



AEROSPACE STANDARD

AS81714™**REV. D**Issued 2004-04
Revised 2021-11

Superseding AS81714C

Terminal Junction System (TJS), Environment Resistant
General Specification for

FSC 5940

RATIONALE

Limited scope revision required to correct Group A sampling plan.

1. SCOPE

AS81714 covers Terminal Junction System (TJS) components which are used for interconnection of wiring and incorporation of passive components (see 6.1). These environment resistant components have in common the use of crimp type external pin contacts in accordance with AS39029/1 for Series I or crimp type external socket contacts in accordance with AS39029/22 for Series II. This family of TJS components is designed to operate continuously over a temperature range of -65 to 200 °C, using any combination of temperatures generated by the electrical load and ambient temperature so that the maximum internal hot spot, combined temperature, will not exceed the maximum specified for the class of TJS component, unless otherwise specified (1.2, 3.1). The maximum continuous temperature established by the electronic components in a component module (block) shall be limited to the block maximum continuous temperature. The components making up the system and covered by AS81714 include:

- a. Terminal junction bussing blocks (6.12.2)
 - 1. Feedback type (6.12.2.1)
 - 2. Feedthrough type (6.12.2.2)
- b. Racks (mounting holders) for blocks (6.12.3)
- c. Brackets, block mounting (6.12.4)
- d. Wire in-line junctions (6.12.5)
- e. Grounding terminal (6.12.6)
- f. Grounding blocks (6.12.7)
- g. Electronic blocks (6.12.12)
- h. Electronic in-line junctions (6.12.9)

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<https://www.sae.org/standards/content/AS81714D>

Documents

Document Sharing Hub

1.1.1 TJS

The TJS components conform to the recommendations of MIL-HDBK-454.

1.2 Classification

1.2.1 Terminal junction components fabricated to AS81714 are classified as follows:

- a. Series. The Series I and II TJS components are not interchangeable or intermateable.

Series I. External pin contact crimped on wire.

Series II. External socket contact crimped on wire.

- b. Class. Terminal junction components described herein are Class D (see 6.10).

1.3 Marking Identification

The components covered by AS81714 shall be identified by a part number, as shown by the applicable detail specification. Series I components shall be identified as in the following examples, or as otherwise specified (3.1).

