – Dimensions of gauge for MQ4 plug connector

Ref.	Dimensions	
	mm	
	Min.	Max.
a	--	7,30
b	5,88	5,90
c	3,70	--
d	10,90	11,00
e	26,42	26,48
f	29,80	30,00
g	10,50	10,60
h	3,30	3,70
j	R1,00 nom	
p	13,90	14,00
t	15,48	15,52
m	3,20	3,35
n	1,65	1,75
u	6,50	6,70
v	1,55	1,65

4.2.4.2 Test procedure

The gauge should be inserted into the MQ4 plug connector three times, and then the insertion force is measured; the insertion force should not be more than 60 N.

5 Quality assessment procedure

5.1 General

Subclauses 5.2 to 5.3.4 provide the recommended rating, performance and test conditions to be considered when preparing a detail specification. They also specify the test schedules and procedure that suit the corresponding quality inspection level.

5.2 Rating and characteristics

The values indicated in Table 9 are recommended for MQ4 series circular connectors, and are given for the writer of the detail specification. They are applicable for the condition when the connectors are fully mated. The preferable characteristics can be seen in Table 9.

Certain tests are listed without any recommended values being given when they are not required. When such tests are required, appropriate values shall be entered in the detail specification at the discretion of the specification writer.

Table 9 – Rating and characteristics

Rating and characteristics	Test method IEC 63138-1:2019 Subclause	Value	Remarks, deviation from standard test method
Electrical			
Nominal impedance		50 Ω	
Frequency range ^a		DC~6 GHz	
Return loss	8.4.1	≥ 26 dB (DC to 3 GHz) ≥ 19 dB (3 GHz to 6 GHz)	Each RF channel tested separately
Centre contact resistance ^b	8.4.3		Each RF channel tested separately
– initial		$\leq 3,0$ m Ω	
– after conditioning		$\leq 5,0$ m Ω	
Outer conductor resistance	8.4.3		Each RF channel tested separately
– initial		$\leq 2,0$ m Ω	
– after conditioning		$\leq 3,0$ m Ω	
Insulation resistance ^b	8.4.4		Each RF channel tested separately
– initial		$\geq 5\,000$ M Ω	
– after conditioning		≥ 200 M Ω	
Proof voltage at sea level ^{c d}	8.4.5	1 000 V	(86~106) kPa, Test each RF channel separately
Screening effectiveness ^e	8.4.6	≥ 90 dB, up to 3 GHz ≥ 70 dB, 3 GHz to 6 GHz	$Z_t \leq 10$ m Ω , Each RF channel tested separately
RF power rating	8.4.10	150 W at 2 GHz, CW	
Discharge test	8.4.7	See DS	Each RF channel tested separately

Rating and characteristics	Test method IEC 63138-1:2019 Subclause	Value	Remarks, deviation from standard test method
Isolation	8.4.9	≥ 90 dB, 0,05 GHz~6 GHz	Test between two adjacent channels
Intermodulation level (PIM3)	8.4.8	≥ 160 dBc Frequency: 0 GHz to 2,7 GHz Power: 2×20 W	Each RF channel tested separately
Mechanical			
Centre contact captivation	8.5.2		Each RF channel tested separately
– axial force – axial torque		See DS	After the test, the centre contact shall meet the requirement for the dimension of mating face.
RF channel captivation	8.5.3		Test each RF channel with socket centre contact separately
– axial force		≥ 240 N	After the test, RF channels of the connector shall meet the requirement for the dimension of mating face.
Engagement and disengagement forces	8.5.4		
– axial force (engagement)		≤ 100 N (quick lock type)	
– axial force (disengagement)		≤ 100 N (quick lock type)	
– torque		≥ 25 N·m (threaded type)	
Gauge retention (resilient contacts)	8.5.5		
– centre contact		$\geq 0,4$ N	See 4.2.1
– outer contact		≥ 4 N	See 4.2.2
Mechanical compatibility	8.3.4	Insertion force ≤ 60 N	See 4.2.3 to 4.2.4
Mechanical test for cable clamping device			
– cable rotation (nutating of cable end)	8.5.6	See DS	
– cable pulling	8.5.7	See DS	
– cable bending	8.5.8	See DS	
– cable torsion	8.5.9	See DS	
Strength of coupling mechanism	8.5.10	Axial force: ≥ 450 N Coupling torque resistance: ≥ 30 N·m (threaded type)	
High frequency vibration	8.5.12	100 m/s^2 (10 to 2 000) Hz	
Shock	8.5.13	500 m/s^2 , 1/2 sine wave, 11 ms	
Environmental			
Climatic category ^f		A:40/85/21	
Hermetic seal	8.6.6	NA	
Leakage	8.6.5		
Salt mist	8.6.7	48 h	Duration of spraying, test after mating

Rating and characteristics	Test method IEC 63138-1:2019 Subclause	Value	Remarks, deviation from standard test method
Endurance			
Mechanical endurance	8.5.14	100 operations	
^a These values apply to the basic connector. In practice, these can be influenced by the cable used and reference should always be made to the actual values given in the DS. ^b Values for a single pair of RF channels. ^c Voltages are RMS values of AC at 40 Hz to 65 Hz, unless otherwise specified. ^d Some cables usable with these connectors have ratings lower than the values given here. ^e When interfaces are fully mated. ^f For certain connectors, the upper temperature limit is restricted by the cable characteristics. Reference should be made to the relevant cable specification.			

5.3 Quality assessment

5.3.1 General

Quality assessment shall be performed according to IEC 63138-1, except for the provisions in 5.3.2 to 5.3.4.

5.3.2 Inspection procedure

Table 10 describes the qualification inspection tests to be performed.

