

Product Specification

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 a AMP-ECONOSEAL-J Mark II+ Connector.

The applicable product descriptions and part number are as follows:

Part Number	Descriptions
171630, 936019 171662, 936020	.070 Series Receptacle Contact
171631, 936088 171661, 936089	.070 Series Tab Contact
368889 368280 368120	Rubber Plug for .070
172748	Cavity Plug for .070
368261	.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
368523	.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
368123	.070 Series 4-Position Plug Housing
174258	Double Lock Plate for .070 Series 4-Position Plug Housing
174259	.070 Series 4-Position Cap Housing
174260	Double Lock Plate for .070 Series 4-Position Cap Housing
368530	.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

Part Number	Descriptions
368533	.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
85258	.070 Series 9-Position Plug Housing
85260	Double Locking Plate for 070 Series 9-Position Plug Housing
85256	.070 Series 9-Position Cap Housing
85257	Cover Plate for 070 Series 9-Position Cap Housing
368536	.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
368047	.070 Series 16-Position Plug Housing
368049	Double Lock Plate for .070 Series 16-Position Plug Housing
368050	.070 Series 16-Position Cap Housing
368051	Double Lock Plate for 070 Series 16-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, this specification shall take precedence.

2.1 AMP Specifications :

- A. 109-5000 Test Specification, General Requirements for Test Methods
- B. 114-5082 Application Specification, Crimping Contacts for AMP-ECONOSEAL-J Mark II+ Connector
- 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 D7101 : 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 :

S 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 on the applicable product drawing.

3.2 Materials & Finish

A. Contact

Description	P/N	Material	Finish
REC	171630	Brass / KLF-5Z	Pre-tinned / Selective Gold
	171662	Brass / KLF-5Z	Pre-tinned / Selective Gold
	936019	CuNiSi	Pre-tinned
	936020	CuNiSi	Pre-tinned
TAB	171631	Brass	Pre-tinned / Selective Gold
	171661	Brass	Pre-tinned / Selective Gold
	936088	Brass	Selective Gold(0.8 μ m)
	936089	Brass	Selective Gold(0.8 μ m)

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

C. Accessories and Hardware :

Rubber Plug : Silicon

Cavity Plug : Nitrile Butadiene Rubber

Seal Ring : Silicon

3.3 Ratings:

A. Temperature Rating : -30°C to + 105°C

(Ambient Temperature+Temperature Rise due to energized current)

3.3.1 Applicable Wires :

Part No.		Applicable Wire Conductor Size (mm ²)	Insulation Diameter (mm)
Contact	Rubber Plug		
171630, 936019 171631, 936020	368889, 368280	AV and AVS 0.2, 0.3, 0.5 one wire	1.4 ~ 2.4
171661, 936088 171662, 936089	368120	AV and AVS (Note 1)0.5, 0.85, 1.25 one wire	2 ~ 2.6

Note 1 : 1.25 mm² wire is applicable to AVS only.

2 : AVS stands for thin wire for automobile.

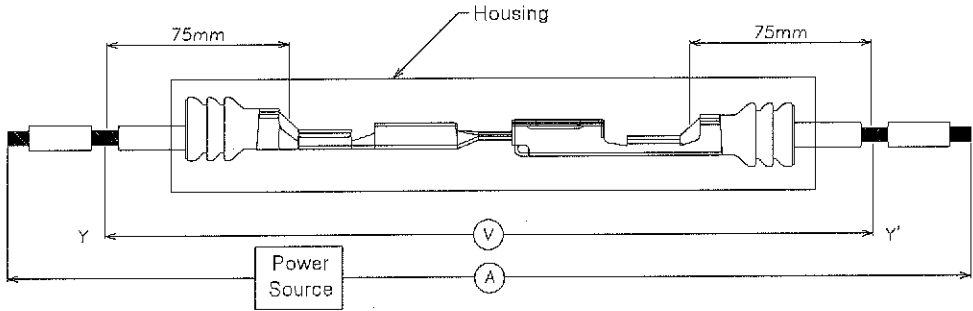
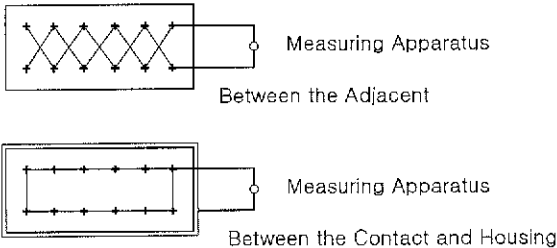
3.4 Performance and Test Descriptions :

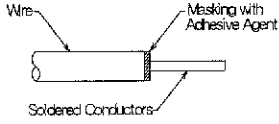
The product is designed to meet the electrical, mechanical and environmental performance requirements specified in para. 3.5. All tests are performed at ambient temperature unless otherwise specified.

