
TE Connectivity Micro-MaTch Miniature Connector Assembly

1. SCOPE**1.1. Content**

This specification covers the general description and performance requirements of the TE Micro-MaTch Miniature Connector System, which includes a complete product-line of board-to-board and wire-to-board interconnections with staggered contact pattern and centerline distance of 1.27 mm [.050 in.] between contacts.

1.2. Qualification

When tests are performed on subject product, procedures specified in this Product Specification shall be used. All inspections shall be performed using applicable inspection plan and product drawing.

2. APPLICABLE DOCUMENTS.

The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, latest edition of the document applies. In the event of conflict between the requirements in this specification and the product drawing, the product drawing shall take precedence. In the event of conflict between requirements of this specification and referenced documents, this specification shall take precedence.

2.1. Qualification Reports

- [R041-1664](#) Test report Wire-To-Board connector (MOW with FOB)
- [R041-1665](#) Test report Paddle-Board connector
- [R041-1666](#) Test report Female On Board SMC connector
- [R041-1846](#) Test report Female On Board SMD connector
- [R041-1847](#) Test report Female In Board SMD connector
- [501-19005](#) Test report Crimp-On Snap-In (COSI) connector
- [501-19094](#) Test report lead-free wave soldering-heat (IDC-connection Paddle-Board)
- [501-19093](#) Test report lead-free wave soldering-heat (Wave-solder connectors)
- [501-19092](#) Test report lead-free reflow soldering-heat (SMD connectors)

2.2. Application Specifications

- [114-13318](#) Application Specification Micro-MaTch Miniature SMD Connectors
- [114-19016](#) Application Specification Micro-MaTch Miniature Connector System (MOW & PBC)
- [114-19027](#) Application Specification Micro-MaTch Female SMC Connector
- [114-19051](#) Application Specification Micro-MaTch Crimp-on Snap-in Male on Wire connector

2.3. DIN-specifications.

- DIN 17662 Wrought copper alloys (tin-bronze); chemical composition
- DIN 17670 Plate, sheet and strip of wrought copper and copper alloys: mechanical properties

2.4. IEC Specifications

- IEC 512 Connectors used for frequencies below 3 MHz (Mc/s)
- IEC 68 Basic environmental testing procedures for electric components and electronic equipment.

2.5. EIAJ Specification.

- RCX-0102/101,102: Test methods of soldering of Surface Mount Devices

3. PRODUCT DESCRIPTION

3.1. Design and Construction:

Products shall be of design, construction and physical dimensions as specified on the applicable product drawings.

All connector types of the Micro-MaTch Miniature connector System are available from 4 to 20 positions (only even numbers)

Centerline distance between contacts is 1.27 mm (.050 in.) or a multiple of this case of selectively loaded connectors, which are available for all versions.

3.2. Material and Finish:

Contacts: Phosphor Bronze according to DIN specifications, tin-plated over nickel underplate.

Housings: General: Polyester (PBT) 20% Glass filled
SMD-versions: P.A.4.6; 30% Glass filled
UL 94 V-0 rated
Color: Red

3.3. Connector types

The system consists of the following connector types:

A. Female-on-Board Connector

Top entry and side entry, consisting of a number of contact springs, press-fit in molded housings.

B. Female-on-Board Connector

Top entry/Surface Mount Compatible (SMC) consisting of a number of contact springs, press-fit in a molded housing. The connector is inserted into the pcb after the soldering operation and contacts the pcb surface by means of an additional spring member with an extremely sharp tip. For firm retention of the connector in the pcb each individual contact features a compliant pin section fitting in the corresponding hole.

C. Male-on-Board Connector

Male-on-board connector assembly, consisting of a number of contact pins, press-fit in a molded housing.

D. Male-on-Wire Connector

Male-on-wire connector assembly, consisting of a number of contact with slotted beam section, press-fit in a molded housing. The connector features a cable cover, pre-loaded on the housing.

E. Paddle Board Connector

Paddle board connector assembly, consisting of a number of contact with slotted beam section, press-fit in a molded housing. The connector features a cable cover, pre-loaded on the housing.