Table 10 – Qualification inspection

Test	IEC 63138-1:2019 Subclause	Number of specimens
Group 1		
Visual inspection	8.2	6
Marking	8.2	
Workmanship	8.2	
Dimensions and interchangeability	8.3	
RF channel interface dimensions	8.3.1	
Connector interface dimensions	8.3.2	
Outline dimensions	8.3.3	
Mechanical compatibility	8.3.4	
Engagement and disengagement forces	8.5.4	
Gauge retention force ^a	8.5.5	
Hermetic seal	8.6.6	
Leakage	8.6.5	
Insulation resistance	8.4.4	
Group 2		
Centre contact captivation	8.5.2	2
RF channel captivation	8.5.3	
Salt mist	8.6.7	

Test	IEC 63138-1:2019 Subclause	Number of specimens
Group 3		
Return loss	8.4.1	2
Insertion loss	8.4.2	
Isolation	8.4.9	
Screening effectiveness	8.4.6	
Passive intermodulation level (PIM)	8.4.8	
RF power rating ^b	8.4.10	
High temperature endurance	8.6.3	
Low temperature endurance	8.6.4	
Mechanical endurance	8.5.14	
Safety wire hole pull-out	8.5.15	
Group 4		
Contact resistance	8.4.3	2
Voltage proof	8.4.5	
Discharge test	8.4.7	
Low frequency vibration	8.5.11	
High frequency vibration	8.5.12	
Shock	8.5.13	
Thermal shock	8.6.2	
Damp heat, steady state	8.6.1	
Effectiveness against cable rotation	8.5.6	
Effectiveness against cable pulling	8.5.7	
Effectiveness against cable bending	8.5.8	
Effectiveness against cable torsion	8.5.9	
Strength of coupling mechanism	8.5.10	
Group 5		
Solderability ^c	8.5.1	
^a The sample size of RF channels for test for gauge retention force is 3 sets of RF channels. ^b The tests are performed only for initial qualification approval if the qualified connectors have no change in design and manufacturing processes. ^c The test shall be performed using 3 sets of piece-parts individually taken from the lot before being assembled into connectors.		

5.3.3 Lot-by-lot inspection

The group A and B test shall be subject to the inspections specified in Table 11 and in the order given in the said table.

Table 11 – Lot-by-lot inspection

Test	IEC 63138-1: 2019 Subclause	Number of specimens
Group A		
Visual inspection	8.2	100 %
Marking	8.2	
Workmanship	8.2	
Dimensions and interchangeability	8.3	
Interface dimensions for RF channels	8.3.1	
Interface dimensions for connectors	8.3.2	
Outline dimensions	8.3.3	
Mechanical compatibility	8.3.4	
Engagement and disengagement forces	8.5.4	
Gauge retention force ^a	8.5.5	
Hermetic seal	8.6.6	
Leakage	8.6.5	
Insulation resistance	8.4.4	
Group B		
Mechanical compatibility	8.3.4	See Table 12
Return loss	8.4.1	

^a Sample size of RF channels for test for gauge retention force is 3 sets of RF channels.

Table 12 – Sampling plans for mechanical compatibility and return loss inspection

Lot size	Sample size for mechanical compatibility inspection	Sample size for return loss inspection
1 to 100	2 ^a	1
101 to 1 200	5	2
1 201 to above	10	3

^a When lot size is 1, the corresponding sample size is also 1.

5.3.4 Periodic inspections

Table 13 describes the periodic tests to be performed.

Table 13 – Periodic inspection

Test	IEC 63138-1:2019 Subclause	Sample size
Group D1		1
Centre contact captivation	8.5.2	
RF channel captivation	8.5.3	
Salt mist	8.6.7	
Group D2		1
Return loss	8.4.1	
Insertion loss	8.4.2	
Isolation	8.4.9	
Screening effectiveness	8.4.6	
Passive intermodulation level (PIM)	8.4.8	
RF power rating ^a	8.4.10	
High temperature endurance	8.6.3	
Low temperature endurance	8.6.4	
Mechanical endurance	8.5.14	
Safety wire hole pull-out	8.5.15	
Group D3		1
Contact resistance	8.4.3	
Discharge test	8.4.7	
Low frequency vibration	8.5.11	
High frequency vibration	8.5.12	
Shock	8.5.13	
Thermal shock	8.6.2	
Damp heat, steady state	8.6.1	
Effectiveness against cable rotation	8.5.6	
Effectiveness against cable pulling	8.5.7	
Effectiveness against cable bending	8.5.8	
Effectiveness against cable torsion	8.5.9	
Strength of coupling mechanism	8.5.10	
Group D4		
Solderability ^b	8.5.1	
^a The tests are performed only for initial qualification approval if the qualified connectors have no change in design and manufacturing processes. ^b The test shall be performed using 3 sets of piece-parts individually taken from the lot before being assembled into connectors.		

6 Instructions for preparation of detail specifications

6.1 General

Detail specification (DS) writers shall use the appropriate blank detail specification (BDS). Clause 6 comprises the BDS dedicated for use with MQ4 series circular connectors. As such, the BDS will already have information entered on it in relation to:

- the basic specification number applicable to all the detail specifications covering connector styles of the series covered by the sectional specification;
- the connector series designation.

The specification writer should enter the details relating to the connector style to be covered by the BDS, as indicated. The numbers in brackets in the BDS correspond to the following indications, which shall be given.

6.2 Identification of the detail specification

- 1) The name of the National Authorized Institution (NAI) under whose authority the DS is published and, if applicable, the organization from whom the DS is available.
- 2) The number allocated to the DS by the relevant National Authorized Institution immediately preceded by the ISO two letter national identity code or "XX" when the DS is produced by an IEC technical subcommittee.
- 3) The number and issue number of the generic specification and, when applicable, the sectional specification; also the national reference if different.
- 4) If different from the IEC number, the national number of the DS, the date of issue and any further information required by the national system, together with any amendment numbers.

6.3 Identification of the component

- 5) Enter the following details:
 - style: the style designation of the connector including type of fixing and sealing, if applicable;
 - attachment: by deletion of the inapplicable options of cable/wire given for centre and outer conductors;
 - special features and markings: as applicable;
 - series designation: in bold characters/digits 15 mm high.
- 6) Enter details of assessment level and the climatic category.
- 7) A reproduction of the outline drawing and details of the panel piercing (if applicable). It shall provide the maximum envelope dimensions, the position of the reference plane and, in the case of a fixed connector, the position of the mounting plane relative to the front face of the connector.

