ASSOCIATION CONNECTING
ELECTRONICS INDUSTRIES

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Number	
3.13	
Subject	
Withstanding Voltage, Connectors	
Date	Revision
7/75	**A**
Originating Task Group	
N/A	

IPC-TM-650
TEST METHODS MANUAL

1.0 Scope

1.1 To determine the ability of the connector to operate safely at its rated voltage and to withstand momentary over-potentials due to switching, surges, or other similar phenomena. The dielectric withstanding voltage test is also called high-potential, over-potential, or dielectric-strength test, but differs from a dielectric-breakdown test as described in paragraph 6.2.

2.0 Reference Documents

2.1 Information in this section is intended to parallel the test method described in EIA-RS-364/TP-20.

3.0 Specimen

3.1 A plug, receptacle or mated combination as specified in the individual connector specification.

4.0 Apparatus

4.1 High voltage source adjustable to within ± 5% of required test voltage (DC or RMS) and capable of delivering a minimum current of 1 milliampere.

4.2 Leakage current meter accurate to ± 5% of reading.

NOTE: Commercial devices are available that incorporate the voltage source and leakage monitor, as well as a fault monitor (e.g., light, bell, automatic shut-down) into one instrument.

4.3 Altitude chamber capable of maintaining a simulated altitude at temperature extremes of –65°C to + 125°C.

5.0 Procedure

WARNING: POTENTIALS USED DURING THIS TEST MAY PROVE HAZARDOUS TO PERSONNEL. TAKE PRECAUTIONS TO PROTECT PERSONNEL FROM ACCIDENTAL EXPOSURE TO THESE TEST POTENTIALS.

5.1 The withstanding voltage shall be applied between individual pairs of immediately adjacent contacts and between the shell and/or engaging hardware (if they exist) and the closest individual contact(s). The method of connection of the test voltage if significant shall be specified in the individual connector specification. When special preparations or conditions such as special test fixtures, reconnection, or grounding isolation are required, they shall be so specified.

5.2 Under the specified conditions of temperature and barometric pressure, the test voltage shall be increased from zero to the specified value as uniformly as possible at an approximate rate of 500 volts (DC or RMS) per second unless otherwise specified.

5.3 The test voltage shall be applied for a minimum period of 60 seconds during which time the connector under test shall be observed for evidence of disruptive discharge or for leakage current in excess of one (1) milliampere.

5.4 The test voltage shall be gradually reduced to zero to avoid surges.

6.0 *Notes*

6.1 Acceptance criteria shall be established by the lack of disruptive discharge as evidenced by flashover (surface discharge), sparkover (air discharge), or breakdown (puncture discharge), or of excessive leakage current. Resistance to these conditions is an inherent characteristic of connector geometry (e.g., contact spacing), contact configuration (e.g., smooth contours), and insulator materials.

6.2 Dielectric withstanding voltage shall be defined as 75 percent of the nominal dielectric breakdown voltage measured under the same conditions of altitude and temperature.

6.3 Simulated altitudes used during this test shall be selected from those shown in Table 1.

Table 1

Barometric Pressure*		Altitude**	
In. of Mercury	**MM of Mercury**	**Feet**	**Meters**
27 to 31	**685 to 785**	**Seal Level**	**Seal Level**
17.4	442	15,000	4,572
3.44	87.4	50,000	15,240
1.40	35.6	70,000	21,336
0.35	8.9	100,000	30,480
0.045	1.14	150,000	45,720

*Source-U.S. Standard Atmosphere 1966.

**Altitude is given as a reference only and should not be specified without barometric pressure as a test requirement.