After the application of the cable, the connector assembly is soldered in the pcb thus providing a reliable and cost-effective permanent connection of ribbon cable to the pcb.

F. Female-on-Board SMD Connector.

Top entry, consisting of a number of contact springs press-fit in molded housings.

G. Female-in Board SMD Connector.

Bottom entry, consisting of a number of contact springs, press-fit in molded housings. The housing is partly falling in the PCB, causing a low built-in height.

H. Male on Wire COSI (Crimp On Snap In) Connector

The COSI connector is a male-on-wire connector designed for discrete wires.

Contacts can be terminated to the wire with a semi-automatic stripper crimper or with a dedicated hand tool, and manually inserted into the housing.

3.4. Application

With the connector versions mentioned in Section 3.3, the following interconnections can be realized.

- Wire-to-board connection with the cable parallel to the pcb
- Wire-to-board connection with the cable perpendicular to the pcb
- Board-to-board connection with two parallel boards (sandwich configuration)
- Board-to-board connection with the perpendicular pcbs (mother/daughter board configuration)
- Wire-to-board and/or Board-to-board connections with the connector system positioned on the solder side of the pcb -for instance Surface Mount Application
- Permanent connections of ribbon cable to pcb, using the Paddle board connector version
- Wire-to board connection with discrete wires



NOTE

The Micro-MaTch male-on-wire connector is specifically designed to be disengaged from its counterpart by pulling the cable in the appropriate direction.

3.5. Ribbon Cable and Wire Specification

A. Ribbon cable specification

The TE Micro-MaTch connectors with IDC (insulation displacement connector) are designed for the application of ribbon cable with the following dimensions and properties:

- Cable style: AWG 28, UL style 2651
- Conductor spacing: 1.27 mm (.050 in.)
- Conductor diameter: solid 0.30 mm; stranded 7*0,12-0,13 mm
- Insulation type: semi rigid PVC
- Insulation diameter: 0.9 mm $\pm$ 0.1 mm

B. COSI- Cable Specification

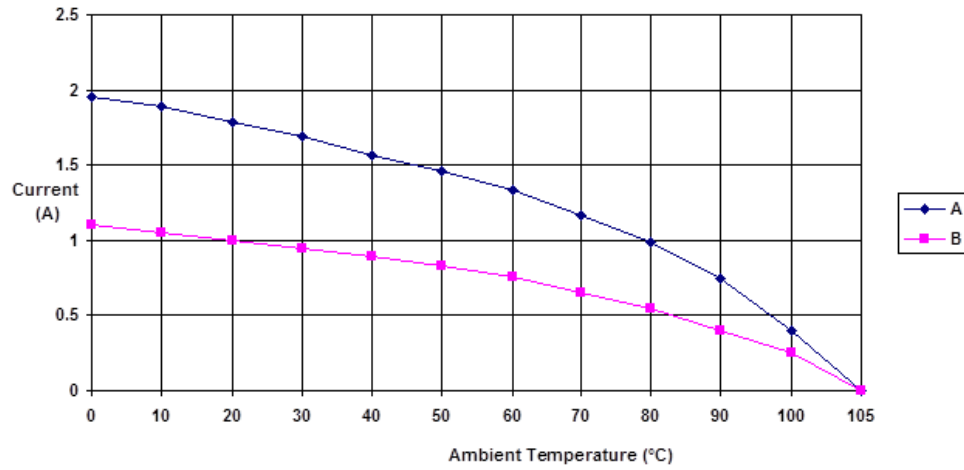
The Micro-MaTch COSI connector is designed for untwisted discrete wires in the range from 20-28 AWG.