Any maximum panel thickness limitations for fixed connectors shall be stated.

- 8) Particulars of all variants covered by the DS. As appropriate, the information shall include:
 - cable types (or sizes) applicable to each variant;
 - alternative plated or protective finishes;
 - details of alternative mounting flanges having either tapped or plain mounting holes;
 - details of alternative solder spills or solder buckets including, when applicable, those for use with microwave integrated circuit (MIC) components.

6.4 Performance

- 9) Performance data listing the most important characteristics of the connector in accordance with the requirements of the relevant sectional specification. Deviations from the minimum requirements shall be clearly indicated. Non-applicable parameters shall be marked "na".

6.5 Marking, ordering information and related matters

- 10) Insert marking and ordering information as appropriate, together with details of related documents and any invoked structural similarity.

6.6 Selection of tests, test conditions and severities

"na" shall be used to indicate non-applicable tests. All tests marked "a" by the detail specification writer shall be mandatory.

When using the normal procedure with a dedicated BDS, the letter "a" – for applicable – shall be entered in the "test required" column opposite each of the tests indicated as being mandatory in the test schedule of the relevant sectional specification. Any additional test required at the discretion of the specification writer shall also be indicated by an "a".

The specification writer shall also indicate, when necessary, details of deviations from the standard test methods and conditions including any relevant deviations given in the test schedule of the sectional specification.

6.7 Blank detail specification pro forma for MQ4 series circular connectors

Subclause 6.7 contains the complete BDS.

IECNORM.COM : Click to view the full PDF of IEC 63138-2:2023 RLV

(1)			(2) Page 1 of		
(3) ELECTRONIC COMPONENT OF ASSESSED QUALITY IN ACCORDANCE WITH: GENERIC SPECIFICATION: IEC 63138-1 SECTIONAL SPECIFICATION: IEC 63138-2			(4) Issue		
(5) Detail specification for radio frequency coaxial connector of assessed quality			Type MQ4		
Style			Special features and markings		
Method of cable/wire+ attachment		Centre conductor – solder/crimp+ Outer conductor – solder/clamp/crimp+ +Delete as appropriate			
(6) Assessment level		Characteristic impedance ...Ω		Climatic category .../.../...	
(7) Outline and maximum dimensions			Panel piercing and mounting details		
(8) Variants					
Variant No	Description of variant	IEC 63138-2			
01					
Information about manufacturers who have components qualified under the IECQ Conformity Assessment System is available through the IECQ on-line certificate system.					

(9) Performance (including limiting conditions of use)

Ratings and characteristics	Variant no. designation	IEC 63138-1:2019 Subclause	Value	Remarks including any deviations from standard test methods
Electrical				
Nominal impedance			50 Ω	
Frequency range			DC to 6 GHz	
Return loss	01	8.4.1	GHz GHz GHz GHz	Measurement frequency range
Centre contact resistance		8.4.3	$\leq$ m Ω $\leq$ m Ω	Initial After conditioning
Insulation resistance		8.4.4	$\geq$ G Ω $\geq$ G Ω	Initial After conditioning
+ Proof voltage at sea level	01	8.4.5	kV kV kV kV	86 kPa to 106 kPa
+ Proof voltage at 4,4 kPa	01	8.4.5	kV kV kV kV	kPa (if not 4,4 kPa)
Screening effectiveness	01	8.4.6	dB at GHz dB at GHz dB at GHz dB at GHz	$Z_t \leq$ m Ω $Z_t \leq$ m Ω $Z_t \leq$ m Ω $Z_t \leq$ m Ω
Discharge test (corona) at sea level	01	8.4.7	Extinction voltage $\geq$ V $\geq$ V $\geq$ V $\geq$ V	Atmospheric pressure
Isolation	01	8.4.9	$\geq$ dB	
Intermodulation level (PIM3)		8.4.8	dBm at GHz	Under 2 carries of +43 dBm
ADDITIONAL ELECTRICAL CHARACTERISTICS				

+ Voltage values are RMS values at 40 Hz to 65 Hz, unless otherwise specified.

Ratings and characteristics	Variant no. designation	IEC 63138-1:2019 Subclause	Value	Remarks including any deviations from standard test methods
Mechanical				
Soldering		8.5.1		
Gauge retention resilient contacts – inner contact – outer contact		8.5.5	N N	
Centre contact captivation – axial force – permitted displacement in each direction – torque		8.5.2	N mm N·m	
Outer contact captivation		8.5.3	N	
Engagement and separation forces and torques – axial force – torque		8.5.4	≤ N ≤ N·m	
Mechanical compatibility		8.3.4	≤ N	
Effectiveness of clamping device against cable rotation (nutation of cable end)	01	8.5.6	Rotations	Bend radius and number of revolutions mm No. mm No. mm No. mm No.
Effectiveness of clamping device against cable pulling	01	8.5.7	N N N N	Point of application and duration mm.....s mm.....s mm.....s mm.....s
Effectiveness of clamping device against cable bending	01	8.5.8	cycles cycles cycles cycles	Length of cable and mass mm.....Kg mm.....Kg mm.....Kg mm.....Kg
Effectiveness of clamping device against cable torsion	01	8.5.9	N·m N·m	Duration of applied torque s s s s
Strength of coupling mechanism		8.5.10	N	
High frequency vibration		8.5.12	m/s ² (to) Hz	(g _n acceleration)
Shock		8.5.13	m/s ² shape ms	(g _n acceleration)

Ratings and characteristics	Variant no. designation	IEC 63138-1:2019 Subclause	Value	Remarks including any deviations from standard test methods
ADDITIONAL MECHANICAL CHARACTERISTICS				
Environmental				
Climatic category			/ /	
Hermetic sealed		8.6.6	KPa·cm ³ / h (bar·cm ³ / h)	(100 to 110) kPa pressure differential
Leakage		8.6.5		
Salt mist		8.6.7	h	Duration of spraying
ADDITIONAL ENVIRONMENTAL CHARACTERISTICS				
Endurance				
Mechanical endurance		8.5.14	Operations	
High temperature endurance		8.6.3	h at °C	

