

AMP-ECONOSEAL-J Mark II⁺ Connector

1. Scope :

1.1 Contents

This specification covers the requirements for product performance, test methods and quality assurance provisions of AMP-ECONOSEAL-J Mark II⁺ Connector.
Applicable product descriptions and part numbers are as follows :

Part Number	Descriptions
171630 171662	.070 Series Receptacle Contact
171631 171661 1897641	.070 Series Tab Contact
172746 900324 172888 900325 178210 176886	Rubber Plug for .070
172748 348461	Cavity Plug for .070
174877	1-Position Plug Housing for .070 Series
174878	Double Lock Plate for .070 Series 1-Position Plug Housing
174879	1-Position Cap Housing for .070
174880	Double Lock Plate for .070 Series 1-Position Cap Housing
174352	.070 Series 2-Position Plug Housing
174353	Double Lock Plate for .070 Series 2-Position Plug Housing
174354	.070 Series 2-Position Cap Housing
174355	Double Lock Plate for .070 Series 2-Position Cap Housing
174357	.070 Series 3-Position Plug Housing
174358	Double Lock Plate for .070 Series 3-Position Plug Housing
174359	.070 Series 3-Position Cap Housing
174360	Double Lock Plate for .070 Series 3-Position Cap Housing
174257	.070 Series 4-Position Plug Housing
174258	Double Lock Plate for .070 Series 4-Position Plug Housing

Part Number	Descriptions
174259	.070 Series 4-Position Cap Housing
174260	Double Lock Plate for .070 Series 4-Position Cap Housing
174262	.070 Series 6-Position Plug Housing
174263	Double Lock Plate for .070 Series 6-Position Plug Housing
174264	.070 Series 6-Position Cap Housing
174265	Double Lock Plate for .070 Series 6-Position Cap Housing
174982	.070 Series 8-Position Plug Housing
174983	Double Lock Plate for .070 Series 8-Position Plug Housing
174984	.070 Series 8-Position Cap Housing
174985	Double Lock Plate for .070 Series 8-Position Cap Housing
174655	.070 Series 10-Position Plug Housing
174656	Double Lock Plate for .070 Series 10-Position Plug Housing
174657	.070 Series 10-Position Cap Housing
174658	Double Lock Plate for .070 Series 10-Position Cap Housing
174661	.070 Series 12-Position Plug Housing
174662	Double Lock Plate for .070 Series 12-Position Plug Housing
174663	.070 Series 12-Position Cap Housing
174664	Double Lock Plate for .070 Series 12-Position Cap Housing

Fig. 1

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, the specification shall take precedence.

2.1 AMP Specification:

- A. 109-5000 Test Specification, General Requirements for Test Methods
- B. 114-5082 Application Specification, Crimping Contacts for AMP-ECONOSEAL-J Mark II⁺
114-5230 Connector
114-61018
- C. 501-5322 Qualification Test Report

D. CM-325J AMP ECONOSEAL-J Mark II⁺ Connector

2.2 Reference Documents :

JASO D 605 : Automotive Multi-pole Connectors

JASO D 7010 : Test Methods for Molded Plastic Parts

JIS C 3406 : Low Voltage 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 Electronic Components

JIS D 0205 : General Rules of Weatherability for Automobile Testing

JIS K 6301 : Physical Testing Methods for Vulcanized Rubber

JIS K 2202 : Gasoline for Automobiles

2.3 Definition of Terms :

2.3.1 Contact :

An electrically conductive metallic member, used independently or as a component of a connector assembly to form circuit connection by contacting.

2.3.2 Housing :

A dielectric component member of a connector made of insulating material that encapsulate contacts in its contact cavities. In this product line, cap housing that encapsulates tab contacts, and plug housing that encapsulates receptacle contacts are available.

2.3.3 Double Lock Plate :

Attached to the housing, this plate is intended to detect improper contact mating as well as to increase contact retention force.

2.3.4 Rubber Plug :

Attached to wire side of tab contact and receptacle contact, this plug is purposed for water-proofing.

