

**Table 02 Connector Screening Requirements (Notes 1, 2) (Page 1 of 7)**

Inspection/ Test	Test Methods, Conditions and Requirements	Connector Type/Grade Level							
		Circular		D-Subminiature		Microminiature		Printed Circuit	
		1	2	1	2	1	2	1	2
Visual Inspection	Verify proper marking, free of workmanship defects in accordance with Table 02A. 3X magnification (min.) and high intensity lighting.	X	X	X	X	X	X	X	X
Mechanical Inspection	Verify design, construction, dimensions, materials and finish.	X	2 (0)	X	2 (0)	X	2 (0)	X	2 (0)
Dielectric Withstanding Voltage (Sea Level)	MIL-STD-1344, Method 3001. Refer to reference specifications for voltages, mating requirements.	X	2 (0)	X	2 (0)	X (Note 3)	X (Note 3)	X	2 (0)
Insulation Resistance	MIL-STD-1344, Method 3003, Condition B. 5000 megohms min. in accordance with reference specifications.	X	2 (0)	X	2 (0)	X	2 (0)	X	2 (0)
Outgassing Control (As req'd)	(Note 4)	X	X	X	X	X	X		
Contact engagement and separation force. (non-removable socket contacts)	MIL-STD-1344, Method 2014, MIL-C-83513, Paragraph 4.7.8 for microminiature connectors. (Note 5)	2 (0)	2 (0)	2 (0)	2 (0)	2 (0)	2 (0)	2 (0)	2 (0)
Thermal shock (liquid to liquid, hermetic receptacles only)	MIL-C-38999, paragraph 4.7.3. Ten cycles from 4°C max to 90°C min. Transfer time shall not exceed 5 seconds. Dwell time shall be 10 minutes, min at each extreme.	X	2 (0)						
Hermeticity (Sealed Receptacles Only)	MIL-STD-1344, Method 1008, Pressure differential across the connector shall be 1 atmosphere (14.7 PSI). Leakage shall not exceed $1 \times 10^{-7}$ ATM CM <sup>3</sup> /Sec or as otherwise specified.	X	2 (0)	X	2 (0)				

See notes on page C-9.

**Table 02 Connector Screening Requirements (Notes 1, 2) (Page 2 of 7)**

Inspection/ Test	Test Methods, Conditions and Requirements	Connector Type/Grade Level							
		Circular		D-Subminiature		Microminiature		Printed Circuit	
		1	2	1	2	1	2	1	2
Contact Retention	MIL-STD-1344, Method 2007. Apply load per reference specification.	2 (0)	2 (0)	2 (0)	2 (0)	2 (0) (Note 6)	2 (0) (Note 6)	2 (0)	2 (0)
Residual Magnetism (Non magnetic Connectors and Contacts)	S-311-P-4, Paragraph 4.5.1 or S-311-P-10, Paragraph 4.5.5			X (Note 7)	X (Note 7)				
Mating and Unmating Force	MIL-STD-1314, Method 2013 MIL-C-55302, Paragraph 4.7.4. Force shall be per reference specification x no. of contacts.			2 (0)	2 (0)	2 (0)	2 (0)	2 (0)	2 (0)
Low Level Signal Contact Resistance (Note 8)	MIL-STD-1344 Method 3002					X	2 (0)	X	2 (0)
Resistance to Soldering Heat (Note 9)	MIL-C-24308, Paragraph 4.7.2.6 MIL-C-83513, Paragraph 4.7.11 MIL-STD-202, Method 210, Condition C			2 (0)	2 (0)	2 (0)	2 (0)	2 (0)	2 (0)

See notes on page C-9.

**Table 02 Connector Screening Requirements (Notes 1, 2) (Page 3 of 7)**

Inspection/ Test	Test Methods, Conditions and Requirements	Connector Type/Grade Level							
		Radio Frequency		Contacts		EMI Filter Pin		High Voltage	
		1	2	1	2	1	2	1	2
Visual Inspection	Verify proper marking, free of workmanship defects in accordance with Table 02A. 3X magnification (min.) and high intensity lighting.	X	X	X	X	X	X	X	X
Mechanical Inspection	Verify design, construction, dimensions, materials and finish.	X	2 (0)	X	2 (0)	X	1(0)	X	2 (0)
Dielectric Withstanding Voltage (Sea Level)	MIL-STD-1344, Method 3001. MIL-STD-202, Method 301 for RF connectors. Refer to reference specifications for voltages, mating requirements.	2 (0) (Note 10)		2 (0) (Note 11)	X (Note 11)	X (Note 12)	X (Note 12)	X (Note 13)	X (Note 13)
Insulation Resistance	MIL-STD-202, Method 302 for RF connectors and filter pins. 5000 megohms min. in accordance with reference specifications.	2 (0)				X	X		
Outgassing Control (As required)	(Note 4)	X	X	X	X	X	X	X	X
Contact engagement and separation force.	MIL-STD-1344, Method 2014.			X (Note 14)	X (Note 14)				
Hermeticity (Sealed Receptacles Only)	MIL-STD-202, Method 112, Condition C, Procedure III. Pressure as specified.	X	2 (0)						
Contact Retention	MIL-C-39012, Paragraph 4.6.9. Apply load per reference specification.	2 (0)	2 (0)						

See notes on page C-9.

