

# **Stewart Connector**

## **Product Specification**

### **PR041-01**

**Revision A0 (Date 4-3-2017)**

## **Modular Connectors with Circular Shells**

# Stewart Connector

## 1.0 Objective

This document establishes the performance requirements and outlines qualification tests for modular connectors produced by Stewart Connector. These products are intended to be terminated onto a cable and mated to a compatible Stewart modular product.

## 2.0 Scope

This specification is applicable to modular products in circular shells.

## 3.0 General

This document is comprised of the following sections (specifications subject to change without notice):

<u>Paragraph</u>	<u>Title</u>
1.0	Objective
2.0	Scope
3.0	General
Table 1	Qualification Test Matrix
4.0	Applicable Documents
5.0	General Requirements
6.0	Quality Assurance Provisions
Table 2	Inspection Conditions
7.0	Requalification of Products
8.0	Electrical Requirements
Table 3	LLCR
Figure 1	Bulk Contact Interface LLCR Measurement
Figure 2	Bulk Shield Interface LLCR Measurement
Figure 3	LLCR Measurement Configuration
Table 4	Insulation Resistance
Table 5	DWV (Adjacent Contacts)
Table 6	DWV (Contacts to Shield )
9.0	Mechanical Requirements
Table 7	Mechanical Shock
Table 8	Sinusoidal Vibration
Table 9	Random Vibration
10.0	Environmental Conditions
Table 10	Temperature Life
Table 11	Thermal Shock
Table 12	Temperature / Humidity

# Stewart Connector

**Table 1**  
**Qualification Testing Matrix**

Qualification		Test Groups						
Testing Matrix		1	2	3	4	5	6	7
Test	Para.	Testing Sequence <sup>3</sup>						
Examination of Product	5.5	1,5	1,7	1,5	1,6	1,8	1,3,6	1,3
Low Level Contact Resistance	8.1	2,4	2,6	2,4	2,4	2,4	2,5	
Temperature Rise vs. Current	8.2	3						
Mechanical Shock	9.1		3					
Vibration (Sinusoidal)	9.2		4					
Vibration (Radom)	9.3		5					
Temperature Life	10.1			3				
Thermal Shock	10.2				3			
Temperature/Humidity	10.3					3		
Insulation Resistance	8.3				5	5		
D. W. V. (Adj. Contacts) <sup>2</sup>	8.4					6		
D. W. V. (Contacts-Shield) <sup>1,2</sup>	8.5					7		
Durability	9.4						4	
Ingress protection	10.4		8 (4)	6 (4)	7 (4)	9 (4)		2 (4)
Note:	1	Applies to Shield and Shell						
	2	DWV stands for Dielectric Withstand Voltage						
	3	Numbers indicate sequence in which tests are performed.						
	4	Test is recorded on separate test						

# Stewart Connector

## 4.0 Applicable Documents

- 4.1 Bel Stewart Specifications:
  - 4.1.1 Product Drawings
  - 4.1.2 Customer Drawings
  - 4.1.3 Test Specifications
  
- 4.2 Other Standards and Specifications (Applicable in Part):
  - 4.2.1 UL94V-0 Flammability
  - 4.2.2 EIA-364
  - 4.2.3 EIA/TIA-568
  - 4.2.4 EIA/TIA-570
  - 4.2.5 IEC 60603-7
  - 4.2.6 IEEE 802.3

Additional specifications and standards may be referenced as applicable. The latest revisions of the above specifications available at the date of issue of this specification are used unless otherwise indicated.

## 5.0 General Requirements

- 5.1 Qualification:  
Connectors furnished under this specification shall be capable of meeting the qualification test requirements specified herein.
  
