

AMP SECURITY CLASSIFICATION
 Restricted to Mazda Co.
 NUMBER 108-5216-2

Product Specification

108-5216-2

.070 Multi-Lock I/O Connector (MLC)
for Wire-to-Board Termination

1. Scope:

This specification provides performance requirements and test methods for .070 Series AMP Multi-Lock I/O Connector (MLC) for wire-to-board termination, of the part numbers specified in Para.2.

2. Applicable Part Numbers and Descriptions:

The products of the following parts numbers shall be governed under this specification.


2.1 Receptacle Contact (hereafter called receptacle)

P/N: 175186 (for AVS 0.2 ~ 0.3 mm²) S type
 175187 (for AVS 0.5 ~ 1.25 mm²)..... M type

2.2 Housings:

Parts No. of Pos.	Parts Name	Plug Housing	Cap Housing		Remarks
			Horizontal Type	Vertical Type	
3		*174921	---	*174953	
6		*174923	---	*174954	
8		173850	173856	174955	
10		*174464	*174467		
12		173851	173858	174957	
14		173852	173860	---	
18		173853	173862	---	
20		174952	---	174960	
24		---	173864	---	Separable into 10- and 14-position connectors
30		---	173866 **174458	174961 ---	Separable into 12- and 18-position connectors
42			**174480		

Notes: One asterisk-marked items are of single row type.
 Two asterisk-marked items are of stand-off type.
 Non asterisk-marked items are of dual type.

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		CHK <i>M. Sakuma</i> 2/19 '90				LOC	NO
		APP <i>M. Ohtsuka</i> 2/19 '90		J	A	108-5216-2	0
0	Released RFA-1558	<i>JS M.O. 2/19/90</i>	SHEET		Product Specification		
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3. Material and Finish:

3.1 Contact:

Contact shall be made from pre-tin brass strip and phosphor bronze strip, or gold plated brass strip and phosphor bronze strip.

3.2 Housing:

Housing shall be made of polybutylene terephthalate (PBT) resin.

4. Test Conditions:

4.1 Temperature Rating:

Temperature rating shall be within the range of -30 and +105°C. This range includes ambient temperature and temperature rising as a result of loaded current affection.

4.2 Applicable Printed Circuit Board:

The thickness of the applicable printed circuit board shall be 1.6±0.15 mm, and the diameter of the hole is 1±0.1 mm.


4.3 Applicable Wires:

Part No.	Applicable Wires	Insulation Diameter
175186	0.2 ~ 0.3 mm ² (AWG#24 ~ #22) 1 wire	1.4 ~ 1.9 mm
175187	0.5 ~ 1.25 mm ² (AWG#20 ~ #16) 1 wire	2.0 ~ 2.6 mm

5. Performance Requirements and Test Methods:

5.1 Performance Requirements and Test Methods:

Test Item	Test Methods	Specified Requirements
1. Appearance	Inspect the sample visually and tactually.	Products shall be free from cracks, breakage, damages, rattling and loose of parts, rust, fusion and other defects that are detrimental to connector functions.

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Test Item	Test Methods	Specified Requirements
2. Contact or Connector Insertion Force	Insert the sample with the speed at a rate of 100 mm a minute.	Contact: 0.3 ~ 0.8 kg Connector: 3-position - 4.0 kg max. 6-position - 6.5 kg max. 8-position - 7.0 kg max. 10-position - 8.0 kg max. 12-position - 9.5 kg max. 14-position - 10.5 kg max. 18-position - 13.0 kg max. 20-position - 14.5 kg max. 24-position - Refer to 10- & 14-position. 30-position - Refer to 12- & 18-position.
3. Contact or Connector Extraction Force	Extract the sample with the speed at a rate of 100 mm a minute. Locking device is not set in effect.	Contact: 0.2 ~ 0.8 kg Connector: 3-position - 0.3 ~ 4 kg 6-position - 0.6 ~ 5 kg 8-position - 0.8 ~ 6 kg 10-position - 1 ~ 7 kg 12-position - 1.2 ~ 8 kg 14-position - 1.4 ~ 9 kg 18-position - 1.8 ~ 12 kg 20-position - 2 ~ 13 kg 24-position - Refer to 10- & 14-position. 30-position - Refer to 12- & 18-position.
4. Termination Resistance (Low Level)	Apply test current of 10 mA at open circuit voltage of 20 mV DC to the sample. (Fig.1)	Initial : 3 mΩ max. After durability and environmental conditioning: 10 mΩ max.