2.3.5 Cavity Plug :

This plug is used for blinding housing holes of unused contact position for such connector as having two or more positions.

2.3.6 Seal Ring :

This ring is attached to plug housing and serves for water-proofing when mated with cap housing.

2.3.7 Connector :

A connector is an assembly of housing and crimped wire contacts with rubber plugs loaded in all contact positions, and further equipped with double lock plate. In this product line, cap housing assembled with tab contact and plug housing assembled with both receptacle contact and seal ring are available.

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 : Pretinned brass or plain brass with selective gold plating over nickel underplate, conforming to Copper Alloy 260 of ASTM B 36, or pretinned phosphor bronze or plain phosphor bronze with selective gold plating over nickel underplate.

B. Housing and Double Lock Plate : Molded Polybutylene-terephthalate (PBT) conforming to UL 94 V-2

C. Accessories and Hardware :

Rubber Plug : Nitrile Butadiene Rubber or Silicon

Cavity Plug : Nitrile Butadiene Rubber

Seal Ring : Nitrile Butadiene Rubber or Silicon

3.3 Ratings:

A. Temperature Rating: -30°C to 105°C (Ambient Temperature +Temperature Rise due to energized current)

3.4 Performance and Test Descriptions:

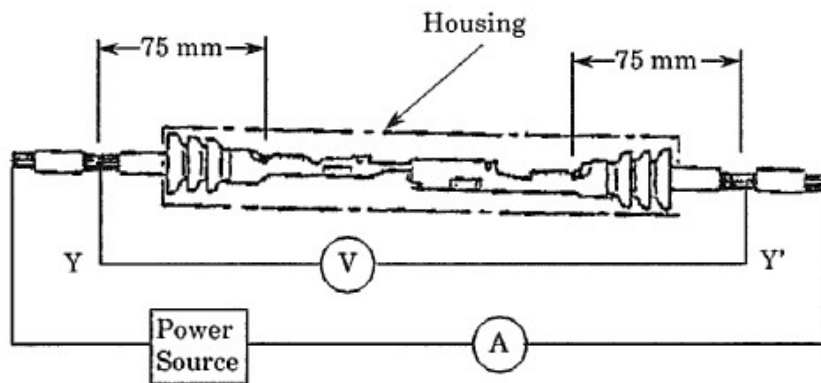
The product shall be designed to meet the electrical, mechanical and environmental performance requirements specified in Para 3. 5. All tests shall be performed in the room temperature, unless otherwise specified.

3.5 Test Requirements and Procedures Summary:

Para.	Test Item	Requirements	Procedures																		
Electrical Requirements																					
3.51	Confirmation of Product	Product shall be conforming to the requirements of applicable product drawing and Application Specification 114-61018	Visually, dimensionally and functionally inspected per applicable quality Inspection plan.																		
3.5.2	Connector Mating Force	<table border="1"> <thead> <tr> <th>No. of Pos</th> <th>Mating Force Max.</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>39 N</td> </tr> <tr> <td>2</td> <td>49 N</td> </tr> <tr> <td>3</td> <td>59 N</td> </tr> <tr> <td>4</td> <td>68.6 N</td> </tr> <tr> <td>6</td> <td>78.5 N</td> </tr> <tr> <td>8</td> <td>98 N</td> </tr> <tr> <td>10</td> <td>118 N</td> </tr> <tr> <td>12</td> <td>137 N</td> </tr> </tbody> </table>	No. of Pos	Mating Force Max.	1	39 N	2	49 N	3	59 N	4	68.6 N	6	78.5 N	8	98 N	10	118 N	12	137 N	Measure the force required to mate connector using locking latch by operating at 100mm approx. a minute, with the locking mechanism of housing set in effect.
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3.5.3	Contact Mating Force	2.94 ~ 7.85 N Per. 070 Ser. Contact	Measure the force required to mate contact by operating the head at a rate of 100mm approx. a minute																		
3.5.4	Connector Unmating Force	<table border="1"> <thead> <tr> <th>No. of Pos</th> <th>Mating Force Max.</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>29 N</td> </tr> <tr> <td>2</td> <td>39 N</td> </tr> <tr> <td>3</td> <td>49 N</td> </tr> <tr> <td>4</td> <td>68.6 N</td> </tr> <tr> <td>6</td> <td>78.5 N</td> </tr> <tr> <td>8</td> <td>98 N</td> </tr> <tr> <td>10</td> <td>118 N</td> </tr> <tr> <td>12</td> <td>137 N</td> </tr> </tbody> </table>	No. of Pos	Mating Force Max.	1	29 N	2	39 N	3	49 N	4	68.6 N	6	78.5 N	8	98 N	10	118 N	12	137 N	Measure the force required to mate connector using locking latch by operating at 100mm approx. a minute, with the locking mechanism of housing set in effect.
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3.5.5	Contact Unmating Force	2.94 ~ 7.85 N Per. 070 Ser. Contact	Apply an axial pull-off load to one of mated contacts. Measure the force required to unmate contact by operating the head at a rate of 100mm approx. a minute.																		

