

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Specification for WB series glass beads with 50 Ω impedance for RF connectors

Spécification pour perles en verre de série WB à impédance de 50 Ω pour connecteurs RF



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**SPECIFICATION FOR WB SERIES GLASS BEADS
WITH 50 Ω IMPEDANCE FOR RF CONNECTORS**

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

Draft	Report on voting
46F/597/FDIS	46F/611/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/standardsdev/publications.

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- withdrawn,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

SPECIFICATION FOR WB SERIES GLASS BEADS WITH 50 Ω IMPEDANCE FOR RF CONNECTORS

1 Scope

This document provides the requirements for WB series glass beads with 50 Ω impedance for RF connectors, including, among other, the structure dimensions, IEC type designation, rating and characteristics, and quality assessment.

These glass beads are used for the adaption of coaxial systems to microstrip circuits used extensively in microwave communication systems such as TR modules, power modules, integrated circuits where hermetic seal is required. They can serve as a part of an RF coaxial connector, multi-channel RF connector or hybrid connector, or can be applied directly in various communication module systems as an independent product. They provide a 50 Ω normative impedance with an operating frequency limit up to 65 GHz.

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 61169-1:2013, *Radio frequency connectors – Part 1: Generic specification – General requirements and measuring methods*

IEC 62153-4-7, *Metallic communication cable test methods – Part 4-7: Electromagnetic compatibility (EMC) – Test method for measuring of transfer impedance Z_T and screening attenuation a_S or coupling attenuation a_C of connectors and assemblies up to and above 3 GHz – Triaxial tube in tube method*

3 Terms and definitions

No terms and definitions are listed in this document.

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

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

4 Structure dimensions and IEC type designation

The structure of WB series glass beads is shown in Figure 1 and the dimensions are shown in Table 1.

Dimensions in millimetres

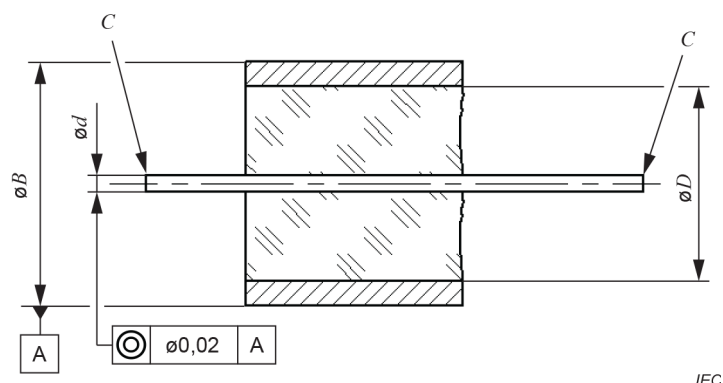


Figure 1 – Structure of WB series glass beads

Table 1 – Dimensions of WB series glass beads

NO	Type designation ^a	d	D^b	B^c (MIN)	C^d	Recommended applicable connector series ^e
		mm	mm	mm	mm	
1	WB0.23	$0,230 \pm 0,010$	-	-	-	SMPM , 1.85 and 2.4
2	WB0.3	$0,300 \pm 0,015$	-	-	-	SMP, 2.92, 2.4, SSMA and SMA
3	WB0.38	$0,380 \pm 0,015$	-	-	-	
4	WB0.45	$0,450 \pm 0,015$	-	-	-	2.92, SSMA and SMA
5	WB0.5	$0,500 \pm 0,015$	-	-	-	
6	WB0.9	$0,900 \pm 0,020$	-	-	-	SMA and TNC

^a Type designation is shown in Annex A.

^b The diameter is selected assuming that the dielectric constant of glass is 4,0, and a 50 Ω characteristic impedance can be obtained.

^c Size shall meet the requirements for electrical and mechanical performances.

^d Size and shape of the terminal are optional, and shall meet the requirements for electrical and mechanical performances.

^e Typical applications of WB glass beads with RF connector series are shown in Annex B.

5 Quality assessment procedure

5.1 General

Subclauses 5.2 to 5.4 provide glass beads' recommended ratings, performance and test conditions. They also provide an appropriate schedule of tests with minimum levels of conformance inspection sampling.

As WB series glass beads are the accessories of RF connectors, most of the test methods of IEC 61169-1 can be used when WB series glass beads are tested in the test fixture shown in Annex B.

5.2 Ratings and characteristics

The values indicated below are recommended for WB series glass beads. They are applicable for the glass beads when they are tested in the test fixture shown in Annex B. Ratings and characteristics are given in Table 2.

Certain tests are listed without any recommended values being given. These tests will usually not be required.

Table 2 – Ratings and characteristics

Ratings and characteristics	IEC61169-1:2013 Subclauses test method	Values	Remarks, deviations from standard test method
Electrical			
Nominal impedance		50 Ω	
Frequency range			
– WB0.23 – WB0.3 – WB0.38 – WB0.45 – WB0.5 – WB0.9		DC to 65 GHz DC to 40 GHz DC to 26,5 GHz DC to 18 GHz DC to 18 GHz DC to 6 GHz	
Return loss	9.2.1	DC to 6 GHz ≥ 25 dB 12,4 GHz to 18 GHz ≥ 19 dB 18 GHz to 26,5 GHz ≥ 18 dB 26,5 GHz to 40 GHz ≥ 16 dB 40 GHz to 65 GHz ≥ 14 dB	The test fixture shall be in accordance with Annex C
Centre contact resistance	9.2.3	na ^b	
Outer contact resistance	9.2.3	na ^b	
Rated voltage at sea level ^a	9.2.2		
– WB0.23 – WB0.3 – WB0.38 – WB0.45 – WB0.5 – WB0.9		85 V 170 V 250 V 250 V 250 V 500 V	(86 to 106) kPa
Rated voltage at 4,4 kPa ^a – WB0.23 – WB0.3 – WB0.38 – WB0.45 – WB0.5 – WB0.9		21 V 45 V 65 V 65 V 65 V 125 V	4,4 kPa approximately equivalent to 20 km
Insulation resistance	9.2.5		
– initial • WB0.23 • others – after conditioning • WB0.23 • others		$\geq 1\,000\text{ M}\Omega$ $\geq 5\,000\text{ M}\Omega$ $\geq 1\,000\text{ M}\Omega$ $\geq 5\,000\text{ M}\Omega$	