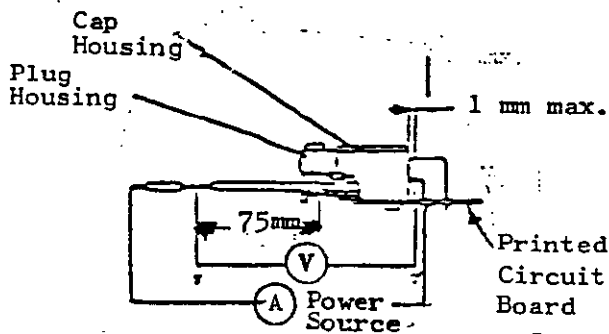
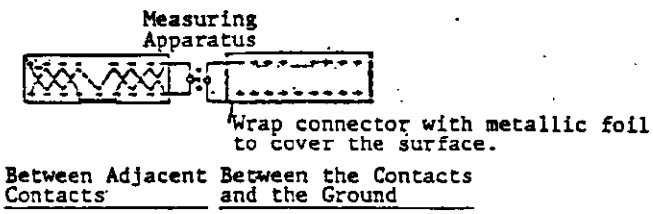
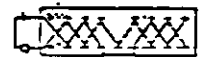



Fig. 1

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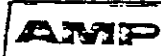
Test Item	Test Methods	Specified Requirements
5. Termination Resistance (Rated Current)	Apply test current of 1 A at open circuit voltage of 12_{-0}^{+2} V DC to the sample. (Fig.1)	Initial : 3 mV/A max. After environmental conditioning : 10 mV/A
6. Physical Touch/ Feeling at Insertion/ Extraction Handling	Inspect the sample manually.	No conflict or difficulties that are detrimental to insertion/extraction assembly operation, shall be observed.
7. Insulation Resistance	500 V DC (between the adjacent contacts and between the contacts and the ground) (Fig.2)	100 MΩ min.
 <p>Measuring Apparatus</p> <p>Wrap connector with metallic foil to cover the surface.</p> <p>Between Adjacent Contacts Between the Contacts and the Ground</p>		
Fig.2		
8. Dielectric Strength	1,800 V AC for one minute (between adjacent contacts and between the contacts and the ground) (Fig.2)	No abnormalities shall be evident.
9. Current Leakage	After exposing the sample in the test chamber (60°C, 90 ~ 95% R.H.) for 1 hour, take out from the chamber and apply test potential of 12 V DC. (Fig.3)	3 mA max.
		
Fig.3		

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Test Item	Test Methods	Specified Requirements																										
10. Current Cycling	Apply the test current of calculated intensity obtained from Table 1, to the 4 positions in the middle part of the testing sample, and to the remainder contact positions, apply a half intensity current of the specified value, for 45 minutes, and deenergize for 15 minutes. Making this a cycle, repeat for 200 cycles.	When tested environmental conditioning in accordance with the test sequence specified in Table 3, performance shall meet the requirements. Table 1 <table border="1"> <thead> <tr> <th>Wire Size</th> <th>Test Current</th> </tr> </thead> <tbody> <tr> <td>0.2 mm²</td> <td>6A DC</td> </tr> <tr> <td>0.3 mm²</td> <td>8A DC</td> </tr> <tr> <td>0.5 mm²</td> <td>11A DC</td> </tr> <tr> <td>0.85 mm²</td> <td>15A DC</td> </tr> <tr> <td>1.25 mm²</td> <td>19A DC</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>No. of Positions</th> <th>Coefficient of Current Loading</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1</td> </tr> <tr> <td>2 ~ 3</td> <td>0.75</td> </tr> <tr> <td>4 ~ 5</td> <td>0.6</td> </tr> <tr> <td>6 ~ 8</td> <td>0.55</td> </tr> <tr> <td>9 ~ 12</td> <td>0.5</td> </tr> <tr> <td>13 & over</td> <td>0.4</td> </tr> </tbody> </table> Note: The test current to be loaded for the test is obtained by calculation of the specified intensity designated for the wire size to be used, multiplied by the number of positions and coefficient of current loading, shown in the above tables.	Wire Size	Test Current	0.2 mm ²	6A DC	0.3 mm ²	8A DC	0.5 mm ²	11A DC	0.85 mm ²	15A DC	1.25 mm ²	19A DC	No. of Positions	Coefficient of Current Loading	1	1	2 ~ 3	0.75	4 ~ 5	0.6	6 ~ 8	0.55	9 ~ 12	0.5	13 & over	0.4
Wire Size	Test Current																											
0.2 mm ²	6A DC																											
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0.85 mm ²	15A DC																											
1.25 mm ²	19A DC																											
No. of Positions	Coefficient of Current Loading																											
1	1																											
2 ~ 3	0.75																											
4 ~ 5	0.6																											
6 ~ 8	0.55																											
9 ~ 12	0.5																											
13 & over	0.4																											
11 Temperature Rising	Apply the test current of calculated intensity obtained from Table 1. Measure the temperature rising in the middle surface of the housing.	60°C max. (the value after subtracting room temperature)																										