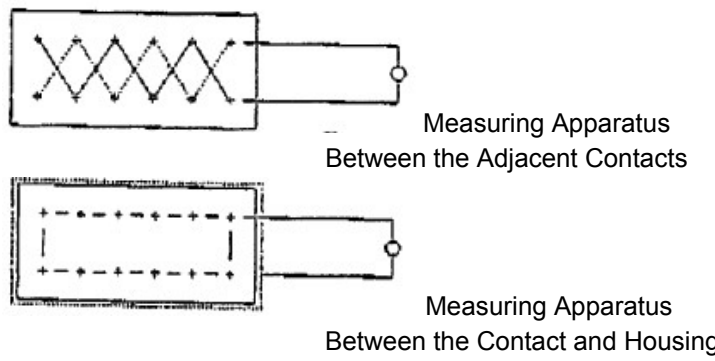
3.5.6	Double Lock Plate Loading Force	<table border="1"> <thead> <tr> <th>No. of Pos</th> <th>Mating Force Max.</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>29 N</td> </tr> <tr> <td>2</td> <td>39 N</td> </tr> <tr> <td>3</td> <td>39 N</td> </tr> <tr> <td>4</td> <td>39 N</td> </tr> <tr> <td>6</td> <td>39 N</td> </tr> <tr> <td>8</td> <td>59 N</td> </tr> <tr> <td>10</td> <td>59 N</td> </tr> <tr> <td>12</td> <td>59 N</td> </tr> </tbody> </table>	No. of Pos	Mating Force Max.	1	29 N	2	39 N	3	39 N	4	39 N	6	39 N	8	59 N	10	59 N	12	59 N	Fix housing of the testing machine, And insert locking plate in axial direction by operating the head at a rate of 100mm approx a minute. measure the force required to complete loading of locking plate.
		No. of Pos	Mating Force Max.																		
		1	29 N																		
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3.5.7	Termination Resistance (Low Level)	3mΩ max.(Initial) 10mΩ max.(Final)	Measure by applying closed circuit current of 50 mA max. at open circuit voltage of 50 mV max. to the mated contact test circuit in housing. Fig.2.																		
3.5.8	Termination Resistance (Specified Current)	Millivolt Drop : 3mV / A max. (Initial) 10mv / A max. (Final)	Measure by applying 1A at 12V DC to Contacts in mated connectors, by Probing at 75mm apart from wire crimp after temperature becomes Stabilized.(Probing at Y and Y' in Fig. 2) Fig.2																		

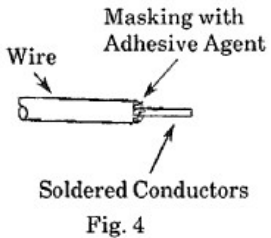
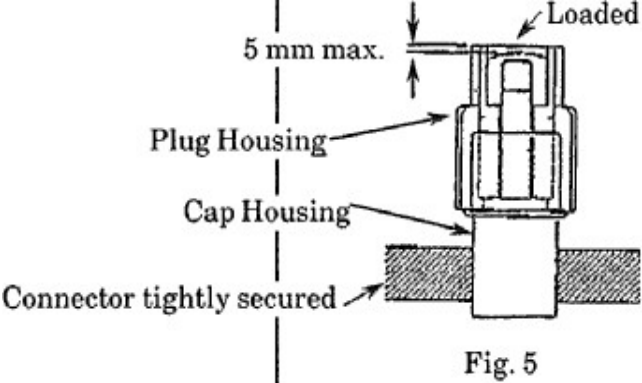
Termination Resistance (Low Level)



