040 Series Multi-Lock Connector wire to wire type

1.Scope:

1.1 Contents

This specification covers the requirements for product performance, test methods and quality assurance provisions of .040 Series Multilock Connector, contacts and housings of the part numbers specified in Fig.1, manufactured by Tyco Electronics AMP K.K.
The applicable product descriptions and part numbers are as shown in Fig.1.

Product Part No.	Descriptions
173681	040 Receptacle Contact (AVS 0.3~0.5mm^2 wire applicable)
175180	040 Receptacle Contact (CAVUS 0.3~0.5mm^2 wire applicable)
173682	040 Tab Contact (AVS 0.3~0.5mm^2 wire applicable)
175206	040 Tab Contact (CAVS/CAVUS 0.3~0.5mm^2 wire applicable)
174056	2 Pos. Plug Housing
174057	2 Pos. Cap Housing
174966	4 Pos. Plug Housing
174967	4 pos. Cap Housing
174045	12 Pos. Plug Housing
174058	12 Pos. Cap Housing
174047	20 Pos. Plug Housing
175652	20 Pos. Cap Housing
176449	2 Pos. Cap Housing (Bobbin Connector)
1612405	2 Pos. Cap Housing (Bobbin Connector)

Fig.1

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2.Applicable Documents:

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

2.1 AMP Specifications:

114-5094, -5162	Application Specification, 040 Series Receptacle Contact
114-5108, -5155	Application Specification, 040 Series Tab Contact
501-5292	Qualification Test Report

2.2 Commercial Standards and Specifications:

A. JASO D 605	Multi-Connectors for Automotives
B. JASO D 7101	Test Method or Molded Plastics Parts for Automobile
C. JIS C 3406	Low-Voltage Cables for Automobile
D. JIS D 0203	Method of Moisture, Rain and Spray Test for Automobile Parts
E. JIS D 0204	Method of High and Low Temperature Test for Automobile Parts
F. JIS D 1601	Vibration Testing Method for Automobile Parts
H. JIS K 2202	Motor Gasoline
K. JIS R 5210	Portland Cement

3.Requirements:

3.1 Design and Construction:

Product shall be of the design, construction and physical dimensions specified in the applicable product drawing.

3.2 Materials :

A. Contact :

Receptacle contact: Pre-tinned phosphor bronze strip

Tab contact: Pre-tinned brass strip

B. Housing:

Polybuthylene-terephthalate resin (PBT)

3.3 Temperature Rating (Mated condition)

-30℃ to + 105℃ (Including temperature rising in addition to the ambient temperature)

3.4 Performance and Test Descriptions:

The product shall be designed to meet the electrical, mechanical and environmental performance requirements specified in Figure 2. All tests shall be performed in the room temperature, unless otherwise specified.

3.5 Test Requirements and Procedures Summary:

Para.	Test Items	Requirements	Procedures
3.5.1	Examination of Product	Product shall be conforming to the requirements of applicable product drawing and Application Specification 114-5094, -5162, -5108, -5155	Visually, dimensionally and functionally inspected per applicable inspection plan.
		Electrical Requirements	
3.5.2	Termination Resistance (Low Level)	10mΩ Max. (Initial) 20mΩ Max. (Final)	Subject mated contacts assembled in housing to closed circuit current of 10mA Max.at open circuit voltage of 20mV Max. Fig. 3
3.5.3	Dielectric Strength	Connector must withstand test potential of 1kVAC for 1 minute. No abnormalities such as corona and flashover shall be evident.	Measure by applying test potential of 1000 V, AC (rms) for 1 minute between the adjacent contacts and between the contacts and ground in the mated connectors. Fig. 4.
3.5.4	Insulation Resistance	100MΩ Min. (Initial) 100MΩ Min. (Final)	Measure by applying test potential between the adjacent contacts, and between the contacts and ground in the mated connector. Test Potential : 500 VDC Fig. 4
3.5.5	Current Leakage	1mA Max.	After exposing mated connector in test chamber(60±5°C,90-95%R.H.)for 1 hour, measure by applying DC 13 V to the circuit. See Fig. 5.
3.5.6	Temperature Rising vs. Current	30°CMax. under loaded specified current.	Measure temperature rising by energized current of the mated connectors. (Probe at the wire crimp of contact.) Obtain temperature rising by deducting room temperature. After having a half number of the contacts series-wired, apply current of 5A (0.5 mm^2 wire).
3.5.7	Current Cycling	Termination resistance (low level) 20mΩ max. (Final)	After having a half number of contacts series-wired, apply the following test current for 45 minutes and reenergize for 15 minutes, in ambient temperature of 60°C, making this a cycle, repeat for 1,000 cycles. 5 A (0.5mm2 wire)