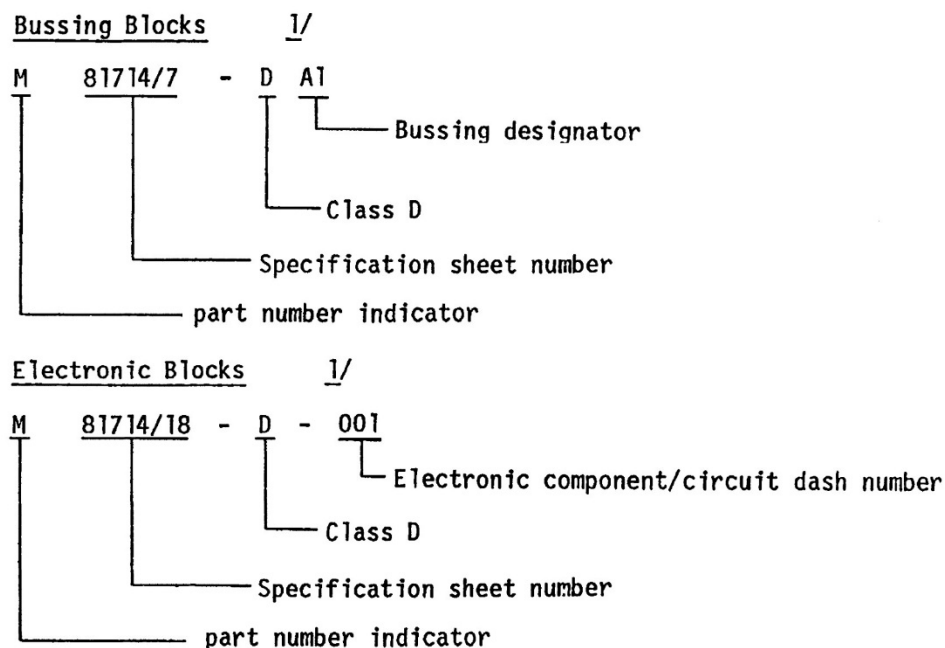
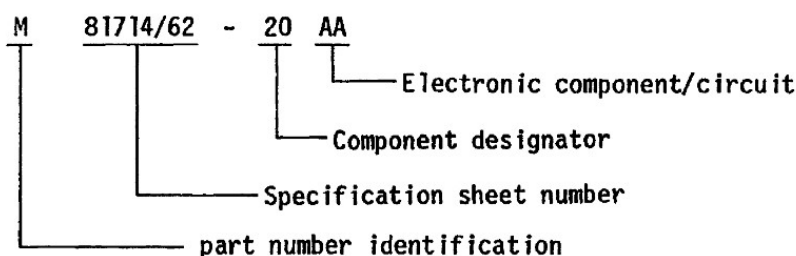
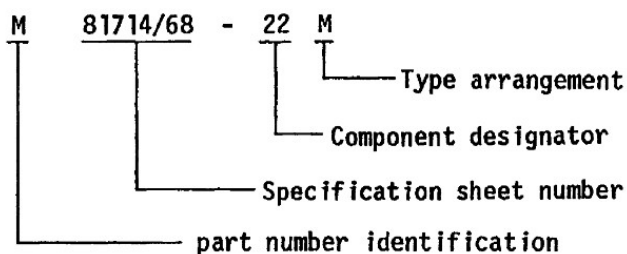
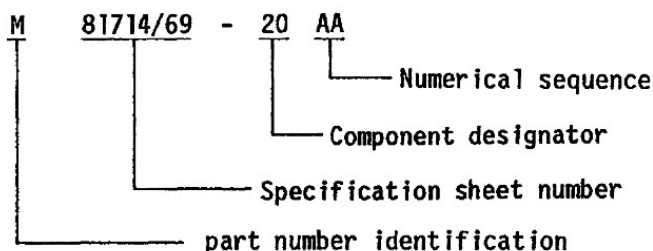
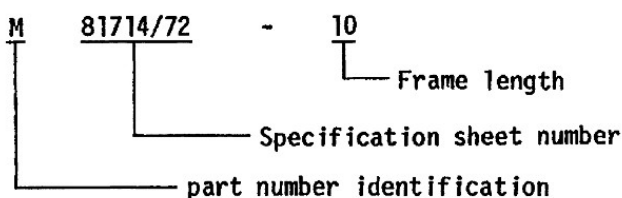
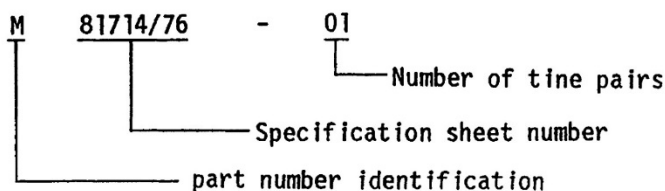


Figure 1 - Series I component marking structure (see 3.1)

Electronic Blocks 1/Wire In-Line JunctionsElectronic In-Line Junction 1/Racks and Brackets 1/Block Removal Tools 1/

1/ The part number shall be printed as shown in the above examples, but without the spaces shown.

Figure 2 (continued) - Series II component marking structure (see 3.1)

1.3.1 Component Designator

A different component designator is required for each component having identical external contacts and for each combination of different contacts used in a block.

1.3.2 Bussing and Circuit Designator

The bussing and circuit designators shall be as shown on the applicable detail specification (3.1).

1.3.3 Voltage Rating

The maximum working voltages shall be as shown in Table 13.

1.4 External Contact Conductor Size Range

Each external contact with the indicated dash number accommodates the range of conductor sizes specified in Table 1.

1.4.1 Grommet Wire Sealing Ranges

For TJS components, each grommet aperture for a specified contact dash number, seals on the OD range of smooth finished wires specified in Table 1.

CAUTION: When selecting wire requiring sealing, the finished wire outer diameter (OD) shall be within the OD range shown in Table 1.