(10) Supplementary information

– Marking of the component: in accordance with IEC 63138-1:2019, 10.1 in the following order of procedure 1) Identity of manufacturer 2) Manufacturing date code year / week 3) Component identification variant no. / designation identification
– Marking and contents of package: in accordance with IEC 63138-1:2019, 10.2 1) Information specified in IEC 63138-1:2019, 10.1 detailed above 2) Nominal characteristic impedance Ω 3) Assessment level code letter 4) Any additional marking required
– Ordering information: 1) Number of the detail specification / variant code 2) Assessment level code letter 3) Body finish (if more than one listed) 4) Any additional information or special requirements
– Related documents (if not included in IEC 63138-1 or sectional specification):
Relevant information on a basic style should be entered as variant 01.

7 Marking

7.1 Marking of components

Each component shall be legibly and durably marked, where space permits and in the following order of precedence, with:

- a) identity code of the manufacturer;
- b) manufacturer's connector identification code or IEC connector designation.

7.2 Marking and contents of package

The package shall be marked with the information specified in 7.1 and, in addition, the following information shall be given:

- a) nominal characteristic impedance;
- b) manufacturing date code;
- c) any additional marking required by the relevant specification.

When required by the relevant specification, the package shall also include instructions for assembling the connector(s) and instructions for the use of any special tools or materials, as necessary.

IECNORM.COM : Click to view the full PDF of IEC 63138-2:2023 RLV

SOMMAIRE

AVANT-PROPOS	32
1 Domaine d'application	34
2 Références normatives	34
3 Termes et définitions	34
4 Informations sur l'interface d'accouplement et le calibre	35
4.1 Dimensions de l'interface d'accouplement	35
4.1.1 Prise femelle MQ4	35
4.1.2 Fiche mâle MQ4	36
4.1.3 Interface d'accouplement du canal RF	39
4.2 Calibres	40
4.2.1 Calibre pour un canal RF	40
4.2.2 Bagues de calibrage pour le contact extérieur mâle	41
4.2.3 Calibre pour une prise femelle MQ4	42
4.2.4 Calibre pour une fiche mâle MQ4	43
5 Procédure d'assurance de la qualité	45
5.1 Généralités	45
5.2 Valeurs assignées et caractéristiques	45
5.3 Assurance de la qualité	47
5.3.1 Généralités	47
5.3.2 Procédure de contrôle	47
5.3.3 Contrôle lot par lot	49
5.3.4 Contrôles périodiques	50
6 Instructions pour l'établissement des spécifications particulières	52
6.1 Généralités	52
6.2 Identification de la spécification particulière	52
6.3 Identification du composant	52
6.4 Performances	53
6.5 Marquage, informations de commande et documents associés	53
6.6 Choix des essais, des conditions d'essai et des sévérités	53
6.7 Modèle pro forma de spécification particulière-cadre pour les connecteurs circulaires de série MQ4	53
7 Marquage	58
7.1 Marquage des composants	58
7.2 Marquage et contenu de l'emballage	58
Figure 1 – Prise femelle MQ4	35
Figure 2 – Fiche mâle à verrouillage rapide MQ4	37
Figure 3 – Fiche mâle à verrouillage par vis MQ4	38
Figure 4 – Interface d'accouplement du canal RF	39
Figure 5 – Calibre pour un contact femelle de canal RF	41
Figure 6 – Calibre pour un contact extérieur mâle	42
Figure 7 – Calibre pour une prise femelle MQ4	43
Figure 8 – Calibre pour une fiche mâle MQ4	44
Tableau 1 – Dimensions de la prise femelle MQ4	36

Tableau 2 – Dimensions de la fiche mâle à verrouillage rapide MQ4	37
Tableau 3 – Dimensions de la fiche mâle à verrouillage par vis MQ4	38
Tableau 4 – Dimensions du canal RF	40
Tableau 5 – Dimensions du calibre pour un contact femelle	41
Tableau 6 – Dimensions du calibre pour un contact extérieur mâle	42
Tableau 7 – Dimensions du calibre pour une prise femelle MQ4	43
Tableau 8 – Dimensions du calibre pour une fiche mâle MQ4	44
Tableau 9 – Valeurs assignées et caractéristiques	45
Tableau 10 – Contrôle de la qualification	48
Tableau 11 – Contrôle lot par lot	50
Tableau 12 – Plans d'échantillonnage pour le contrôle de la compatibilité mécanique et de l'affaiblissement de réflexion	50
Tableau 13 – Contrôles périodiques	51

IECNORM.COM : Click to view the full PDF of IEC 63138-2:2023 RLV

COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

CONNECTEURS RADIOFRÉQUENCES MULTICANAUX –

Partie 2: Spécification intermédiaire pour les connecteurs circulaires de série MQ4