- Maximum insulation diameter for wires between 20-24 AWG is $\varnothing$ 0.76 mm
- Maximum insulation diameter for wires between 24-28 AWG is $\varnothing$ 1.27 mm

3.6. Performance and Test description

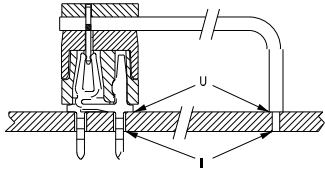
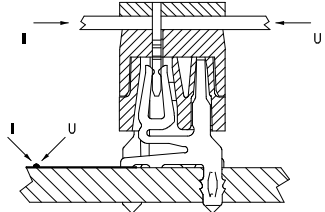
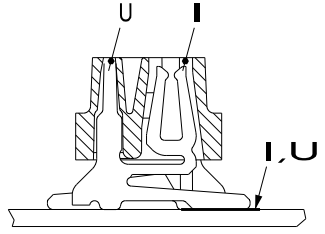
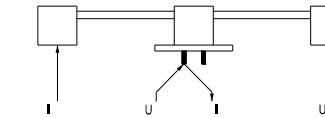
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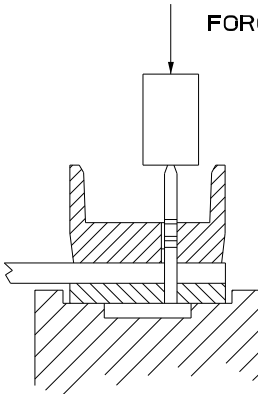
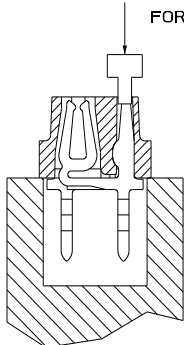
- Temperature: Continuous operation throughout an ambient temperature range of -40°C to 105°C. Followed test procedure: IEC 60512-5
- Current rating: For current carrying capacity see derating curves
- Voltage rating: 100 Volts DC or alternating current peak
- Test conditions: Unless specifically stated, tests and examinations required by this specification shall be executed under any combination of conditions as specified in IEC 68-1, clause 5.3



A valid for	SMC Female Top Entry with Male On Wire	B valid for:	Female Top Entry with Male On Board
	Female Side Entry with Male On Wire		Female Top Entry with Male On Wire
	SMD Female Top Entry with Male On Wire		Female Side Entry with Male On Board
	Paddle Board		SMD Inboard with Male On Wire
	Crimp On Snap In		

VISUAL			
	Test description	Performance Requirements or Severity	Procedures
3.6.1	Examination of product	Meets requirements of product drawing and applicable application specification.	Visual, dimensional and functional per applicable inspection plan. In acc. with IEC 60512-1-1, test 1a. Magnification 10 x.
3.6.2	Solderability for through hole versions	Solderbath temp 235°C. Ageing 3, 16 hrs. at 155°C (Simulates 2 year solderability.) Min 95% wetting.	In acc. with IEC 60512-12-1
3.6.3	Resistance to soldering heat for through hole versions	Solderbath temp. 265°C Dip duration: 10 seconds Mount connectors in a pcb as intended to be applied. Requirement: No detrimental effects.	In acc. with: TE Test Spec 109-202 Method § 4.3, condition B. or IEC 60068-2-20, Test Tb, Method 1a
3.6.4	Solderability for SMD	Solderbath temp 235°C. Ageing 3, 16 hrs at 155°C. (Simulates 2 year solderability.) Min 95% wetting. Appearance of the specimen shall be inspected after the test with 10x magnification of any damage such as pinholes, void or rough surface.	In acc. with IEC 60512-12-1
3.6.5	Resistance to Soldering Heat for SMD	3 cycles of 260°C peak reflow soldering simulation curve. Test severity shall not include moisture soak. Requirement: No detrimental effects.	In acc. with: TE Test Spec 109-201 Reflow curve § 3.3, Test method B, condition B