Table 1 - Wire range accommodations

Series I Modules				
Contact M39029/1	Mating End Size	Wire Barrel Size	Conductor Size	OD Range of Finished Wires (inch)
-507	20	22D	28 26 24 22	0.030-0.054
-100	16	22	26 24 22	0.034-0.060
-101	16	20	24 22 20	0.040-0.083
-102	14	16	20 18 16	0.065-0.109
-103	12	12	14 12	0.097-0.142
Series II Modules				
Contact M39029/22	Mating End Size	Wire Barrel Size	Conductor Size	OD Range of Finished Wires (inch)
-191	22	22	26 24 22	0.030-0.060
-192	20	20	24 22 20	0.040-0.083
-193	16	16	20 18 16	0.065-0.109
605	12	12	14 12	0.097-0.142

2. REFERENCES

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of the other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

AMS1424	Fluid, Aircraft Deicing/Anti-Icing, SAE Type I
AIR1351	Manufacturers' Identification of Aerospace Electrical and Electronic Wiring Devices and Accessories
ARP9013	Statistical Product Acceptance Requirements
AS9003	Inspection and Test Quality System
AS22759	Wire, Electrical, Fluoropolymer-Insulated, Copper or Copper Alloy
AS39029	Contacts, Electrical Connector, General Specification For
AS39029/1	Contacts, Electrical Connector, Pin, Crimp Removable (for AS81714 Terminal Junction System)
AS39029/22	Contacts, Electrical, Connector, Socket, Crimp Removable (for AS81714 Terminal Junction System Series II)
AS50881	Wiring Aerospace Vehicle
AS81714	Detail Specifications:
AS81714/1	Terminal Junction System, Terminal Junction Blocks, Sectional, Bussing Modules, Feedback Type, Size 22, Series I
AS81714/2	Terminal Junction System, Terminal Junction Blocks, Sectional, Bussing Modules, Feedback Type, Size 20, Series I
AS81714/3	Terminal Junction System, Terminal Junction Blocks, Sectional, Bussing Modules, Feedback Type, Size 16, Series I
AS81714/4	Terminal Junction System, Terminal Junction Blocks, Sectional, Bussing Modules, Feedback Type, Size 12, Series I
AS81714/5	Terminal Junction System, Rack Assembly, Track Feedback Type, Series I
AS81714/6	Terminal Junction System, Terminal Junction Blocks, Sectional, Bussing Modules, Feed thru Type, Size 22, Series I

AS81714/7	Terminal Junction System, Terminal Junction Blocks, Sectional, Bussing Modules, Feed thru Type, Size 20, Series I
AS81714/8	Terminal Junction System, Terminal Junction Blocks, Sectional, Bussing Modules, Feed thru Type, Size 16, Series I
AS81714/9	Terminal Junction System, Terminal Junction Blocks, Sectional, Bussing Modules, Feed thru Type, Size 12, Series I
AS81714/10	Terminal Junction System, Rack Assembly, Track Feed thru Type, Series
AS81714/11	Terminal Junction System, Terminal Junction Blocks, Sectional, Wire In-Line Junctions, Single, Series I
AS81714/12	Terminal Junction System, Terminal Junction Blocks, Sectional, Wire In-Line Junctions, Double, Series I
AS81714/14	Terminal Junction System, Rack Assembly, Track, Feedthru Type, Light Weight, Series I
AS81714/15	Terminal Junction System, Grounding Stud, Series I
AS81714/16	Terminal Junction System, Rack Assembly, Track, Feedback Type, Light Weight, Series I
AS81714/17	Terminal Junction System, Terminal Junction Blocks, Sectional, Bussing Modules, Feedback Type, Size 22D, Series I
AS81714/18	Terminal Junction System, Terminal Junction Blocks, Sectional, Modules, Electronic, Feedback Type, Size 20, Series I
AS81714/19	Terminal Junction System, Terminal Junction Blocks, Sectional, Modules, Electronic, Feedback Type, Size 16, Series I
AS81714/20	Terminal Junction System, Terminal Junction Blocks, Sectional, Modules, Electronic, Feedback Type, Size 12, Series I
AS81714/21	Terminal Junction System, Terminal Junction Blocks, Sectional, Electronic In-Line Junctions, Diode, Series I
AS81714/22	Terminal Junction System, Terminal Junction Blocks, Electronic, In-Line Junction, Integral Resistor, Series I
AS81714/23	Terminal Junction System, Terminal Junction Blocks, Electronic, In-Line Junctions, Integral Fuse, Series I
AS81714/24	Terminal Junction System, Terminal Junction Blocks, Sectional, Electronic, In-Line Junctions, Double, Integral Diode(s), Series I
AS81714/25	Terminal Junction System, Terminal Junction Blocks, Sectional, Modules, Electronic, Feedback Type, Size 20-1, Series I
AS81714/26	Terminal Junction System, Terminal Junction Blocks, Sectional, Modules, Electronic, Diode, Feedback Type, Size 20, Series I
AS81714/27	Terminal Junction System, Terminal Junction Blocks, Sectional, Grounding Modules, Stud Type Mounting, Series I
AS81714/28	Terminal Junction System, Terminal Junction Blocks, Sectional, Grounding Modules, Integral Bracket Mounting Series I