Fig. 2 (To be continued)

Mechanical Requirements				
Para.	Test Items	Requirements		Procedures
3.5.8	Vibration Sinusoidal Low Frequency	No electrical discontinuity greater than 10 microsecond(s) shall occur. Termination Resistance(Low Level) 20mΩ Max. (Final)		Subject mated connectors to 10-50 Hz traversed in 1 minutes with 66.7m/s^2 (6.8G) accelerated velocity;3 mutually perpendicular planes. For the durations in the directions as shown below. Up-Down :4hours Front-Rear :2hous Right-Left :2hours Fig. 6
3.5.9	Connector Mating Force	No. of Pos.	Mating Force (max) N	Using autograph, measure the force required to mate connector using locking latch by operating at 20mm a minute.
		2	29.4	
		4	39.2	
		12	68.6	
		20	98	
3.5.10	Connector Unmating Force	No. of Pos.	Unmating Force (max) N	Using autograph measure the force required to unmated connector without locking latch set in effect, by operating at 20mm a minute.
		2	29.4	
		4	39.2	
		12	68.6	
		20	98	
3.5.11	Contact Retention Force	49 N min.		Apply axial load to contact by operating at a rate of 100mm a minute.
3.5.12	Contact Engaging Force	0.98~5.88N		Measure force required to mate contacts by operating 100mm a minute.
3.5.13	Contact Separating Force	0.98~5.88 N		Measure force required to unmated contacts by operating 100mm a minute.

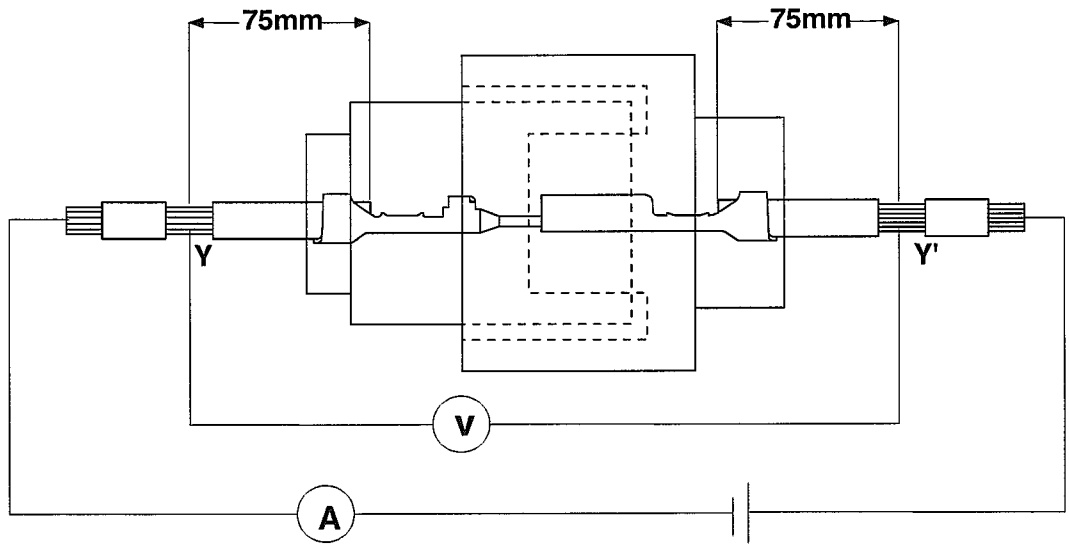
Fig. 2 (To be continued)