AVANT-PROPOS

- 1) La Commission Électrotechnique Internationale (IEC) est une organisation mondiale de normalisation composée de l'ensemble des comités électrotechniques nationaux (Comités nationaux de l'IEC). L'IEC a pour objet de favoriser la coopération internationale pour toutes les questions de normalisation dans les domaines de l'électricité et de l'électronique. À cet effet, l'IEC – entre autres activités – publie des Normes internationales, des Spécifications techniques, des Rapports techniques, des Spécifications accessibles au public (PAS) et des Guides (ci-après dénommés "Publication(s) de l'IEC"). Leur élaboration est confiée à des comités d'études, aux travaux desquels tout Comité national intéressé par le sujet traité peut participer. Les organisations internationales, gouvernementales et non gouvernementales, en liaison avec l'IEC, participent également aux travaux. L'IEC collabore étroitement avec l'Organisation Internationale de Normalisation (ISO), selon des conditions fixées par accord entre les deux organisations.
- 2) Les décisions ou accords officiels de l'IEC concernant les questions techniques représentent, dans la mesure du possible, un accord international sur les sujets étudiés, étant donné que les Comités nationaux de l'IEC intéressés sont représentés dans chaque comité d'études.
- 3) Les Publications de l'IEC se présentent sous la forme de recommandations internationales et sont agréées comme telles par les Comités nationaux de l'IEC. Tous les efforts raisonnables sont entrepris afin que l'IEC s'assure de l'exactitude du contenu technique de ses Publications; l'IEC ne peut pas être tenue responsable de l'éventuelle mauvaise utilisation ou interprétation qui en est faite par un quelconque utilisateur final.
- 4) Dans le but d'encourager l'uniformité internationale, les Comités nationaux de l'IEC s'engagent, dans toute la mesure possible, à appliquer de façon transparente les Publications de l'IEC dans leurs publications nationales et régionales. Toutes divergences entre toutes Publications de l'IEC et toutes publications nationales ou régionales correspondantes doivent être indiquées en termes clairs dans ces dernières.
- 5) L'IEC elle-même ne fournit aucune attestation de conformité. Des organismes de certification indépendants fournissent des services d'évaluation de conformité et, dans certains secteurs, accèdent aux marques de conformité de l'IEC. L'IEC n'est responsable d'aucun des services effectués par les organismes de certification indépendants.
- 6) Tous les utilisateurs doivent s'assurer qu'ils sont en possession de la dernière édition de cette publication.
- 7) Aucune responsabilité ne doit être imputée à l'IEC, à ses administrateurs, employés, auxiliaires ou mandataires, y compris ses experts particuliers et les membres de ses comités d'études et des Comités nationaux de l'IEC, pour tout préjudice causé en cas de dommages corporels et matériels, ou de tout autre dommage de quelque nature que ce soit, directe ou indirecte, ou pour supporter les coûts (y compris les frais de justice) et les dépenses découlant de la publication ou de l'utilisation de cette Publication de l'IEC ou de toute autre Publication de l'IEC, ou au crédit qui lui est accordé.
- 8) L'attention est attirée sur les références normatives citées dans cette publication. L'utilisation de publications référencées est obligatoire pour une application correcte de la présente publication.
- 9) L'IEC attire l'attention sur le fait que la mise en application du présent document peut entraîner l'utilisation d'un ou de plusieurs brevets. L'IEC ne prend pas position quant à la preuve, à la validité et à l'applicabilité de tout droit de propriété revendiqué à cet égard. À la date de publication du présent document, l'IEC avait reçu notification qu'un ou plusieurs brevets pouvaient être nécessaires à sa mise en application. Cependant, les développeurs sont avertis que cela peut ne pas représenter les informations les plus récentes, qui peuvent être obtenues à partir de la base de données des brevets disponible sur <https://patents.iec.ch> et ne doivent pas être tenus responsables de l'identification de tout ou partie de ces droits de propriété.

L'IEC 63138-2 a été établie par le sous-comité 46F: Composants passifs pour hyperfréquences et radio fréquences, du comité d'études 46 de l'IEC: Câbles, fils, guides d'ondes, connecteurs, composants passifs pour micro-onde et accessoires. Il s'agit d'une Norme internationale.

Cette deuxième édition annule et remplace la première édition parue en 2020. Cette édition constitue une révision technique.

Cette édition inclut les modifications techniques majeures suivantes par rapport à l'édition précédente:

- a) modification de la légende supplémentaire et du degré de la position de la rainure de 0,1 à 0,05 à la Figure 1, la Figure 2, la Figure 3, la Figure 7 et la Figure 8;
- b) modification de la dimension q de 1,60 min. à 1,65 min. dans le Tableau 1;
- c) ajout d'un plan de référence électrique à la Figure 4;
- d) ajout des dimensions dans le Tableau 1;
- e) modification de la dimension n de 1,55 max. à 1,50 max. dans le Tableau 2, le Tableau 3 et le Tableau 7;
- f) réactualisation de certaines dimensions à la Figure 4 et dans le Tableau 4;
- g) modification de la dimension a de 7,50 min. à 7,52 min., et 7,60 max. à 7,58 max. dans le Tableau 7;
- h) réactualisation de certaines dimensions à la Figure 8 et dans le Tableau 8;
- i) modification de la compatibilité mécanique de 50 N à 60 N aux paragraphes 4.2.3 et 4.2.4.

Le texte de cette Norme internationale est issu des documents suivants:

Projet	Rapport de vote
46F/644/FDIS	46F/651/RVD

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à son approbation.

La langue employée pour l'élaboration de cette Norme internationale est l'anglais.

Ce document a été rédigé selon les Directives ISO/IEC, Partie 2, il a été développé selon les Directives ISO/IEC, Partie 1 et les Directives ISO/IEC, Supplément IEC, disponibles sous www.iec.ch/members_experts/refdocs. Les principaux types de documents développés par l'IEC sont décrits plus en détail sous www.iec.ch/publications.

Le présent document doit être lu conjointement avec l'IEC 63138-1:2019.

Une liste de toutes les parties de la série IEC 63138, publiées sous le titre général *Connecteurs radiofréquences multicanaux*, se trouve sur le site web de l'IEC.

Le comité a décidé que le contenu de ce document ne sera pas modifié avant la date de stabilité indiquée sur le site Web de l'IEC sous webstore.iec.ch dans les données relatives au document recherché. À cette date, le document sera

- reconduit,
- supprimé,
- remplacé par une édition révisée, ou
- amendé.

CONNECTEURS RADIOFRÉQUENCES MULTICANAUX –

Partie 2: Spécification intermédiaire pour les connecteurs circulaires de série MQ4

1 Domaine d'application

La présente partie de l'IEC 63138, qui est une spécification intermédiaire (SI), fournit des informations et des règles pour l'établissement de spécifications particulières (SP) relatives aux connecteurs circulaires de série MQ4 disposant de quatre canaux RF, ainsi qu'une spécification particulière-cadre.