Termination resistance is obtained after deducting the millivolt drop of 150mm-long Wire used for termination.
Probing points Y and Y' shall be pretreated by uniform soldering in order to stabilize Measurement reading during the test.

Fig. 2 Measurement of Termination Resistance

3.5.9	Insulation Resistance	100MΩ min. (Initial)	Measure by applying test potential between the adjacent contacts, and between the contacts and ground in the mated connectors.																					
3.5.10	Dielectric Strength	Connector must withstand test potential of 1.0kVAC for 1 minute. no physical damage shall be evident after the test.	<p>Measure by applying test potential between the adjacent contacts, and between the contacts and ground in the mated connector. Fig 3</p> <div style="text-align: center;">  <p>Measuring Apparatus Between the Adjacent Contacts</p> <p>Measuring Apparatus Between the Contact and Housing</p> <p>Fig 3</p> </div>																					
3.5.11	Handling Ergonomics	No abnormal touch shall be perceived during mating/unmating, that may cause pain	Repeat mating and unmating of connectors by hands.																					
3.5.12	Crimp Tensile Strength	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2">Wire size</th> <th>Crimp Tensile</th> </tr> <tr> <th>mm2</th> <th>(AWG)</th> <th>N Min.</th> </tr> </thead> <tbody> <tr> <td>0.2</td> <td>(#24)</td> <td>68.6</td> </tr> <tr> <td>0.3</td> <td>(#22)</td> <td>78.5</td> </tr> <tr> <td>0.5</td> <td>(#20)</td> <td>88.3</td> </tr> <tr> <td>0.85</td> <td>(#18)</td> <td>127</td> </tr> <tr> <td>1.25</td> <td>(#16)</td> <td>127</td> </tr> </tbody> </table>	Wire size		Crimp Tensile	mm2	(AWG)	N Min.	0.2	(#24)	68.6	0.3	(#22)	78.5	0.5	(#20)	88.3	0.85	(#18)	127	1.25	(#16)	127	<p>Apply an axial pull-off load to crimped Wire of contact secured on the tester At a rate of 100mm(4.0") a minute.</p> <p>AMP spec. 109-5205</p>
Wire size		Crimp Tensile																						
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0.85	(#18)	127																						
1.25	(#16)	127																						
3.5.13	Contact Retention Force	Contact shall not dislodge a Distance greater than 78.5N Min.	<p>Apply an axial load to 0.85mm2, 100 Mm long crimped contact on housing. Measure the force required to Dislodge the contact from housing.</p> <p>AMP spec. 109-30</p>																					

3.5.14	Housing Locking retention Force :	98N min.	Fix mated pair of connectors on testing machine, and apply an axial separating force to one of them, measure the force required to separate the connectors, with or without breakage of locking leg.
3.5.15	Watertight Sealing	<p>49kPa(4.9mN/mm²)min. (Initial) 29.4kPa(2.9mN/mm²)min. (Final)</p>  <p>Fig. 4</p>	Blow compressed air into mated pair of connectors through a small hole. for this test, wire ends are sealed with solder and adhesive masking. place the connectors in 30cm deep water, and must withstand the air pressure of 9.8kPa(1mN/mm ²) for 30 seconds. Increase pressure at a rate of 9.8kPa(1mN/mm ²) each time until air leakage takes place.
3.5.16	Temperature Life :	Must meet the specified requirements after testing in the sequence specified in Fig.7	Expose mated connector under elevated temperature at 120±2°C for 120 hours. Recondition in the room temperature before subsequent measurement.
3.5.17	Resistance to Cold	Must meet the specified requirements after testing in the sequence specified in Fig.7	Expose mated pair of connectors under the cold atmosphere at -50±5°C for 120hours. Recondition In the room temperature before the subsequence measurement.
3.5.18	Resistance to "Kojiri"	<p>Must meet the specified requirements after testing in the sequence specified in Fig. 9</p>  <p>Fig. 5</p>	Tightly secure a connector on a sturdy bench, and mate the counterpart connector. In the unmating way, apply 196N · cm (T)force in right-left directions at every 1mm graduation along the disengaging full stroke. Making one disengagement a cycle repeat for 25 cycles. When the first direction cycles are completed, apply another 25 cycles to the traverse directions of manually repeat mating/unmating of connectors for 50 cycles with Kojiri motion mode. Fig.5