Para.	Test Items	Requirements			Procedures
3.5.14	Crimp Tensile Strength	Wire Size		Crimp Tensile(min.)	Apply an axial pull-off load to crimped wire of contact secured on the tester, at a rate of 100mm a minute.
		mm^2	(AWG)	N	
		0.3	#22	58.8	
		0.5	#20	88.2	
3.5.15	Housing Lock Strength	98N min.			Determine strength of housing locking mechanism.
3.5.16	Durability (Repeated Mate/Unmating)	Termination Resistance (Low Level)(Final)20mΩ Max.			Repeat mate and unmated of connector for fifty cycles by hands.
3.5.17	Resistance to "Kojiri"	Termination Resistance (Low Level) (Final) 20mΩ max.			Secure one of the connectors and apply reciprocating force to the upper connector in the direction amis to working axis, at every 1 mm graduation from the fully mated depth of the connector until they become unmated. The strokes shall be applied in back/forth direction with approx 78.4N force and after repeating for the two steps of the depth shown in Fig. 7, extract the connectors. Making this one cycle, repeat for 10 cycles. Fig.7
		Environmental Requirements			
3.5.18	Humidity, Steady State	Insulation Resistance (Final) 100 MΩ min. Current Leakage (Final) 1 mA max.Termination resistance (low level) (Final) 20mΩ max.			Subject mated connectors to steady state humidity at 40℃ and 90-95% R.H. for 96 hours. Recondition at room temperature before measurement.
3.5.19	Temperature Life	Termination resistance (low level)(Final) 20mΩ max.			Subject mated connectors to exposure of 100℃ for 24 hours.
3.5.20	Resistance to Cold	Termination resistance (low level) (Final) 20mΩ max.			Subject mated connectors to exposure of -40℃ for 24 hours. Recondition at room temperature before measurement.
3.5.21	Dust Bombardment	Termination resistance (low level) (Final) 20mΩ max.			Subject mated connectors to a spray of Portland cement (JIS R 5210) for 60 minutes, propelled by compressed air at a rate of 1.5kg in 10 seconds in every 15 minutes, in a closed chamber of 1,000mm cube with the sample connector hung 150mm away the chamber wall. And then, mate and unmated for three times.

Fig. 2 (To be continued)

<table>
<tr><th>Para.</th><th>Test Items</th><th>Requirements</th><th>Procedures</th></tr>
<tr><td>3.5.22</td><td>Resistance to Oil and liquid</td><td>Termination resistance (low level) 20mΩ max.
(Final)
No abnormalities in the appearance.</td><td>After immersing the connector in mated condition in sequences as listed below and dry in the room temperature.
<table>
<tr><th rowspan="2">Kinds</th><th rowspan="2">Liquid Temperature</th><th rowspan="2">Immersion Duration</th><th colspan="2">Immersion Sequence</th></tr>
<tr><th>Group A</th><th>Group B</th></tr>
<tr><td>Mixed Solution of Equal mixing Ration of Engine Oil & Kerosene.</td><td>50℃</td><td>2hrs.</td><td>1</td><td></td></tr>
<tr><td>Motor Gasoline</td><td>Room Temp.</td><td>10 mins</td><td></td><td>1</td></tr>
<tr><td>Brake Oil</td><td>Room Temp.</td><td>1hr.</td><td>3</td><td>3</td></tr>
<tr><td>Coolant Anti-freeze Liquid (50% aqueous solution)</td><td>Room Temp.</td><td>1hr.</td><td>5</td><td>5</td></tr>
<tr><td>Cooling Water Anti-freeze Liquid(50% aqueous solution)</td><td>Room Temp.</td><td>1hr.</td><td>7</td><td>7</td></tr>
<tr><td>Washer Fluid</td><td>Room Temp.</td><td>1hr.</td><td>9</td><td>9</td></tr>
<tr><td>Kerosene</td><td>Room Temp.</td><td>5 mins.</td><td>2.4.6.8</td><td>2.4.6.8</td></tr>
</table>
Note: Engine oil : SAE 10W
Kerosene : JIS K 2203-NO.2
Motor Gasoline : JIS K 2202
For other tests, use genuine car manufacture's liquid products.</td></tr>
<tr><td>3.5.23</td><td>Fuse Matching Ability</td><td>Fusion of the housing or ignition of the connector must not occur.</td><td>After having a half number of contacts series-wired, apply the test eurrent " α " for 24 hours, then apply current " β "for 1 hour.
<table>
<tr><th>Current α</th><th>Current β</th><th>Wire Size</th></tr>
<tr><td>11A</td><td>14A</td><td>0.5mm²</td></tr>
</table></td></tr>
</table>

Fig. 2 (End)



From the measured readings, deduct the resistance of the 150mm long wire used for termination. The stripped wire sections of Y and Y' shall be soldered for obtaining uniformity of current density at the probing points.