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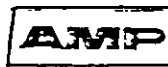
Test Item	Test Methods	Specified Requirements
12. Contact Retention Force	Pull off the wire with the speed at a rate of 100 mm a minute. (Cross-section area size of the applicable wire is 0.85mm ² min.)	Only main lance - 8 kg min. Total force (main lance + double lock) - 10 kg min.
13. Crimp Tensile Strength	Pull the wire with the speed at a rate of 100 mm a minute till the wire pull off from the wire crimp or break.	0.2 mm ² - 7 kg min. 0.3 mm ² - 8 kg min. 0.5 mm ² - 9 kg min. 0.85 mm ² - 13 kg min. 1.25 mm ² - 18 kg min. 2.0 mm ² - 27 kg min.
14. Housing Retention Force	Pull the counterpart connector with the speed at a rate of 100 mm a minute till the sample connectors separate with or without break-off of locking legs of housing.	10 kg min.
15. Contact Loading Force	Insert wire-crimped contact into housing cavity, and measure the force required to insert and lock the contact in position by travelling the head with the speed at a rate of 100 mm a minute approximately.	1.5 kg max.
16. Repeated Insertion/ Extraction	Repeat insertion and extraction with the speed at a rate of 100 mm a minute for 30 cycles.	When tested environmental conditioning in accordance with the test sequence specified in Table 3, performance shall meet the requirements.
17. "Kojiri" Resistivity	Manually repeat "kojiri" insertion and extraction for 30 cycles.	
18. Heat Resistivity	Expose the sample in the test chamber (120°C) for 120 hours.	

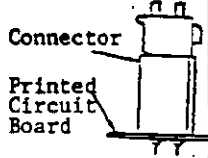
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Test Item	Test Methods	Specified Requirements
19. Cold Resistivity	Expose the sample in the test chamber (-50°C) for 120 hours.	When tested Environmental conditioning in accordance with the test sequence specified in Table 3, performance shall meet the requirements
20. Thermal Shock	After exposing the sample in the test chamber (80°C) for 2 hours, move into -30°C test chamber within 5 minutes, and expose for 2 hours. Making this a cycle, repeat for 5 cycles.	
21. Humidity (Steady State)	Expose the sample in the test chamber (60°C, 90 ~ 95% RH) for 48 hours.	
22. Salt Spray	Expose the sample under 5% salt spray for 24 hours, and after resting for 1 hour, expose under the same condition for another 24 hours. After rinsing with tap water, dry in the room temperature for 1 hour.	
23. Oil Resistivity	Immerse the sample in the following test oil that is controlled at 50°C specified in Table 2.	

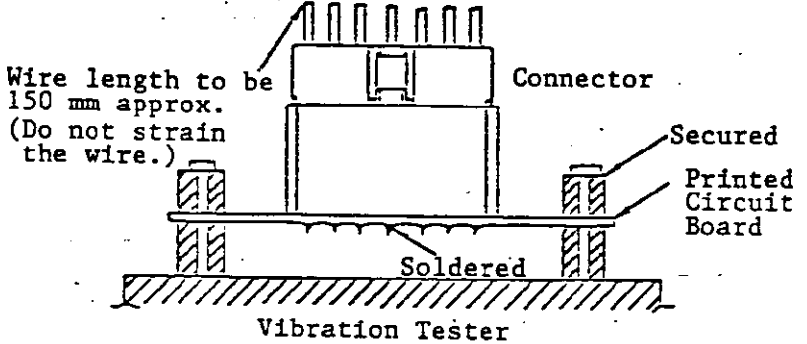
Type of Oil	Time of Immersion	Sequence of Immersion
Torque Converter Oil	1 hr.	1
Transmission Oil	1 hr.	3
Engine Oil	1 hr.	5
Clutch Oil	1 hr.	7
Brake Oil	1 hr.	9
Kerosene	5 min.	2,4,6,8,10