3.5.19	Resistance to Liquid detergents :	Must meet the specified requirements after testing in the sequence specified in Fig.9	Immerse mated connectors into commercially suppliable car washer liquid detergent at $50 \pm 2^{\circ}$ C for 2 hours. After the durations, rinse in tab water for 5 minute, and have it dried before subsequent measurement.			
3.5.20	Resistance to coolant	Must meet the specified requirements after testing in the sequence specified in Fig.9	Immerse mated connectors into commercially suppliable L.L.C(long life coolant) at $50 \pm 2^{\circ}$ C for 2 hours. After the durations, rinse in tab water for 5 minute, and have it dried before subsequent measurement.			
3.5.21	Resistance to Oil	Must meet the specified requirements after testing in the sequence specified in Fig.9	Immerse mated connectors into oils the following in the specified sequence:			
			No	Oil Name	Temperature	Duretion
			1	Engine Oil(SEA 10W)	$50 \pm 2^{\circ}$ C	60 min.
			2	Kerosene Linse	Room Temp	5 min
			3	Motor Gasolines	Room Temp	60 min
4	Drying w/o Powered Ventilation	Room Temp	AS Req'd			
3.5.22	Resistance to Ozon	Must meet the specified requirements after testing in the sequence specified in Fig.9	Suspend mated connector in a closed container, and expose in ozon atmosphere 50 ± 5 ppm concentration per JIS K 6301,Para.16 at $40 \pm 2^{\circ}$ C for 24 hours. After the duration, recondition in the room temperature, before subsequent measurement. Record cracking condition of tested rubber surfaces, according to JIS K 6301,Para.16.6			
3.5.23	Weather Aging :	Must meet the specified requirements after testing in the sequence specified in Fig.9	Expose mated connectors under the sunshine carbon are light beam per JIS D 0205,Para. 5.4(WAN-1S), aging Tester, at $63 \pm 3^{\circ}$ C for 150 hours. Record cracking condition of tested rubber surfaces, according to JIS K 6301,Para.16.6			

3.5.24	Dust Bombardment	Must meet the specified requirements after testing in the sequence specified in Fig. 9	Subject mated connectors to Ejection of Port1 and cement or Kanto loam dust powder dispersed by Compressed air blowing at a rate of 1.5kg per 10 seconds at every other 15 minutes for the total of 1hours. After completion of duration, reoeat Mating/unmating for 3 cycles
3.2.25	Temperature Rising	50℃ max. Must meet the specified requirements after testing in the sequence specified in Fig.9.	Subject mated connectors with all the contacts series wired, to be energized with the current of the intensity obtained by Fig.5. Measure temperatures rising in a draft-free chamber after temperature becomes stabilized.
3.5.26	Water Sprinkle	Must meet the specified requirements after testing in the sequence specified in Fig.9. Current leakage : 100 μ A max.	Suspend mated connector in a closed chamber. Subject it to heat at 120±3℃ for 4 minutes followed by sprinkling of water at room temperature for 20 minutes. Making this cycles, repeat for 48 cycles per. JIS D 0203.S1. Energize the contacts with 12 VDC, and monitor the circuits for current leakage. Connected 2-meter lead wires are drawn out of the chamber for measurement.