Ratings and characteristics	IEC61169-1:2013 Subclauses test method	Values	Remarks, deviations from standard test method
Proof voltage at sea level ^a	9.2.6		(86 to 106) kPa
– WB0.23		500 V	
– WB0.3		500 V	
– WB0.38		750 V	
– WB0.45		750 V	
– WB0.5		750 V	
– WB0.9		1 500 V	
Proof voltage at 4,4 kPa ^a	9.2.6		4,4 kPa approximately equivalent to 20 km
– WB0.23		65 V	
– WB0.3		170 V	
– WB0.38		250 V	
– WB0.45		250 V	
– WB0.5		250 V	
– WB0.9		500 V	
Proof voltage (after environmental test at sea level) ^a	9.2.6		(86 to 106) kPa
– WB0.23		125 V	
– WB0.3		250 V	
– WB0.38		375 V	
– WB0.45		375 V	
– WB0.5		375 V	
– WB0.9		750 V	
Screening effectiveness	IEC 62153-4-7	na ^b	
Discharge test (corona effect)	9.2.8		Extinction voltage at 4,4 kPa
– WB0.23		65 V	
– WB0.3		125 V	
– WB0.38		190 V	
– WB0.45		190 V	
– WB0.5		190 V	
– WB0.9		375 V	
Passive intermodulation level (PIM)	9.2.9	na ^b	
Mechanical			
Soldering	9.3.2		
– bit size			
Solderability	9.3.2.2	245 °C ± 5 °C, 5 S	
Resistance to soldering heat	9.2.3.3	2 605 °C ± 5 °C, 10 S	
Gauge retention force (resilient contacts)			
– centre contact	9.3.4	na ^b	
– outer contact		na ^b	

Ratings and characteristics	IEC61169-1:2013 Subclauses test method	Values	Remarks, deviations from standard test method
Centre contact captivation – axial force – permitted displacement, in each direction – torque	9.3.5	≥2,22 N displacement na ^b	
Engagement and separation	9.3.6	na ^b	
Strength of coupling mechanism	9.3.11	na ^b	
Effectiveness of cable fixing against – cable rotation – cable pulling – cable bending – cable torsion	9.3.7 9.3.8 9.3.9 9.3.10	na ^b na ^b na ^b na ^b	
Bending moment	9.3.12	na ^b	
Bump	9.3.13	200 m/s ²	
Vibration	9.3.3	200 m/s ² 10 Hz to 2 000 Hz	(20g _n , acceleration)
Shock	9.3.14	1 000 m/s ² 1/2 sine wave 6 ms	(100g _n , acceleration)
Endurance			
Mechanical endurance	9.3.15	na ^b	
High temperature endurance	9.4.5	250 h at 200 °C	
Low temperature endurance	9.4.6	250 h at -65 °C	
Environmental			
Climatic category	9.4.2	65/200/56	
Sealing non-hermetic	9.4.7	na ^b	
Hermetic	9.4.8	10 ⁻³ Pa·cm ³ /s	100 kPa to 110k Pa differential
Water immersion	9.4.9	na	
Salt mist	9.4.10	48 h	Duration of spraying
Chemical contamination			
Resistance to solvents and contaminating fluids to be used Applicable fluids	9.4.11	na ^b	
Sulphur dioxide	9.4.12	na ^b	
^a Voltages are RMS values from 50 Hz-to 60 Hz, unless otherwise specified. ^b na: not applicable.			

5.3 Test schedule and inspection requirements

5.3.1 Acceptance tests

Acceptance tests are shown in Table 3.

Table 3 – Acceptance tests

	IEC 61169-1: 2013 subclause	Assessment level M (higher)				Assessment level H (lower)			
		Test required	IL	AQL %	Period	Test required	IL	AQL %	Period
Group A1									
Visual examination	9.1.1	a	II	1		a	S3	1,5	
Group B1									
Outline dimensions	9.1.2	a	S4	0,4		a	S3	4,0	
Mechanical compatibility	9.1.2.2	na	II			na	S3		
Engagement and separation forces and torques	9.3.6	na	S4		Lot by lot	na	S3		Lot by lot
Gauge retention (resilient contacts)	9.3.5	na	II			na	S3		
Insertion retention force (resilient contacts)	9.3.4								
Sealing									
-non-hermetic	9.4.7	na	II			na	S3		
-hermetic	9.4.8	a	II	0,015		ia	S3	0,025	
Water immersion	9.4.9	ia	II	0,015		ia	S3	0,025	
Voltage proof	9.2.6	a	II	0,4		a	II	4,0	
Solderability (d)	9.3.2.2	ia	S4	0,4		ia	S3	4,0	
Insulation resistance	9.2.5	a	S4	0,4		a	S3	4,0	
Safety wire hole pullout	9.3.12	na	S4			na	S3		
Key: a – suggested as applicable ia – test suggested (if technically applicable) na – not applicable IL – inspection level AQL – acceptable quality level (d) – destructive tests – specimens shall not be returned to stock									

5.3.2 Periodic tests

Periodic tests are shown in Table 4. There are no group C tests for levels H and M.