ELECTRICAL			
Para.	Test description	Performance Requirements or Severity	Procedures
3.6.6	Insulation resistance	Test voltage 100V DC- or AC-peak. Duration: 1 minute. Requirement: 1000 mΩ min.	In acc. with IEC 60512-3-1, Test 3a.
3.6.7	Voltage proof	Test voltage: 500 VAC. Duration: 1 minute Requirement: No break-down or flash-over	In acc. with IEC 60512-4-1, Test 4a.
3.6.8	Termination resistance  Measuring points Termination resistance	Maximum open voltage 20 Millivolts. Maximum current 100 Milliampers. Termination resistance consists of bulk cable + bulk connectors and contact resistance. Requirement: 10 Milliohms max. (excluding bulk cable)	In acc. with IEC 60512-2-1, Test 2a. Under dry circuit conditions. All contacts measured.
3.6.9	Termination resistance SMC types 	Max. open voltage 20 mV Max. current 100 mA Termination resistance consists of IDC slot resistance + contact resistance + bulk connectors + resistance contact member pcb + pcb path. Requirement: 10 mΩ max. (exclude bulk resistance)	In acc. with IEC 60512-2-1, Test 2a Under dry circuit conditions All contacts measured.
3.6.10	Termination resistance SMD types 	Max. open voltage 20 mV Max. current 100 mA Termination resistance consists of bulk resistance of contact + solder connection. Requirement: 10 mΩ max.	In acc. with IEC 60512-2-1, Test 2a. Under dry circuit conditions All contacts measured.
3.6.11	Termination resistance paddle board. 	Max. open voltage 20 mV Max. current 100 mA Termination resistance consists of IDC slot resistance + contact bulk resistance Requirement: 10 mΩ max.	In acc. with IEC 60512-2-1, Test 2a. Under dry circuit conditions All contacts measured.

MECHANICAL			
	Test description	Performance Requirements or Severity	Procedures
3.6.12	Contact retention in housing.	Requirements: 10 N min. per contact. No dislodge from housing.  Contact retention in housing male on wire connector	In acc. with IEC 60512-15-2, Test 15b. (COSI: IEC 60512-15-1, Test 15a).  Contact retention in housing female connector
3.6.13	Mechanical operation	Number of operations: 20 Frequency: 10 times/min. Minimum time between 2 operations: 1 sec.	In acc. with IEC 60512-9-1 Test 9a.
3.6.14	Axial strength of wire termination	min. 10N/contact rate 25 mm/min	In acc. with IEC 60512-16-4 Test 16d.
3.6.15	Tensile strength of cable termination.	min. force 10N/contact	soldered connector/ cable assembly is loaded with force, perpendicular to board surface
3.6.16	Engaging and separating force	Engaging max 5N/contact Separating 1 N/contact for standard Micro-MaTch. Separating force for Micro-MaTch COSI 0.7N/contact	In acc. with IEC 60512-13-1, Test 13a, IEC 60512-13-2, Test 13b (COSI).
3.6.17	Vibration	10-55 Hz sweep rate: 1 oct./min. /0.75 mm 10 cycles (45 minutes) in each direction. Requirements: No physical damage No discontinuity >1 μ sec.	In acc. with IEC 60512-6-4, Test 6d. In acc. with IEC 68-2-6 Test Fc.procedure 8.2.1
3.6.18	Push-in push out forces in a PCB	Push out force 13 N min per contact	At push in forces connectors must be supported by a part of the application tooling. The push out force to be determined by pushing onto the posts Speed 5 mm/minute.
3.6.19	Connector insertion force in PCB (only Paddle board)	Max 5N per contact	Terminated paddleboard connector is inserted into pcb with appropriate hole pattern
3.6.20	Connector extraction force out of PCB (only paddleboard)	Min force 0.5 N per contact (depends on hole size and board material)	Terminated paddleboard connector is extracted from pcb.

ENVIRONMENTAL			
Para.	Test description	Performance Requirements or Severity	Procedures
3.6.21	Damp heat cyclic	25/ 55°C 12/12 hours. Un-mated total 6 cycles.	In acc. with IEC 60512-11-12, Test 11m.
3.6.22	Dry heat under cyclic current loading	Temp. 70°C, test current 125 % of rated current (par 3.6.) 500 cycles. 45 min ON/15 min OFF.	In acc. with IEC 60512-9-5, Test 9e.
3.6.23	Dry heat test	Temperature 105°C Duration: 16 hours.	In acc. with IEC 60512-11-9, Test 11i. (COSI:IEC 68-2-2 Test Ba)
3.6.24	Cold test	Temperature: - 40 ° Duration 2 hrs., unmated	In acc. with IEC 60512-11- 10, Test 11j.
3.6.25	Rapid change of temperature	-40/+105°C 15 min/15 min, 10 cycles mated.	In acc. with IEC 60512-11-4, Test 11d.