3.5.27	Compound Environmental Testing (Optionally performed By customer's requirements)	Must meet the requirements after testing in the sequence specified in Fig.9.	Subject mated connectors, with all the loaded contacts series-wired as shown in Fig.7, to 44m/s ² (4.5G)vibration to reciprocate between 20-200Hz one cycle every 3 minutes for 100 hours each to three axial directions. Measure termination resistance(low level)at completion of each axis vibration cycle. During vibration, apply test current of the intensity obtain by Table 1, for 45 minutes ON, and 15 minutes OFF for 300 cycles, in the heat cycle test condition to reciprocate between 80±3℃, -30±3℃, in 80-95% R.H.atmosphere.Fig.8.			
3.5.28	Current Cycling	Must meet the specified requirements after testing in the sequence specified in Fig.9.	Subject mated contact to test current of the intensity obtained by Fig. 6 applied for 300 cycles intermittently 45 minutes ON, 15 minutes OFF to the series wired contacts.			
			Wire Size (mm ²)	Test Current (DCA)	No.of Position	Reduction Coefficient
			0.2 0.3 0.5 0.85 1.25	7 9 11 14.5 18.5	1 2~3 4~5 6~8 9~12	1 0.75 0.6 0.55 0.5
<p style="text-align: center;">Fig. 6</p> <p>Note : Applying current is obtained by calculation by multiplying the current value of applicable wire size and the reduction coefficient according to the number of contact loading of the connector.</p>						

3.5.29	Vibration Sinusoidal High Frequency	No electrical discontinuity greater than 1 microsecond shall occur. Fig. 9	Subject mated connectors to 20-200Hz traversed in 3 minutes With 44m/s ² (4.5G) accelerated Velocity ; 2 hours each for "X" and "Y" Axes, and 4 hours for "Z" axis. Monitor circuit for electrical Discontinuity greater than 1μsec. Taking place in the series-wired Contacts.
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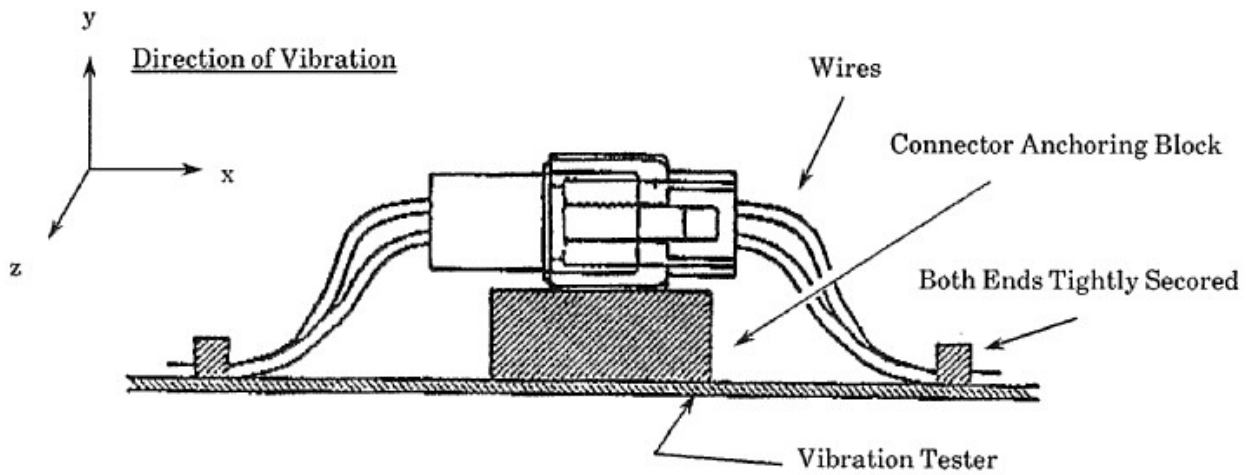