Un connecteur circulaire de série MQ4 présentant une impédance nominale de 50 Ω dispose de quatre canaux RF pouvant être accouplés et désaccouplés en même temps. Il existe deux versions de fiches mâles: une première version à verrouillage rapide et une seconde version à verrouillage par vis. La prise femelle offre deux mécanismes d'accouplement: un couplage par verrouillage rapide et un couplage par verrouillage par vis.

Les connecteurs circulaires de série MQ4 peuvent être utilisés au sein de systèmes de communication mobiles ainsi que dans d'autres équipements de communication.

Le présent document spécifie également les dimensions de l'interface d'accouplement et les informations sur le calibre des connecteurs circulaires de série MQ4, ainsi que les essais choisis à partir de l'IEC 63138-1, applicables à toutes les spécifications particulières relatives aux connecteurs circulaires de série MQ4.

2 Références normatives

Les documents suivants sont cités dans le texte de sorte qu'ils constituent, pour tout ou partie de leur contenu, des exigences du présent document. Pour les références datées, seule l'édition citée s'applique. Pour les références non datées, la dernière édition du document de référence s'applique (y compris les éventuels amendements).

IEC 63138-1:2019, *Connecteurs radiofréquences multicanaux – Partie 1: Spécification générique – Exigences générales et méthodes d'essai*

3 Termes et définitions

Pour les besoins du présent document, les termes et les définitions de l'IEC 63138-1 s'appliquent.

L'ISO et l'IEC tiennent à jour des bases de données terminologiques destinées à être utilisées en normalisation, consultables aux adresses suivantes:

- IEC Electropedia: disponible à l'adresse <https://www.electropedia.org/>
- ISO Online browsing platform: disponible à l'adresse <https://www.iso.org/obp>

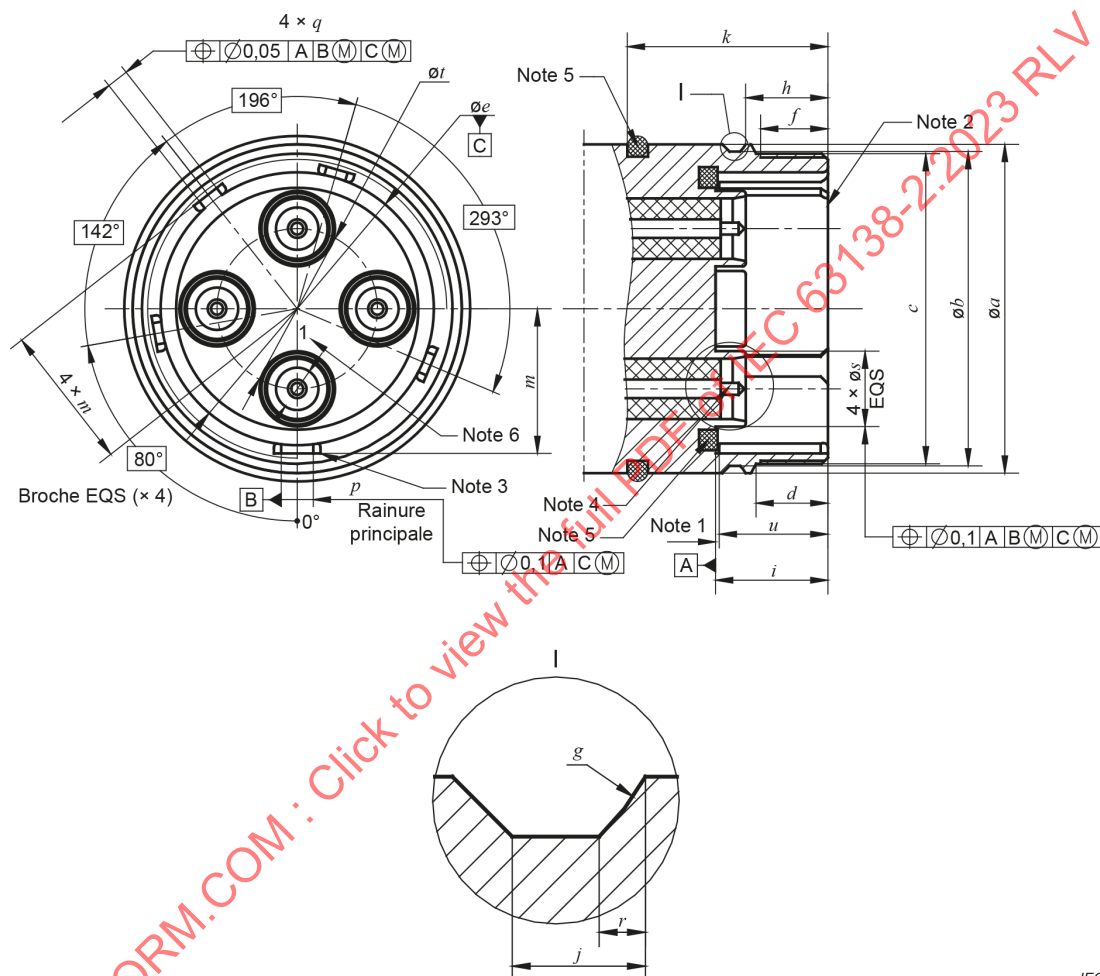
4 Informations sur l'interface d'accouplement et le calibre

4.1 Dimensions de l'interface d'accouplement

4.1.1 Prise femelle MQ4

L'interface d'accouplement des prises femelles MQ4 est représentée à la Figure 1 et ses dimensions sont indiquées dans le Tableau 1.

NOTE Les dimensions métriques sont les dimensions d'origine. Toutes les configurations représentées sans dimensions sont fournies uniquement pour référence.



NOTE 1 Plan de référence mécanique.

NOTE 2 Le chanfrein des quatre rainures supplémentaires est facultatif.

NOTE 3 Le chanfrein de la rainure principale est facultatif.

NOTE 4 L'interface d'accouplement du canal RF avec un contact mâle est représentée à la Figure 4a) et ses dimensions sont indiquées dans le Tableau 4.