Table 2

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Test Item	Test Methods	Specified Requirements
<p>24. Dust and Sand Bombardment</p>  <p>Fig. 4</p>	<p>Suspend the sample with wire entry of cap housing facing upward as shown in Fig. 4 in the closed test chamber whose dimensions are between 900 mm and 1,200 mm in width, height and depth, where the sample is subject to ejection of Portland powdered cement by the aid of compressed air at a rate of 1.5 kg within 10 seconds once every 15 minutes. The ejected cement is dispersed with the use of powered driven fan. The test duration should be 1 hour.</p>	<p>When tested environmental conditioning in accordance with the test sequence specified in Table 3, performance shall meet the requirements.</p>
<p>25. Icing</p>	<p>After immersing the sample in the boiling hot water for 1 hour, place in the test chamber (-30°C) and expose until the drenched water turns to ice. After the sample become frozen, take out of the test chamber and recondition in the room temperature to melt the ice completely.</p>	
<p>26. Sulfurous Acid Gas Resistivity</p>	<p>Expose the sample under the sulfurous acid gas atmosphere of 10 ppm in room temperature with relative humidity of 90% minimum for 24 hours.</p>	

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Test Item	Test Methods	Specified Requirements
27 Vibration, High Frequency	After having all the contacts series-wired, apply the test current of 0.1A at open circuit voltage of 12 V DC, and confirm electrical discontinuity greater than 1 microsecond taking place in the circuit. Vibration: 4.5G Vibration frequencies: 20 ~ 200 ~ 20/min. 8 hours (Fig.5)	When tested environmental conditioning in accordance with the test sequence specified in Table 3, performance shall meet the requirements.
 <p>Wire length to be 150 mm approx. (Do not strain the wire.)</p> <p>Connector</p> <p>Secured</p> <p>Printed Circuit Board</p> <p>Soldered</p> <p>Vibration Tester</p> <p>Fig.5</p>		
28. Solderability	After immersing into the inert flux (Alpha 100 or equivalent) for 5 ~ 10 seconds, immerse into the soldering tab (60-40) whose temperature is controlled at $230 \pm 5^\circ\text{C}$ for 3 ± 0.5 seconds.	More than 95% of tested area shall be covered with uniformly fresh, wet solder except the sheared surfaces.


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5.2 Test Sequence:

The tests shall be performed in the sequence specified in Table 3.

Classification Test Item	Contact		Connector Test Sequence						
	Group	I	II	I	II	III	IV	V	VI
Appearance	1			1	1,3	1	1	1	1, 16,22
Contact or Connector Insertion Force	2					2			
Contact or Connector Extraction Force	5					8			
Termination Resistance (Low Level)	3					3,11,14,17,21,24	2,5,8,11,15	2,5,8,11,14,18	
Termination Resistance (Rated Current)	4					4,12,15,18,22,25	3,6,9,12,16	3,6,9,12,15,19	
Physical Touch/Feeling at Insertion/Extraction Handling	6					9, 25		10	23
Insulation Resistance						6			5
Dielectric Strength						7			6, 20
Current Leakage						5, 19	13		4, 21
Current Cycling						20			
Temperature Rising						23			
Contact Retention Force						26		12	
Crimp Tensile Strength		1							
Housing Retention Force						27		11	
Contact Loading Force			2						
Repeated Insertion/Extraction Force									7
"Kojiri" Resistivity						10		4	
Heat Resistivity							4		
Cold Resistivity							7		
Thermal Shock							14		
Humidity (Steady State)							10		
Salt Spray									10
Oil Resistivity									13
Dust and Sand Bombardment						13			
Icing						16			
Sulfurous Acid Gas Resistivity									17
Vibration, High Frequency								7	
Solderability				2					

Table 3

SHEET			AMP (Japan), Ltd. TOKYO, JAPAN	
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6. Quality Assurance Provisions:

6.1 Test Conditions:

Unless otherwise specified, all the tests shall be performed under any combination of the following test conditions.