AS81714/29	Terminal Junction System, Bracket, Block Mounting, Series I
AS81714/30	Terminal Junction System, Terminal Junction Blocks, Modules, Electronic, Feedback Type, Sizes 20-3, 20-4, 20-5 Vertical Mounting with Integral Bracket, Block Mounting, Series I
AS81714/31	Terminal Junction System, Terminal Junction Blocks, Modules, Feedback Type, Sizes 20-6, 20-7, 20-8 Horizontal Mounting with Integral Bracket, Series I
AS81714/60	Terminal Junction System, Terminal Junction Blocks, Sectional, Bussing Modules, Feedback Type, Series II
AS81714/61	Terminal Junction System, Terminal Junction Blocks, Sectional, Bussing Modules, Feedback Type, Series II
AS81714/63	Terminal Junction System, Terminal Junction Blocks, Sectional, Grounding Modules, Stud and Flange Type Mounting, Series II
AS81714/65	Terminal Junction System, Terminal Junction Blocks, Sectional, Wire In-Line Junctions, Series II
AS81714/67	Terminal Junction System, Rack Assembly, Track, Feedback Type, Series II
AS81714/69	Terminal Junction System, Block Removal Tools, Series II
AS85049/143	Connector Accessories, Backshell, Strain Relief, Category 4C(for AS81714, Size 22, 20 and 16 Terminal Junction Blocks)

2.2 ASQ Publications

Available from American Society for Quality, 600 North Plankinton Avenue, Milwaukee, WI 53203, Tel: 800-248-1946 (United States or Canada), 001-800-514-1564 (Mexico) or +1-414-272-8575 (all other locations), www.asq.org.

ASQC Z1.4 Sampling Procedures and Tables for Inspection by Attributes

2.3 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM D3951 Commercial Packaging

2.4 ECIA Publications

Available from Electronic Components Industry Association (ECIA), 310 Maxwell Road, STE 200, Alpharetta, GA 30009, Tel: 678-393-9990. Copies of these documents are available online at <https://www.ecianow.org>.

ECIA EIA-364-03	Altitude Immersion Test Procedure for Electrical Connectors
ECIA EIA-364-06	Contact Resistance Test Procedure for Electrical Connectors
ECIA EIA-364-10	Fluid Immersion Test Procedure for Electrical Connectors
ECIA EIA-364-14	Ozone Exposure Test Procedure for Electrical Connectors
ECIA EIA-364-20	Withstanding Voltage Test Procedure for Electrical Connectors, Sockets and Coaxial Contacts
ECIA EIA-364-21	Insulation Resistance Test Procedure for Electrical Connectors, Sockets, and Coaxial Contacts
ECIA EIA-364-23	Low Level Contact Resistance Test Procedure for Electrical Connectors and Sockets

ECIA EIA-364-26	Salt Spray Test Procedure for Electrical Connectors, Contacts and Sockets
ECIA EIA-364-27	Mechanical Shock (Specified Pulse) Test Procedure for Electrical Connectors
ECIA EIA-364-28	Vibration Test Procedure for Electrical Connectors and Sockets
ECIA EIA-364-29	Contact Retention Test Procedure for Electrical Connectors
ECIA EIA-364-31	Humidity Test Procedure for Electrical Connectors and Sockets
ECIA EIA-364-32	Thermal Shock (Temperature Cycling) Test Procedure for Electrical Connectors and Sockets
ECIA EIA-364-54	Magnetic Permeability Test Procedure for Electrical Connectors, Contacts, and Sockets

2.5 National Conference of Standards Laboratories (NCSL) Publications

Available from NCSL International, 2995 Wilderness Place, Suite 107, Boulder, CO 80301, Tel: 303-440-3339, www.ncsli.org.