NOTE 5 La forme du joint torique d'étanchéité est facultative.

NOTE 6 Le numéro de la position initiale du canal RF avec un contact mâle et les autres positions numérotées dans le sens horaire.

Figure 1 – Prise femelle MQ4

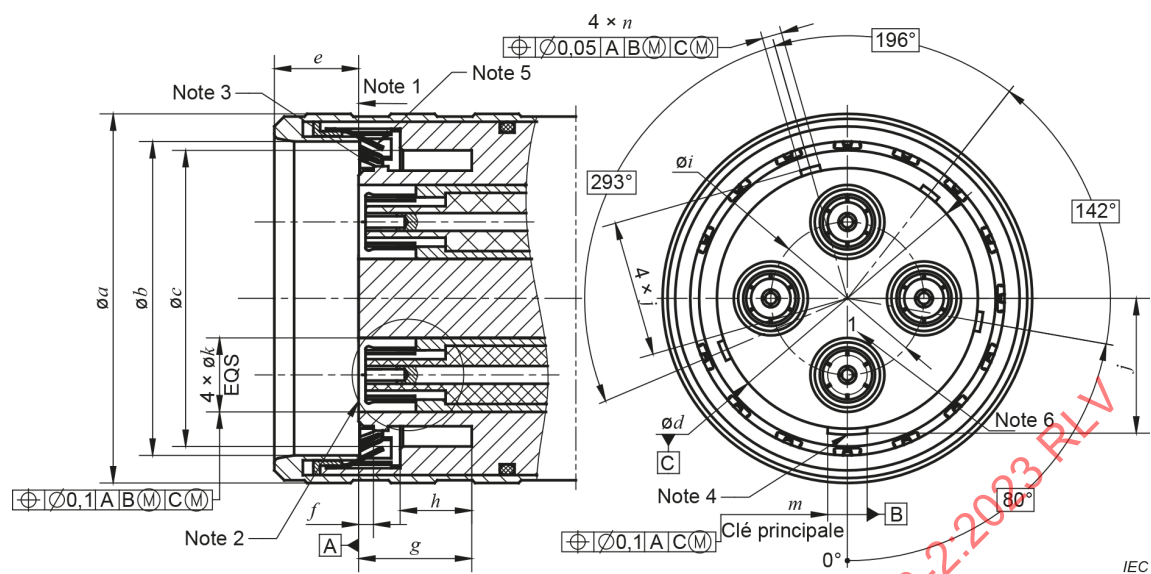
Tableau 1 – Dimensions de la prise femelle MQ4

Réf.	Dimensions	
	mm	
	Min.	Max.
<i>a</i>	31,75	31,80
<i>b</i>	30,35	30,40
<i>c</i>	M30 × 1 tolérance 6 g	
<i>d</i>	6,80	7,00
<i>e</i>	26,42	26,48
<i>f</i>	6,00	--
<i>g</i>	R3,0 nom.	
<i>h</i>	7,95	8,05
<i>i</i>	10,95	11,00
<i>j</i>	1,50	1,80
<i>k</i>	19,30	19,45
<i>m</i>	13,90	14,00
<i>p</i>	3,20	3,35
<i>q</i>	1,65	1,75
<i>r</i>	0,50	0,60
<i>s</i>	7,28	7,32
<i>t</i>	15,48	15,52
<i>u</i>	10,30	10,90

4.1.2 Fiche mâle MQ4

4.1.2.1 Fiche mâle à verrouillage rapide MQ4

L'interface d'accouplement du connecteur MQ4 à verrouillage rapide est représentée à la Figure 2 et ses dimensions sont indiquées dans le Tableau 2.



NOTE 1 Plan de référence mécanique.

NOTE 2 L'interface d'accouplement du canal RF avec un contact femelle est représentée à la Figure 4b) et ses dimensions sont indiquées dans le Tableau 4.

NOTE 3 La forme des quatre clés supplémentaires est facultative.

NOTE 4 La forme de la clé principale est facultative.

NOTE 5 La forme du doigt élastique est facultative.

NOTE 6 Le numéro de la position initiale du canal RF avec un contact femelle et les autres positions numérotées dans le sens antihoraire.

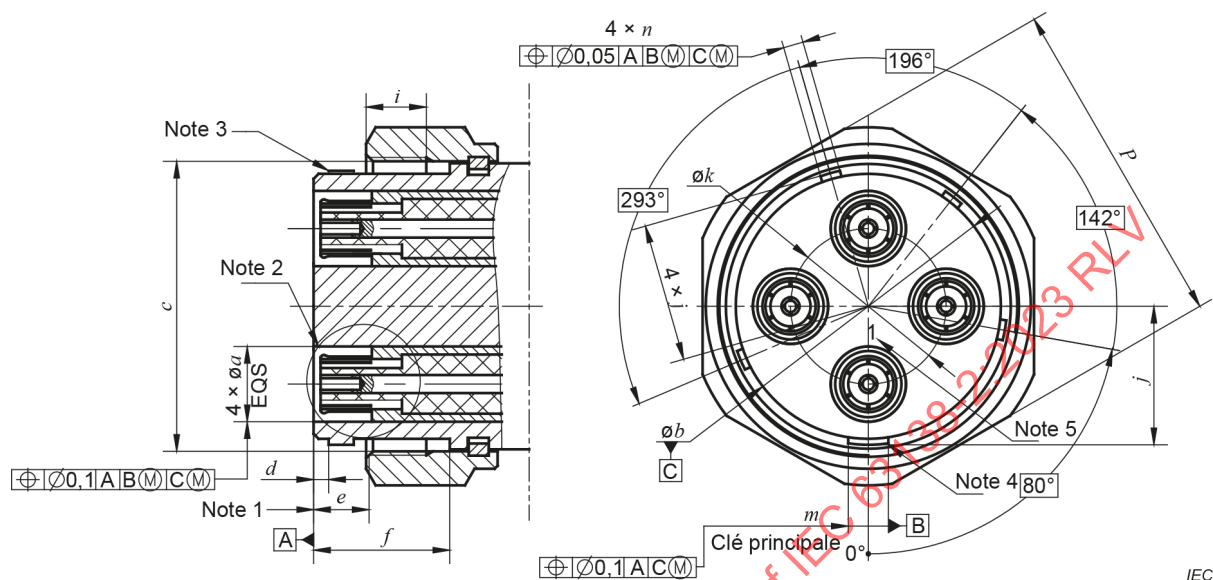
Figure 2 – Fiche mâle à verrouillage rapide MQ4