Fig. 7

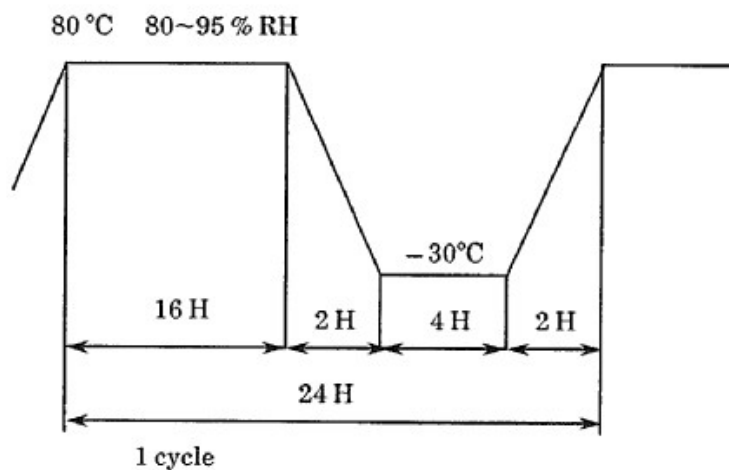


Fig. 8

4. Product Qualification and Requalification Testing :

Test Items	Test Group(a)											
	1	2	3	4	5	6	7	8	9	10	11	12
	Test Sequence(c)											
Examination of Product	1	1	1	1	1	1	1	1	1,4	1,4	1	1
Connector Mating Force				2,10								
Contact Engaging Force	2											
Connector Unmating Force				4,11								
Contact Separating Force	3											
Double Lock Plate Loading Force			2									
Termination Resistance Low Level				3,6 8		2,6 8,10			2,5	2,5	2,4	2,4
Termination Resistance Specified Current					2,5		2,5 7					
Watertight Sealing				9		12	8	3	6	6		
Insulation Resistance						3,11						
Dielectric Withstanding Strength					4							
Handling Ergonomics							3					
Contact Retention Force			3									
Housing Retention Force				12								
Temperature Life				5								
Resistance to Cold				7								
Water Sprinkle									2			
Resistance to Kojiri								4				
Crimp Tensile Strength		2										
Composite Environmental Test								6				
Resistance to Liquid Detergents						4						
Resistance to Coolant						5						
Resistance to Oil						7						
Resistance to Ozon									3			
Weather Aging										3		
Dust Bombardment						9						
Temperature Rise vs Current					3							
Vibration Sinusoidal High Frequency											3	
Current Cycling												3

Fig. 9

(a) The numbers in the columns indicate the sequence in which the tests are performed.

5. Quality Assurance Provisions :

5.1 Test Conditions :

Unless otherwise specified all the tests shall be performed in any combination of the following test Conditions.

Temperature	15~35°C
Relative Humidity	45~75%
Atmospheric Pressure	86.7~107KPa (650~800mmHg)

Fig. 10

5.2 Sample Preparation :

5.2.1 Samples :

The samples to be employed for the tests shall be prepared in accordance with 114-5082 and 114-61018, AMP Application Specification, Crimping .070 Contact for AMP ECONOSEAL "J" Mark II+ Connector by using the wires specified in Table 8. No sample shall be reused, unless otherwise specified.

5.2.2 Number of Samples :

The number of contact and connector samples shall be consisting of more than 10 pieces contacts For testing contact, and more than 2 sets of connectors for testing connector.

Termination of .090 Series Receptacle Contacts.

No sample shall be reused, unless otherwise specified.

6. Crimping and Assembly Processing :

In order to maintain reliable termination performance of housing and contacts, crimping contact Shall be performed in accordance with 114-5082 and 114-61018, AMP Application Specification, Crimping .070 Contact for AMP-ECONOSEAL "J" Mark II+ Connector.

Manufacturing harness and extracting contacts shall be performed in accordance with Customer Manual CM-325J, AMP-ECONOSEAL "J" Mark II+ Connectors.

7. REVISION HISTORY

Current Revision	New Revision	Changes	Reason for Change	EC No.
	A		New 108-61110 spec released	

8. SPECIFICATION APPROVAL

Prepared by, **B.S. Yoo**

Checked By, **Y.D. Lee**

Approved by, **H.G. Cho**