ANSI/NCSL Z540-3 Calibration of Measuring and Test Equipment, Requirements for

2.6 U.S. Government Publications

Copies of these documents are available online at <https://quicksearch.dla.mil>.

MIL-HDBK-454	Standard General Requirements for Electronic Equipment
MIL-DTL-5624	Turbine Fuel, Aviation, Grades JP-4 and JP-5
MIL-DTL-45204	Gold Plating (Electrodeposited)
MIL-DTL-55330	Connectors, Electrical and Fiber Optic, Packaging of
MIL-PRF-5606	Hydraulic Fluid, Petroleum Base, Aircraft, Missile, and Ordnance
MIL-PRF-7808	Lubricating Oil, Aircraft Turbine Engine, Synthetic Base
MIL-PRF-23699	Lubricating Oil, Aircraft Turbine Engines, Synthetic Base
MIL-STD-129	Military Marking for Shipment and Storage
MIL-STD-202	Test Methods for Electronic and Electrical Component Parts
MIL-STD-889	Dissimilar Metals
MIL-STD-1285	Marking of Electrical and Electronic Parts
MS27488	Plug, End Seal, Electrical Connector
SAM	System for Award Management*

*Available from <https://www.sam.gov/portal/public/SAM/>.

SD-6 Provisions Governing Qualification

2.7 Order of Precedence

In the event of a conflict between AS81714 requirements and the references cited herein, the AS81714 shall take precedence.

3. REQUIREMENTS

3.1 Detail Specification

The individual part requirements shall be as specified herein and in accordance with the applicable detail specification.

3.1.1 Precedence

In the event of conflict between AS81714 and the detail specification, the latter shall govern.

3.2 Qualification

TJS components furnished under AS81714 shall be products that have been tested and has passed the qualification tests specified herein and have been listed on or approved for listing on the applicable Qualified Products List (see 4.4 and 6.5). AS81714 part numbers listed in the detail specification can only be used by a supplier qualified by the qualifying activity. A supplier that is no longer qualified may use the part number for a contract, if the supplier was qualified by the qualifying activity at the time when a purchase order had been approved by the purchaser.

3.3 Materials

Materials shall be as specified herein; however, when a definite material is not specified, materials used shall meet the performance requirements of AS81714. Materials shall be fungus resistant meeting the recommended requirements of MIL-HDBK-454, Guideline 4. Approval of any constituent material shall not be construed as a guarantee for acceptance of the finished product.

3.3.1 Dissimilar Metals

When dissimilar metals are employed in intimate contact with each other, protection against electrolytic corrosion shall be provided as specified in MIL-STD-889.

3.3.2 Nonmagnetic Materials

All parts, including the racks, shall be made from materials which are classed as nonmagnetic (3.5.15).

3.3.3 Internal Contact Plating

Internal contacts shall be gold plated in accordance with MIL-DTL-45204, Type I, Grade C, Class 1 (50 μ in (minimum)), over a Nickel underplating (see 4.6.1). Accessory members of the internal contact assembly need not be plated, but shall comply with the requirements for dissimilar metals (3.3.1). Silver plate or silver underplate shall not be used.

3.3.4 Internal Current Carrying Members

Internal current carrying members shall be copper alloy.

3.3.5 Housing

Housing shall be constructed of hard dielectric material.

3.3.6 Sealing Grommet

Sealing grommet shall be silicone or silicone blend elastomer bonded to the housing and shall seal the specified wire diameter ranges in Table 1.