Tableau 2 – Dimensions de la fiche mâle à verrouillage rapide MQ4

Réf.	Dimensions	
	mm	
	Min.	Max.
<i>a</i>	--	42,00
<i>b</i>	31,80	31,90
<i>c</i>	30,05	30,15
<i>d</i>	26,30	26,40
<i>e</i>	8,40	8,60
<i>f</i>	1,20	1,50
<i>g</i>	11,00	11,10
<i>h</i>	6,60	6,80
<i>i</i>	15,48	15,52
<i>j</i>	13,70	13,80
<i>k</i>	7,52	7,58
<i>m</i>	3,00	3,15
<i>n</i>	1,40	1,50

4.1.2.2 Fiche mâle à verrouillage par vis MQ4

La face d'accouplement de la fiche mâle à verrouillage par vis MQ4 est représentée à la Figure 3 et ses dimensions sont indiquées dans le Tableau 3.



NOTE 1 Plan de référence mécanique.

NOTE 2 L'interface d'accouplement du canal RF avec un contact femelle est représentée à la Figure 4b) et ses dimensions sont indiquées dans le Tableau 4.

NOTE 3 La forme des quatre clés supplémentaires est facultative.

NOTE 4 La forme de la clé principale est facultative.

NOTE 5 Le numéro de la position initiale du canal RF avec un contact femelle et les autres positions numérotées dans le sens antihoraire.

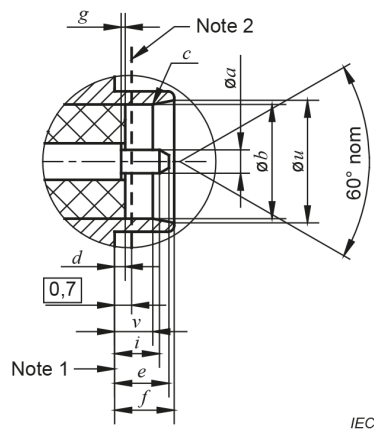
Figure 3 – Fiche mâle à verrouillage par vis MQ4

Tableau 3 – Dimensions de la fiche mâle à verrouillage par vis MQ4

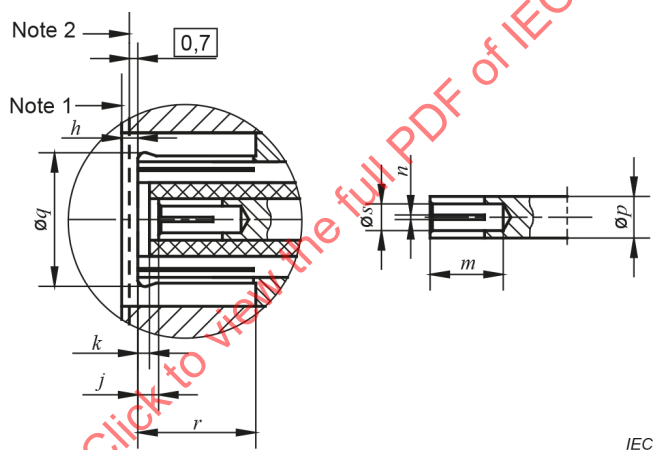
Réf.	Dimensions	
	mm	
	Min.	Max.
a	7,52	7,58
b	26,35	26,40
c	M30 × 1 tolérance 6 H	
d	1,20	1,50
e	5,20	5,60
f	11,20	--
i	7,00	--
j	13,70	13,80
k	15,48	15,52
m	3,00	3,15
n	1,40	1,50
p	32,0 nom.	

4.1.3 Interface d'accouplement du canal RF

L'interface d'accouplement du canal RF avec un contact mâle est représentée à la Figure 4a), l'interface d'accouplement du canal RF avec un contact femelle est représentée à la Figure 4b) et leurs dimensions sont indiquées dans le Tableau 4.



a) Canal RF avec contact mâle



b) Canal RF avec contact femelle

NOTE 1 Plan de référence mécanique.

NOTE 2 Plan de référence électrique.

Figure 4 – Interface d'accouplement du canal RF

Tableau 4 – Dimensions du canal RF

Réf.	Dimensions	
	mm	
	Min.	Max.
<i>a</i>	1,17	1,23
<i>b</i>	5,90	5,93
<i>c</i>	R1,00 nom.	
<i>d</i>	0,35	0,65
<i>e</i>	2,60	2,90
<i>f</i>	3,30	3,70
<i>g</i>	0	0,25
<i>h</i>	0,75	1,00
<i>i</i>	1,70	--
<i>j</i>	0	0,25
<i>k</i>	0	0,25
<i>m</i>	3,00	--
<i>n^a</i>	--	--
<i>p</i>	1,8 nom.	
<i>q^b</i>	--	6,40
<i>r</i>	3,80	--
<i>u</i>	6,60	6,70
<i>v</i>	2,00	2,20
<i>s^a</i>	--	--
^a La conception de la fente est facultative lors de l'accouplement avec une fiche de $\Phi 1,17$ mm à $\Phi 1,23$ mm. Il convient qu'elle respecte les exigences de performances mécaniques et électriques. ^b Élastique pour respecter les exigences des bagues de calibrage pour un contact extérieur femelle.		

4.2 Calibres

4.2.1 Calibre pour un canal RF

4.2.1.1 Contact central femelle

4.2.1.2 Dimensions du calibre

Le calibre pour le contact femelle du canal RF est représenté à la Figure 5 et ses dimensions sont indiquées dans le Tableau 5.