**Table 02 Connector Screening Requirements (Notes 1, 2) (Page 4 of 7)**

Inspection/ Test	Test Methods, Conditions and Requirements	Connector Type/Grade Level							
		Radio Frequency		Contacts		EMI Filter Pin		High Voltage	
		1	2	1	2	1	2	1	2
Residual Magnetism (Non magnetic Connectors and Contacts)	S-311-P-4, Paragraph 4.5.1 and S-311P-4/08 or /10, Paragraph 3.1.1.			X (Note 7)	X (Note 7)				
Engage/Disengage Force	MIL-C-39012, Paragraph 4.6.2. 2 inch-lbs torque min. for SMA types.	2 (0)	2 (0)						
Coupling Proof Torque (Plugs Only)	MIL-C-39012, Paragraph 4.6.3. 15 inch-lbs torque min. for SMA types.	2 (0)	2 (0)						
Voltage Conditioning	MIL-STD-202 Method 108. 125°C. 2 x rated dc voltage. 168 hours min. per GSFC S-311-P-626.					X	X		
Capacitance	MIL-STD-202, Method 305, and S-311-P-626					X	X		
Attenuation	MIL-STD-220 and S-311-P-626 paragraph 4.8.9.1.					X	X		

See notes on page C-9.

## Table 02 Connector Screening Requirements (Page 5 of 7)

### Notes:

1. For commercial connectors procured from a manufacturer who is listed on the QPL for a similar connector, screening tests do not have to be repeated if attributes data or a certificate of compliance is acquired from the manufacturer, and indicate that the tests were performed. However, sample testing can never be a substitute for 100% testing. 100% examination may be performed at the user's receiving and inspection facilities in lieu of performance by the manufacturer.
2. An "X" in the table indicates that the inspection/test is to be performed on a 100% basis. Y (0) indicates the quantity (accept number) for sample testing. If a failure occurs during sample testing, the tests shall either be performed on a 100% basis or the sample size shall be tripled and the tests repeated. If a failure occurs during the second sample test, the lot shall be rejected.
3. For MIL-C-83513 microminiature connectors with crimp type pig tail leads, adjacent leads shall be tested for shorting prior to DWV. Each lead shall be tested. For DWV testing, a test potential of 600 VRMS (sea level) shall be used. If manufacturer can certify that this test is performed on each connector, additional testing is not required.
4. All non metallic materials shall be traceable to acceptable outgassing test results in NASA reference publication 1124 or MSFC-HDBK-527.
  - a. Some QPL manufacturers provide circular connectors which are specially processed to meet outgassing requirements, indicated by a special suffix to the commercial equivalent of the military part number. The user may process connectors for outgassing control by removing and replacing lubricant with a low outgassing lubricant followed by a bakeout of 24 hours at 125°C. Low outgassing lubricants as well as other acceptable variations of bakeout time, temperature, and vacuum for outgassing control are contained in NASA Reference publication 1124. Since removal and replacement of lubricant requires disassembly and is labor intensive, it is recommended that this processing be performed by the manufacturer to a controlled specification.
  - b. Some commercial D-Subminiature connectors contain a rear silicone rubber sealing grommet behind the connector which provides wire support and seals the rear of the connector, but represents an outgassing concern. A bakeout of 125°C for 24 hours is recommended for outgassing control.
  - c. Microminiature receptacles contain either a fluorosilicone (acceptable) or silicone rubber interface seal. The silicone rubber seal may be an outgassing concern and can be carefully removed with small tweezers and discarded. Otherwise, a bakeout of 24 hours at 125°C is recommended.
  - d. Type SMA RF connector plugs may contain a silicone rubber O-Ring interface seal inside the coupling nut, on the mounting flange or inside the cable nut, and require replacement with fluorosilicone O-Rings or a 125°C bakeout for 24 hours to prevent outgassing.
  - e. High voltage panel mount receptacle connectors contain a small silicone rubber grommet which surrounds the center pin contact. This grommet is an outgassing concern, and a bakeout of 125°C is recommended for outgassing control.