Fig. 3

Measurement of Termination Resistance

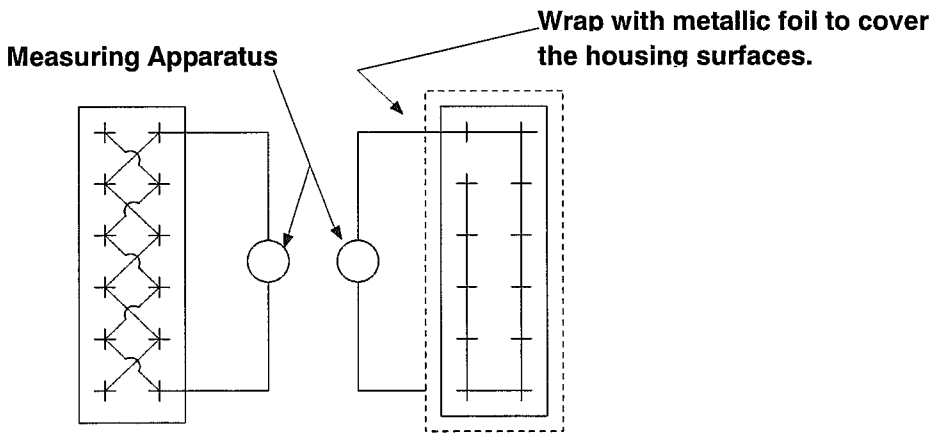

Measuring Apparatus
Wrap with metallic foil to cover the housing surfaces.
Between the Adjacent Contacts
Between the Contact and Housing.

Fig.4

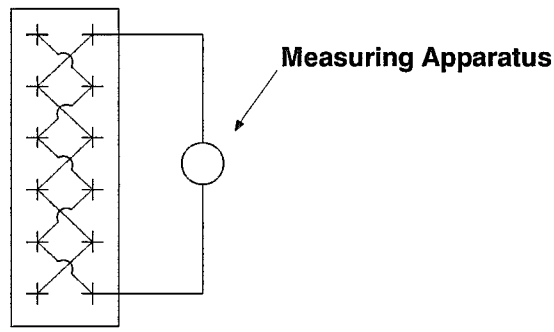

Measuring Apparatus
Between the Adjacent Contacts

Fig. 5

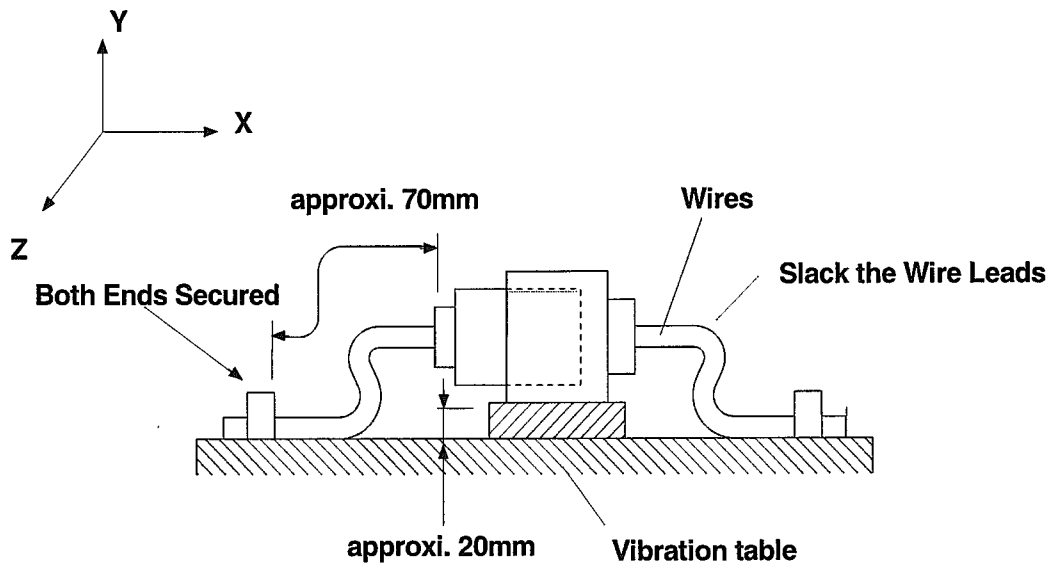

Y
X
Z
approxi. 70mm
Wires
Slack the Wire Leads
Both Ends Secured
approxi. 20mm
Vibration table

Fig. 6

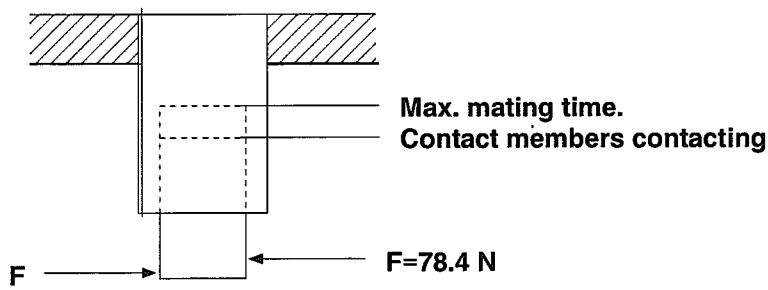

Max. mating time.
Contact members contacting
F
F=78.4 N

Fig. 7