3.7. Test sequence

A. Female Top/Side Entry in combination with Male on Wire/Male On Board connector.

Tests	Measurements	Paragraph
<u>Test group 1</u>		
1. Visual examination		3.6.1
2.	Termination resistance	3.6.8
3. Climatic sequence		
a) Dry heat		3.6.23
b) Damp heat cyclic, first cycle		3.6.21
c) Cold		3.6.24
d) Damp Heat cyclic, remaining 5 cycles		3.6.21
4.	Termination resistance	3.6.8
5. Visual examination		3.6.1
<u>Test group 2</u>		
1. Visual examination		3.6.1
2. Engaging force		3.6.16
3.	Termination resistance	3.6.8
4. Separating force		3.6.16
5. Mechanical operation and engaging force last cycle		3.6.13
6.		3.6.16
7.	Termination resistance	3.6.8
8. Damp heat cyclic, 6 cycles		3.6.21
9.	Termination resistance	3.6.8
10. Separating force		3.6.16
11. Visual examination		3.6.1
<u>Test group 3:</u>		
1. Visual examination		3.6.1
2.	Termination resistance	3.6.8
3. Rapid change of temperature		3.6.25
4.	Termination resistance	3.6.8
5. Vibration		3.6.17
6.	Termination resistance	3.6.8
7. Visual examination		3.6.1
<u>Test group 4:</u>		
1. Visual examination		3.6.1
2. Solderability		3.6.2
3. Visual examination		3.6.1
<u>Test group 5:</u>		
1. Visual examination		3.6.1
2. Resistance to soldering heat		3.6.3
3. Visual examination		3.6.1
<u>Test group 6:</u>		
1. Visual examination		3.6.1
2. Axial strength of wire termination (half the lot)	Termination strength in Newtons	3.6.14
3. Rapid change of temperature		3.6.25
4. Axial strength of wire termination (rest of the lot)	Termination strength in Newtons	3.6.14
<u>Test group 7:</u>		
1. Visual examination		3.6.1
2. Contact retention in housing	Push-out force in Newtons	3.6.12

Tests	Measurements	Paragraph
3. Visual examination		3.6.1
<u>Test group 8:</u>		
1. Visual examination		3.6.1
2. Dry heat under cyclic current loading	Termination resistance	3.6.8
3. Dry heat under cyclic current loading		3.6.22
4. Visual examination	Termination resistance	3.6.8
5. Visual examination		3.6.1
<u>Test group 9:</u>		
1. Visual examination		3.6.1
2. Pre-conditioning (24 hrs. at lab. conditions)		
3. Voltage proof	Insulation resistance	3.6.6
4. Climatic sequence		3.6.7
5. Climatic sequence		
a) Dry heat		3.6.23
b) Damp heat cyclic, first cycle		3.6.21
c) Cold		3.6.24
d) Damp Heat cyclic, remaining 5 cycles		3.6.21
	Insulation resistance	3.6.6
6. Voltage proof		3.6.7
7. Rapid change of temperature		3.6.25
8. Voltage proof	Insulation resistance	3.6.6
9. Visual examination		3.6.7
10. Voltage proof		3.6.1
11. Visual examination		