- 5.2 Material:
  - 5.2.1 Plastic Housings: UL94V-0
  - 5.2.2 Contacts: Copper Alloy
  - 5.2.3 Shield: Copper Alloy
  - 5.2.4 Shell: Plastic UL94V-0
  
- 5.3 Finish:
  - 5.3.1 Contacts: Gold Selectively Plated
  - 5.3.2 Contacts: Nickel Plated All Over
  - 5.3.3 Shield: Tin or Nickel Plated All Over
  - 5.3.4 Shell: N/A
  
- 5.4 Design and Construction:  
Connectors shall be of the design, construction and physical dimensions as specified on the

# Stewart Connector

applicable product drawing and TIA 1096 specifications. In case of conflict between this specification and product drawings, the drawings shall take precedence. 50  $\mu$ inch (1.27  $\mu$ m) gold plated connectors compliant with TIA 1096 specifications.

## 5.5 Examination of Product:

Connectors shall meet all specified dimensions of product drawings and internal workmanship standards. There shall be no evidence of cracking, chipping, contamination or loose parts when inspected, without magnification, to the unaided eye.

## 5.6 Operating and Storage Temperature Range: -40°C to 85°C

## 5.7 Ratings:

5.7.1 Current: 1.2 amperes maximum at 25°C

5.7.2 Voltage: 150 VAC maximum

## 5.8 Minimum Number of Mating/Unmating Operations:

5.8.1 Level I: 750 Cycles

# Stewart Connector

## 6.0 Quality Assurance Provisions

### 6.1 Equipment Calibration:

All test equipment and inspection facilities used in the performance of any test shall be maintained and calibrated in accordance with Stewart Operating Procedures and/or other applicable specifications.

### 6.2 Inspection Conditions:

Unless otherwise specified, all inspections shall be performed under the conditions noted. See Table 2 below:

**Table 2**  
**Inspection Conditions**

Temperature (±5 °C)	Relative Humidity (%)	Barometric Pressure
25	30 to 50	Local Ambient

### 6.3 Sample Quantity and Description:

The test samples required for groups 1 through 5 in Table 1 shall be chosen to comprise a group that consists of 80 contacts (10 examples minimum) of each individual contact design.

### 6.4 Acceptance:

6.4.1 All samples tested in accordance with this product specification shall meet the stated requirements.

6.4.2 Failures attributed to equipment, test set-up, sample preparation problems, contaminants or operator error, should not disqualify the product. Corrective action will be taken and samples re-submitted for qualification.

## 7.0 Requalification of Products

### 7.1 Requalification Testing

If changes are made to the product, design or manufacturing process after initial product qualification that are judged by the management of Stewart Connector to materially affect the product form, fit or function, then new product samples shall be subject to full or partial requalification testing.

# Stewart Connector

## 8.0 Electrical Requirements

### 8.1 Low Level Contact Resistance:

LLCR of the Coupler should be measured (mated with Stewart Connector plugs) in accordance with EIA-364-23 with a test current of 100 mA and a maximum open circuit voltage of 20 mVDC (dry circuit test). See Table 5 below:

**Table 3**  
**Low Level Contact Resistance**

Contacts		Shield Interface if applicable	
Initial (mΩ)	Final (mΩ)	Initial (mΩ)	Final (mΩ)
100*	Δ20	100	Δ100

All values listed are maximum values.  
\* 100 mΩ Initial LLCR Includes Bulk

Low Level Contact Resistance (LLCR) is measured between the two (2) mated connectors (one plug is within the Plug Shell) and the Coupler that is within the Receptacle Shell. Measurements are generally performed before and after environmental exposure or mechanical conditioning. Bulk LLCR is measured between the signal contacts and shield connections of the Plugs that are mated through the Coupler. Signal Contact Bulk resistance consists of the sum of all interface connections between the conductors, contacts and coupler.



**FIGURE 1**

# Stewart Connector

## 8.1 Low Level Contact Resistance: (Cont.)

Shield Bulk resistance consists of the sum of all interface connections between the ground interfaces of the cable shields, the Plug shields, and the Coupler shield.

Stewart's product specification requirement is a bulk contact resistance change after conditioning. In most cases, the maximum allowable change in bulk contact resistance after environmental conditioning is 100 m $\Omega$ .