## Table 02 Connector Screening Requirements (Page 6 of 7)

### Notes (Continued):

5. a. Circular connectors. Applies to nonremovable solder socket contacts only. In-process inspections shall be used. MS3197 test pin shall be inserted to .7L and measured forces shall comply with MIL-C-39029, Table IX. All socket contacts shall be measured for acceptable levels of separation force. Ten percent of contacts selected at random shall be measured for insertion force.
- b. D-Subminiature connectors. Applies to nonremovable solder socket contacts. Insert and remove maximum diameter MS3197 gage pin. Insert minimum diameter gage pin, and measure separation force. Insert and separate maximum diameter gage pin three times, and measure engagement force during third cycle. All measurements shall comply with MIL-C-39029, Table IX. Test 20 percent of contacts (min of four) from each sample.
- c. Microminiature connectors. Twenty percent of pin contacts (min of seven) per test sample shall be tested using socket test sleeves per MIL-C-83513. Engagement force shall be 6 ounces maximum per contact. Separation force shall be 0.5 ounces minimum per contact.
- d. Printed Circuit Connectors. In process testing shall be used. Applies to socket contacts only. Insert MS3197 test pins to a depth of .140 inches. Maximum engagement force shall be 12 ounces per contact for standard force contacts and 4 ounces per contact for low insertion force contacts. Minimum separation force is 5 ounces per contact (each type). Sample size shall be per MIL-STD-105, general inspection level II, .65% AQL.
6. For MIL-C-83513 microminiature connectors with crimp type pigtail leads, apply a 5 lb. load to individual wire pigtails for 6 seconds, minimum. Load shall not displace contact or pull the wire from the crimp contact.
7. When low residual magnetism is a requirement, each connector must be tested for specific levels of residual magnetism. The test procedure in GSFC S-311-P-4, Paragraph 4.5.1 or S-311-P-10, Paragraph 4.5.5 shall apply. The test procedure in GSFC S-311-P-4/08 and /10 paragraph 3.3.1 shall apply for contacts. Contacts shall be grouped together and the measured value for the group shall not exceed a gamma level of  $0.1 \times$  the number of contacts in the group. Following testing, connectors and contacts shall be demagnetized per S-311-P-4 paragraph 6.1.3 or equivalent. Performance of residual magnetism requires the use of specialized test equipment and should be performed at the manufacturer's facilities.
8. Test is intended to determine resistance of contacts with crimp joined or weld joined solid straight or formed wire leads. Test shall be performed using a micro-ohmmeter and four wire measurements. Mated connector pairs are preferred. Attached current leads at extreme ends of contacts. Attach voltage leads at contact lead closest point to engagement barrel without touching barrel. Apply one milliamp DC or as otherwise specified. Measurement shall not exceed 15 milliohms for size 22 contacts, 20 milliohms for size 24 contacts, 32 milliohms for size 26 contacts, or as otherwise specified.
9. Test is not required for connectors with diallyl phthalate insert material. For connectors with thermoplastic insert material, test 20% of contacts (7 minimum). Solder cup contacts or PC terminations shall be soldered with a pencil type iron heated to 360°C using SN63 solder for a minimum duration of four seconds. There shall be no evidence of damage or distortion. Contact floating conditions, if applicable, shall be maintained.
10. For coaxial connectors, the connector shall be terminated to the appropriate coaxial cable, and the applied voltage shall be as specified in the detail specification.
11. For coaxial contacts, the dielectric withstanding voltage test shall be performed in accordance with MIL-STD-1344, Method 3001. A voltage of 1000 VRMS (Sea Level) shall be applied for 10 seconds between inner contact and shell.

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### Notes (Continued):

12. For filter pin connectors, dielectric withstanding voltage of twice the rated dc voltage shall be applied for five to ten seconds between each contact and the shell. Current shall be limited to 20 milliamps.
13. High voltage connectors have voltage ratings in excess of 5KV and are similar to Reynolds part numbers 167-3770 and 167-3771. For high voltage connectors rated at 10KVDC, a potential of 15KVDC shall be applied to each connector for 10 seconds, minimum.
14. Applies to sockets only. For both contact engagement force and contact separation force, engage contact with MS3197 test pin to a depth of 0.7L. Force shall comply with MIL-C-39029, Table IX. For sizes 16 and smaller, each contact shall be tested for separation force. MIL-STD-105, general inspection level II, 1% AQL shall apply for larger contact sizes and for insertion force.

**Table 02A Inspection Criteria for Connectors and Contacts (Note 1)**

DEFECT	Circulars	DSUBS	Micro-miniature	PC	RF	Contacts	RF Contacts	Filter Pin	High Voltage
INSERT	X	X	X	X	X		X	X	X
Insert to Shell Positioning and Orientation	X	X	X		X		X	X	X
Cracks, Chips	X	X	X	X	X		X	X	X
Marking				X				X	
Negative Meniscus of Glass (Hermetics only-glass to contact and glass to shell)	X	X			X				
GROMMET	X								X
Nicks, Gougles, Tears, Folds	X								X
Marking	X		X						
SHELLS	X	X	X		X	X	X	X	X
Cracks, Dents, Scratches	X	X	X		X	X	X	X	X
Finish (Peeled or blistered plating, discoloration, exposed base metal)	X	X	X		X	X	X	X	X
Marking Completeness, Legibility	X	X	X		X	X	X	X	
Sleeves (Fixed - Not free to move)					X	X	X		
THREADS (As Applicable)	X				X				X
Nicks, Dents, Voids	X				X				X
ADHESIVES	X	X	X	X	X			X	X
Excess Bonding Material (Overflow)	X	X	X	X	X			X	X
Voids	X	X	X	X	X			X	X