B. Additional tests for the female top entry SMC with Male On Wire/Board connector

Tests	Measurements	Paragraph
<u>Test group 1</u>		
1. Visual examination		3.6.1
2.	Termination resistance	3.6.9
3. Climatic sequence		
a) Dry heat		3.6.23
b) Damp heat cyclic, first cycle		3.6.21
c) Cold		3.6.24
d) Damp Heat cyclic, remaining 5 cycles		3.6.21
4.	Termination resistance	3.6.9
5. Visual examination		3.6.1
<u>Test group 2</u>		
1. Visual examination		3.6.1
2.	Termination resistance	3.6.9
3. Mechanical operation		3.6.13
4.	Termination resistance	3.6.9
5. Damp heat cyclic, 6 cycles		3.6.21
6.	Termination resistance	3.6.9
7. Visual examination		3.6.1
<u>Test group 3:</u>		
1. Visual examination		3.6.1
2.	Termination resistance	3.6.9
3. Rapid change of temperature		3.6.25
4.	Termination resistance	3.6.9
5. Visual examination		3.6.1
<u>Test group 4:</u>		
1. Visual examination		3.6.1
2. Push-in and push out forces in a PCB		3.6.18
3. Visual examination		3.6.1
<u>Test group 5:</u>		
1. Visual examination		3.6.1
2.	Termination resistance	3.6.9
3. Dry heat under cyclic current loading		3.6.22
4.	Termination resistance	3.6.9
5. Visual examination		3.6.1
<u>Test group 6:</u>		
1. Visual examination		3.6.1
2. Contact retention in housing	Push out forces in Newtons	3.6.12
3. Visual examination		3.6.1

C. Additional tests for Paddle Board connector

Tests	Measurements	Paragraph
<u>Test group 1</u>		
1. Visual examination	Termination resistance	3.6.1
2. Climatic sequence		3.6.11
a) Dry heat		3.6.23
b) Damp heat cyclic, first cycle		3.6.21
c) Cold		3.6.24
d) Damp Heat cyclic, remaining 5 cycles		3.6.21
	Termination resistance	3.6.11
3. Visual examination		3.6.1
<u>Test group 2:</u>		
1. Visual examination	Termination resistance	3.6.1
2.		3.6.11
3. Rapid change of temperature		3.6.25
4.	Termination resistance	3.6.11
5. Visual examination		3.6.1
<u>Test group 3:</u>		
1. Visual examination		3.6.1
2. Solderability		3.6.2
3. Visual examination		3.6.1
<u>Test group 4:</u>		
1. Visual examination	Termination resistance	3.6.1
2.		3.6.11
3. Resistance to soldering heat		3.6.3
4.	Termination resistance	3.6.11
5. Visual examination		3.6.1
<u>Test group 5:</u>		
1. Visual examination	Termination strength in Newtons	3.6.1
2. Axial tensile strength of wire termination		3.6.15
3. Visual examination		3.6.1
<u>Test group 6:</u>		
1. Visual examination	Push-in force in Newtons	3.6.1
2. Connector insertion force		3.6.19
3. Connector extraction force	Push-out forces in Newtons	3.6.20
4. Visual examination		3.6.1
<u>Test group 7:</u>		
1. Visual examination	Termination resistance	3.6.1
2.		3.6.11
3. Dry heat under cyclic current loading		3.6.22
4.	Termination resistance	3.6.11
5. Visual examination		3.6.1

D. Additional tests for Female SMD (Top Entry and in-board) with Male on Wire/Board.

Tests	Measurements	Paragraph
<u>Test group 1</u>		
1. Visual examination		3.6.1
2. Pre-conditioning (24 hrs. at lab. conditions)		
3.	Termination resistance	3.6.10
4.	Insulation resistance	3.6.6
5. Voltage proof		3.6.7
6. Climatic sequence		
a) Dry heat		3.6.23
b) Damp heat cyclic, first cycle		3.6.21
c) Cold		3.6.24
d) Damp Heat cyclic, remaining 5 cycles		3.6.21
7.	Termination resistance	3.6.10
8.	Insulation resistance	3.6.6
9. Voltage proof		3.6.7
10. Rapid change of temperature		3.6.25
11.	Termination resistance	3.6.10
12.	Insulation resistance	3.6.6
13. Voltage proof		3.6.7
14. Visual examination		3.6.1
<u>Test group 2: (in-board only)</u>		
1. Visual examination		3.6.1
2.	Termination resistance	3.6.10
3. Mechanical operation		3.6.13
4.	Termination resistance	3.6.10
5. Damp heat cyclic, 6 cycles		3.6.21
6.	Termination resistance	3.6.10
7. Visual examination		3.6.1
<u>Test group 3:</u>		
1. Visual examination		3.6.1
2.	Termination resistance	3.6.10
3. Rapid change of temperature		3.6.25
4.	Termination resistance	3.6.10
5. Vibration		3.6.17
6.	Termination resistance	3.6.10
7. Visual examination		3.6.1
<u>Test group 4:</u>		
1. Visual examination		3.6.1
2. Contact retention in housing	Push out force in Newtons	3.6.12
3. Visual examination		3.6.1
<u>Test group 5:</u>		
1. Visual examination		3.6.1
2. Solderability		3.6.4
3. Visual examination		3.6.1
<u>Test group 6:</u>		
1. Visual examination		3.6.1
2. Resistance to soldering heat		3.6.5
3. Visual examination		3.6.1