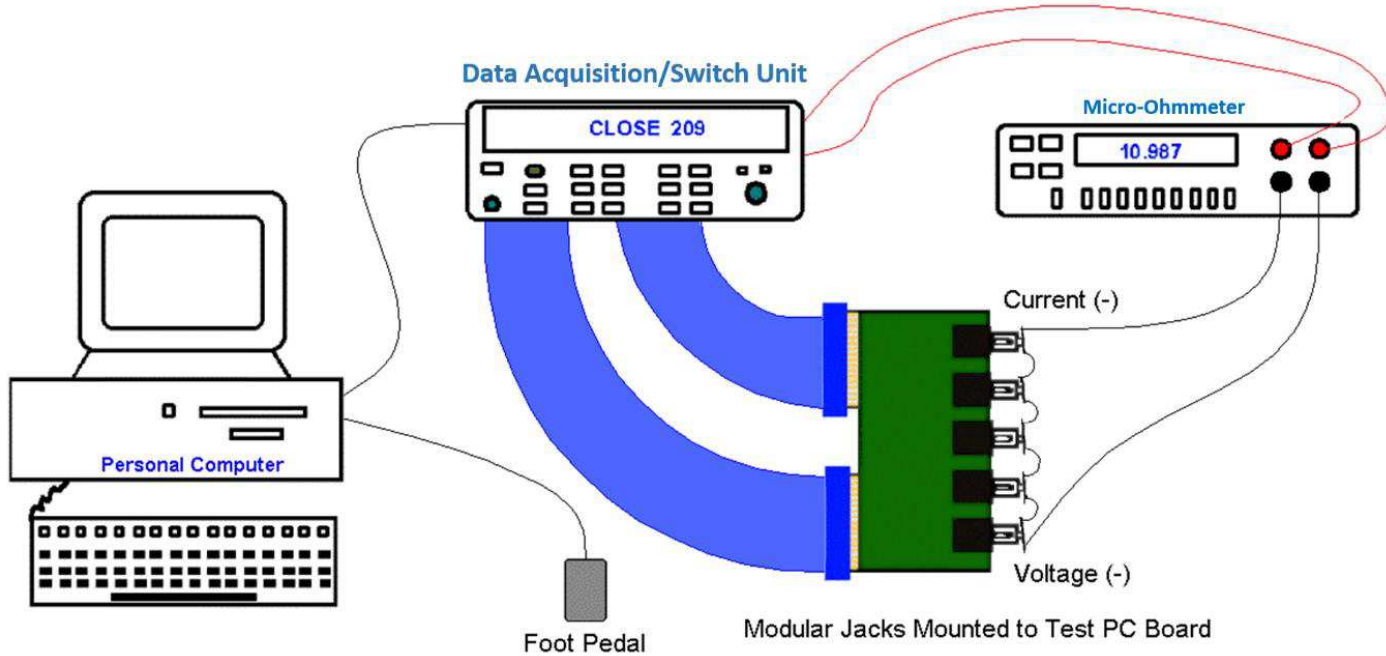
LLCR measurements are conducted utilizing a four (4) wire dry circuit test method. Implementation consists of a 100 mA DC current source with a maximum open circuit voltage of 20 mV. Measurements are performed using low current and voltage levels to preserve oxides and films that may form during environmental conditioning.

In practice, Jacks are typically mounted on PWB boards (although jacks can be measured manually as well), which are design to interface with automated switching and measuring equipment. Stewart Connector LLCR measuring system consists of a Micro-Ohmmeter and a Hewlett Packard Data Acquisition Switch Unit. Automation software is utilized to fully control the measurement sequence. Refer to measurement configuration in Figure 4 below.



# Stewart Connector

## 8.1 Low Level Contact Resistance: (Cont.)



**FIGURE 3**

## 8.2 Temperature Rise versus Current:

The temperature rise above ambient (25°C) shall not exceed 30 °C at any point on the connector when all contacts are powered in series with 1.2 Amps DC in accordance with EIA-364-70.