3.3.7 Cadmium Material

This document includes cadmium as a plating material in various detail specifications. The use of cadmium has been restricted and/or banned for use in many countries due to environmental and health concerns. The user should consult with local officials on applicable health and environmental regulations regarding its use.

3.4 Design and Construction

TJS components shall be designed and constructed to withstand normal handling incident to installation and maintenance in service. Controlled dimensions shall be as specified (3.1).

3.4.1 Contacts

External contacts shall be qualified to AS39029/1 for Series I modules or AS39029/22 for Series II modules. The design of the internal contact and the housing in which it is installed shall be such that it assures a minimum of 0.035 inch of electrical engagement with the installed external contact (see 4.6.1).

3.4.2 Contact Retention Design

The contact retention system shall be designed to provide positive retention of the external contact to meet the minimum contact retention requirement (see 3.5.4). Inserting and removal of an external contact from these components shall be by the applicable AS81969 installing and removal tool for the entire range of wire outside diameters as specified in Table 1 and specified by part number in the detail specification.

3.4.3 TJS Component Design (Current Carrying Devices)

These components shall comply with the applicable detail specification. Separate cavities shall be provided for all contacts and contact interconnections which are not electrically interconnected. Wire sealing grommets shall be bonded or molded to the housing. There shall be no air paths through the walls of the housing, either to the outside or between contacts which are not electrically interconnected (see 4.6.1 and 3.5.21).

3.4.4 Grommet Construction

The design of the grommet shall accommodate and seal on insulated wires having a smooth outside jacket and outside diameters within the range specified in Table 1. The openings in the grommets for the entrance of the contacts shall not be covered or closed by a solid membrane. The design of the external component shall permit installing and removal of individual contacts without damage to the sealing member, using the applicable installing and removal tools.

3.4.5 End Seal Plugs

The grommets shall be designed to accept sealing plugs in accordance with MS27488 in lieu of wire and contacts. When installing sealing plugs in the module grommets, the head of the sealing plug shall be inserted first.

3.4.6 Bussing Arrangement

The arrangement of internal contacts, bussing, and circuitry shall be as specified (3.1 and 1.3).

3.4.7 Interchangeability

All TJS components having the same part number shall be completely interchangeable with each other with respect to installation (physical) and performance (function) as specified herein.

3.4.8 Internal Electronic Components

Ratings and characteristics of electronic components shall be in accordance with the electronic component specification (3.1). Class designator in the TJS part housing electronic components applies to the basic TJS parts (bussing block and wire in-line junctions) only. Electronic junctions shall be rated at the electronic component level or the basic TJS part level, whichever has the lesser requirement (4.4.1.1.5).

3.4.9 Pin Bus (Series II)

The pin bus shall be one-piece construction or equivalent assembly (see 4.6.1).

3.5 Performance

TJS components with specified AS39029 contacts installed with the applicable AS81969 tool shall be designed to meet the performance requirements stated herein when tested in accordance with the specified methods of Section 4.

3.5.1 Resistance to Probe Damage (Series I)

When tested in accordance with 4.6.2, Series I internal contacts shall withstand the bending moment and depth of test probe insertion without evidence of damage that would interfere with mechanical performance and shall then comply with the contact resistance of 3.5.16 and low signal level contact resistance (3.5.17). Probe damage tests are not applicable to Series II components.

3.5.2 Maintenance Aging

Applicable TJS components shall conform to AS81714 after maintenance aging testing in accordance with 4.6.3 and shall meet the requirements of Table 8.

3.5.3 Contact Insertion Forces and Removal Forces

The contact insertion forces and removal forces shall comply with the requirements of Table 8 while being subjected to the maintenance aging test in accordance with 4.6.3.

3.5.4 Contact Retention

When tested in accordance with 4.6.4, the axial displacement of the contacts with respect to the applicable component shall not exceed 0.012 inch.

3.5.5 Thermal Shock

When tested in accordance with 4.6.5, there shall be no damage detrimental to operation of the TJS components after being subjected to the temperature extremes of Table 10. There shall be electrical continuity on all contacts when measured at the high and low temperature extremes. The blocks shall meet the insulation resistance requirements of 3.5.11.