E. Additional tests for COSI Male on Wire with Female top entry.

Tests	Measurements	Paragraph
<u>Test group 1</u>		
1. Visual examination		3.6.1
2.	Termination resistance	3.6.8
3. Climatic sequence		
a) Dry heat		3.6.23
b) Damp heat cyclic, first cycle		3.6.21
c) Cold		3.6.24
d) Damp Heat cyclic, remaining 5 cycles		3.6.21
4.	Termination resistance	3.6.8
5. Visual examination		3.6.1
<u>Test group 2</u>		
1. Visual examination		3.6.1
2. Engaging/separating force		3.6.16
3.	Termination resistance	3.6.8
4. Mechanical operation		3.6.13
5. Engaging/separating force		3.6.16
6.	Termination resistance	3.6.8
7. Damp heat cyclic		3.6.21
8. Engaging/separating force		3.6.16
9.	Termination resistance	3.6.8
10. Visual examination		3.6.1
<u>Test group 3:</u>		
1. Visual examination		3.6.1
2.	Termination resistance	3.6.8
3. Rapid change of temperature		3.6.25
4.	Termination resistance	3.6.8
5. Vibration		3.6.17
6.	Termination resistance	3.6.8
Visual examination		3.6.1
<u>Test group 4:</u>		
1. Visual examination		3.6.1
2. Contact retention in housing		3.6.12
3. Visual examination		3.6.1
<u>Test group 5:</u>		
1. Visual examination		3.6.1
2. Current load cyclic		3.6.22
3. Visual examination		3.6.1
<u>Test group 6:</u>		
1. Visual examination		3.6.1
2.	Insulation resistance	3.6.6
3. Voltage proof		3.6.7
4. Climatic sequence		
a) Dry heat		3.6.23
b) Damp heat cyclic, first cycle		3.6.21
c) Cold		3.6.24
d) Damp Heat cyclic, remaining 5 cycles		3.6.21
5.	Insulation resistance	3.6.6
6. Voltage proof		3.6.7
7. Visual examination		3.6.1

4. QUALITY ASSURANCE PROVISIONS (QUALIFICATION TESTING)

4.1. Sample selection:

Samples shall be released in accordance with applicable instruction sheets. They shall be selected at random from production. At least 5 connectors of the 6 positions or at least 30 contacts shall be used for each test group.

4.2. Test sequence

Qualification inspection shall be verified by testing samples as specified in spec. 108-19052 Paragraph 3.7.

4.3. Requalification testing

If changes significantly affecting form, fit or function are made to the product or the manufacturing process, product assurance shall co-ordinate requalification testing, consisting of all or part of the original testing sequence as determined by development/product, quality and reliability engineering.

4.4. Acceptance.

Acceptance is based on verification that the product meets the requirement of Paragraph 3.6. Failures attributed to equipment, test set-up or operator deficiencies shall not disqualify the product. When product failure occurs, corrective action shall be taken and samples resubmitted to qualification. Testing to confirm corrective action is required before submittal.

4.5. Quality Conformance Inspection

The applicable TE quality inspection plan will specify the samples acceptable quality level to be used. Dimensional and functional requirements shall be in accordance with applicable product drawing and this specification.