Temperature	15 ~ 35°C
Relative Humidity	45 ~ 75%
Atmospheric Pressure	650 ~ 800 mmHg

6.2 Test and Samples:

6.2.1 Test Specimens:

The samples to be employed for the tests shall be prepared in accordance with AMP Application Specification 114-5091-1, Crimping of .070 Series Receptacle Contact. Unless otherwise specified, no sample shall be reused.

6.2.2 Number of Samples:

The number of the samples to be used for the tests shall consist of 10 sets minimum of the contacts of each group for testing contacts, and 2 sets minimum of the connectors of each group for testing connectors.

6.2.3 Printed Circuit Board:

Printed circuit board to be used for the tests shall be the ones specified below.

Material: Epoxy glass, 70 μ m thick copper clad one side only

Finish : Tin-plated, flux applied

Diameter of the hole: 1+0.1 mm


(Tolerance of other sizes is +0.1 mm)

6.2.4 Applicable Wires:

The wires used for termination of products for evaluation testing, shall be conforming to the following requirements specified in Table 4.

Wire Size		Composition of Strands		Calculated Cross-sectional Area of Wire	
Nominal (mm ²)	AWG	Diameter of Conductor (mm)	Number of Conductors	mm ²	CMA
0.2	#24	0.20	7	0.22	434
0.3	#22	0.26	7	0.37	733
0.5	#20	0.32	7	0.56	1,111
0.85	#18	0.32	11	0.88	1,746
1.25	#16	0.32	16	1.28	2,540

Table 4

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7. Handling Specification:

7.1 Crimping Operation:

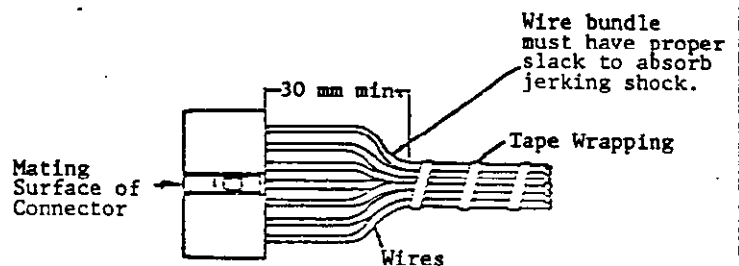
In order to maintain designated performance capability of the product, crimping of contact shall be controlled by AMP Application Specification 114-5091-1, Crimping of .070 Series Receptacle Contact.

7.2 Solder Cap Housing:

When to assemble cap housing and printed circuit board, mount the housing and secure by screw-on attachment using tapping screw conforming to Class 4 or Class 2, M3x6 of JIS B, then solder the contacts. In order to assure reliable solderability of the product contacts, soldering shall be performed within 6 months after the delivery.

7.3 Taping of Wires at Assembly of Harnesses:

In order to maintain engagement and retention capability of connectors, wire bundling by tapes shall be controlled properly to allow slack of wire bundle just next to wire lead out of housing as shown in right figure.



7.4 Crimping Tool:

For crimping contacts and extracting contacts from loaded housing, use AMP specified extraction tools. (Refer to the Instruction Sheet No. IS-287J for extraction tools.)

10. Reference Documents:

- JASO 7002 : Multi-pole Connector for Automobiles
- JASO 7101 : Test Methods for Plastic Molded Parts
- JIS C 3406 : Low Voltage Wires and Cables for Automobiles
- JIS D 0203 : Method of Moisture, Rain and Spray Test for Automobile Parts
- JIS D 0204 : Method of High and Low Temperature Test for Automobile Parts
- JIS D 1601 : Vibration Testing Method for Automobile Parts
- JIS R 5210 : Portland Cement
- JIS C 5028 : Salt Mist Testing Method for Electronic Components
- MIL-STD-202 Test Method 208: Solderability, Test Methods for Electronic and Electrical Component Parts
- JIS D 5500 : Lighting and Signaling Equipment for Automobile Parts
- 114-5091 : Application Specification, .070 Series Receptacle Contact

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