3.5.6 Dielectric Withstanding Voltage (DWV)

When tested in accordance with 4.6.6, TJS components shall show no evidence of breakdown or flashover when subjected to the test voltages and altitude of Table 11. During application of test voltage, the leakage current shall not exceed 2 mA. Corona shall not be considered as breakdown.

3.5.7 Fluid Immersion

After being subjected to fluid immersion in accordance with 4.6.7, TJS components furnished hereunder shall comply with contact insertion and removal forces (3.5.3), and insulation resistance at ambient temperature (3.5.11.1). Nonmetallic parts shall show no evidence of cracking, chipping, swelling, or loosening of bonds or seams which will adversely affect their performance.

3.5.8 Vibration

TJS components shall not be damaged and there shall be no loosening of parts due to vibration. Blocks shall remain firmly fixed with relation to each other and the rack or bracket. There shall be no interruption of electrical continuity longer than 1 μ s in duration during the vibration test, when performed in accordance with 4.6.8.

3.5.9 Mechanical Shock

Items shall not be damaged and there shall be no loosening of parts due to shock. Blocks shall remain firmly fixed with relation to each other and the rack or bracket. There shall be no interruption of electrical continuity longer than 1 μ s during the exposure to mechanical shock, when performed in accordance with 4.6.9.

3.5.10 Humidity

When exposed to humidity in accordance with 4.6.10, the insulation resistance shall be a minimum of 100 M Ω measured at the completion of the tenth cycle of test while at 20 °C $\pm$ 5 °C and 95% relative humidity (RH).

3.5.11 Insulation Resistance

Insulation resistance shall be measured at room and elevated temperatures in accordance with 4.6.11.

3.5.11.1 At Room Condition

The insulation resistance at room temperature shall be not less than 5000 M Ω , when tested in accordance with 4.6.11.1.

3.5.11.2 At Elevated Temperature

The insulation resistance shall be not less than 50 M Ω at the specified high temperature, when tested in accordance with 4.6.11.2.

3.5.12 Salt Spray

When tested in accordance with 4.6.12, TJS components with exterior metal parts and racks shall show no exposure of basis metal and no corrosion that will affect performance.

3.5.13 Temperature Life

The TJS components shall perform satisfactorily after exposure to the temperature life test (4.6.13), and shall comply with insulation resistance at elevated temperature (3.5.11.2) and low signal level contact resistance (3.5.17) measured at room temperature.

3.5.14 Ozone Exposure

After being subjected to ozone in accordance with 4.6.14, there shall be no evidence of cracking of dielectric material or other damage which will adversely affect their performance.

3.5.15 Relative Magnetic Permeability

When tested in accordance with 4.6.15, the relative magnetic permeability shall not exceed two.

3.5.16 Contact Resistance (for Other than Electronic Components)

When tested in accordance with 4.6.16, the resistance across a series circuit of two external contacts of the same size and with same wire gage while they are carrying test current shall not exceed the values specified in Table 2.

3.5.16.1 Electronic Components

The resistance of electronic components shall be as specified in the internal passive component specification, taking into account the added resistance of the contacts (3.4.8).

3.5.17 Low Signal Level Contact Resistance (Size 16 Wire Barrel and Smaller)

When tested in accordance with 4.6.17, the low signal level resistance of a series circuit of two external contacts of the same size and with the same wire gage shall not exceed the applicable values specified in Table 3.

Table 2 - Contact resistance limits

Contact			Wire Size	Test Current (amperes)	Resistance (millivolts drop maximum)	
Part No.	Mating End Size	Wire Barrel Size			Initial	After Condition
M39029/1-507	20	22D	22 28	5.0 1.5	55 50	65 55
-100	16	22	22 26	5.0 2.0	45 40	50 45
-101	16	20	20 24	7.5 3.0	45 40	50 45
-102	14	16	16 20	13.0 7.5	50 45	55 50
-103	12	12	12 14	23.0 17.0	40 35	45 40
M39029/22-191	22	22	22 26	5.0 2.0	70 60	80 70
-192	20	20	20 24	7.5 3.0	55 45	65 55
-193	16	16	16 20	13.0 7.5	50 45	60 55
605	12	12	12 14	23.0 17.0	60 45	70 65