## 8.3 Insulation Resistance:

The insulation resistance of the unmated connectors shall be measured in accordance with EIA-364-21. See Table 6 below:

**Table 4  
Insulation Resistance**

Test Voltage (VDC)	Test Duration (Minutes)	Requirement (MΩ)	Points of Measurement
500	1	500	Between adjacent contacts
500	1	500	Between contacts and shield

# Stewart Connector

## 8.4 Dielectric Withstanding Voltage (DWV) Adjacent Contacts:

There shall be no arc over, insulation breakdown or excessive leakage (>1 mA) when tested in accordance with EIA-364-20 on mated connectors. See Table 7 below:

**Table 5**  
**DWV – Adjacent Contacts**

Test Voltage	Test Duration (Minutes)	Points of Measurement
1000 VDC	1	Between adjacent contacts

## 8.5 Dielectric Withstanding Voltage (DWV) Contact to Shield:

There shall be no arc over, insulation breakdown or excessive leakage (>1 mA) when tested in accordance with EIA-364-20 on mated connectors. See Table 8 below:

**Table 6**  
**DWV – Contact to Shield**

Connector	Test Voltage	Test Duration (Minutes)	Points of Measurement
All Connectors	1500 VAC <sub>RMS</sub> or 2121 VDC	1	Between contacts and shield

# Stewart Connector

## 9.0 Mechanical Requirements

### 9.1 Mechanical Shock:

Mechanical Shock shall be measured in accordance with EIA-364-27, condition A, with assembled connectors mounted rigidly to table and no discontinuities of >1 microsecond. See Table 12 below:

**Table 7  
Mechanical Shock**

Wave Type	Velocity Change (ft/s)	Number of shocks per direction	Duration Each Face (milliseconds)	Applied Energy (g)	Mutually Perpendicular Axis
Half Sine	11.3	6	11	50	3

### 9.2 Vibration (Sinusoidal):

Sinusoidal Vibration shall be measured in accordance with EIA-364-28 Test Condition I, with assembled connectors mounted rigidly to vibrating table and no discontinuities of >1 microsecond. See Table 13 below:

**Table 8  
Sinusoidal Vibration**

Wave Type	Amplitude	Frequency (Hz)	Duration Each Face (hours)	Mutually Perpendicular Axis
Sine	.06 in. DA	10 to 55	2	3

### 9.3 Vibration (Random):

Random Vibration shall be measured in accordance with EIA-364-28 Test Condition V Letter D, with assembled connectors mounted rigidly to vibrating table and no discontinuities of >1 microsecond. See Table 14 below:

**Table 9  
Random Vibration**

Frequency (Hz)	Duration Each Face (minutes)	Overall rms (g)	Mutually Perpendicular Axis
50 to 2000	90	11.95	3

### 9.4 Durability:

Cycles (number of times) 500 mated and unmated

There to be no evidence of any damage or negative impact to form, fit or function.

# Stewart Connector

## 10.0 Environmental Conditions

Note: Unless otherwise specified, all environmental testing is to be done with the connector in the mated state.

### 10.1 Temperature Life:

Temperature life shall be measured in accordance with EIA-364-17, per method A. See Table 16 below:

**Table 10**  
**Temperature Life**

Temperature (°C)	Duration (hours)
85±2	500

### 10.2 Thermal Shock:

Thermal Shock shall be measured in accordance with EIA/TIA-568. See Table 17 below:

**Table 11**  
**Thermal Shock**

Temperature (±3 °C)	Number of Cycles	Duration at Each Extreme (Minutes)	Test Condition
-40 to +85	25	30	1

### 10.3 Temperature / Humidity:

Temperature / Humidity shall be measured in accordance with EIA-364-31, Method IV. See Table 18 below:

**Table 12**  
**Temperature / Humidity**

Relative Humidity (±3 %)	Low Temperature (±2 °C)	High Temperature (±2 °C)	Cold Sub-cycle (±2 °C)	Cycle Time (hours)	Number Of Cycles
93	25	65	-10	24	21

### 10.4 Ingress protection:

Tested per IEC/EN 60529, section 14.2.8. Depth up to 1 meter, duration 30 minutes (IP67 versions only).