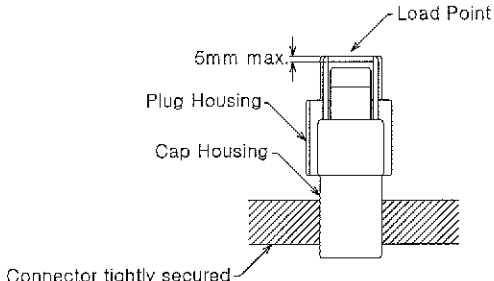
3.5 Test Requirements and Procedures Summary :

Para.	Test items	Requirements		Procedures
3.5.1	Confirmation of Product	Product shall be conforming to the requirements of applicable product drawing and Application Specification 114-5082		Visually, Dimensionally and Functionally inspected per applicable inspection plan.
3.5.2	Connector Mating Force	No. of Pos	Mating Force N Max	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.
		1	39	
		2	49	
		3	59	
		4	68.6	
		6	78.5	
		8	98	
		9	108	
		10	118	
		12	137	
		16	170.5	
3.5.3	Contact Mating Force	2.94~7.85N : 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	No. of Pos	Mating Force N Max	Measure the force required to mate connector using locking latch by operating at 100mm a minute, without the locking mechanism of housing set in effect.
		1	29	
		2	39	
		3	49	
		4	68.6	
		6	78.5	
		8	98	
		9	108	
		10	118	
		12	137	
		16	170.5	
3.5.5	Contact Unmating Force	2.94-7.85 N : .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.

Para.	Test items	Requirements		Procedures
		No. of Pos	Mating Force N Max	
3.5.6	Double lock Plate Loading Force	1	29	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 lociing plate.
		2	39	
		3	39	
		4	39	
		6	39	
		8	59	
		9	59	
		10	59	
		12	59	
		16	78	
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 mA 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.

Para.	Test items	Requirements	Procedures
<p>Termination Resistance (Low Level):</p>  <p>Termination resistance is obtained after deducting the millivolt drop of 150 mm-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.</p> <p style="text-align: center;">Fig. 2 Measurement of Termination Resistance</p>			
3.5.9	Insulation Resistance	100 MΩ 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	<p>Connector must withstand test potential of 1.0k VAC for 1 minute. No physical damage shall be evident after the test.</p>  <p style="text-align: center;">Fig. 3</p>	Measure by applying Test potential between the adjacent contacts, and between the contacts and ground in the mated connectors. Fig.3

Para.	Test items	Requirements	Procedures			
3.5.11	Handling Ergonomics	No abnormal touch shall be perceived during mating/ unmating, that may cause pain or fatigue on sperator's hand.	Repeat mating and unmating of connectors by hands.			
3.5.12	Crimp Tensile Strength	Wire Size	Apply an axial pull-off load to crimped wire of contact secured on the tester, at a rate of 100mm (4.0") a minute.			
		mm ²		(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)	177				
3.5.13	Contact Retention Force	Contact shall not dislodge a distance greater than 78.5N Min.	Apply an axial load to 0.85 mm ² , 100mm long crimped contact on housing. Measure the force required to dislodge the contact from housing. AMP Spec. 109-30			
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	49 kPa(4.9mN/mm ²)min (initial)	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 30 cm deep water, and must withstand the air pressure of 9.8 kPa (1mN/mm ²) for 30 seconds. Increase pressure at a rate of 9.8kPa (1mN/mm ²)each time until air leakage takes place.			
		29.4 kPa(2.9mN/mm ²)min. (Final)				
		 <p>Fig. 4</p>				

Para.	Test items	Requirements	Procedures
3.5.16	Temperature Life :	Must meet the specified requirements after testing in the sequence specified in Fig. 7.	Expose mated connectors under elevated temperature at $120 \pm 2^\circ\text{C}$ 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 $-50 \pm 5^\circ\text{C}$ for 120 hours. Recondition in the room temperature before the subsequence measurement.
3.5.18	Resistance to "Kojiri"	Must meet the specified requirements after testing in the sequence specified in Fig. 9	Tightly secure a connector on a sturdy bench, and mate the counterpart connector. In the unmating way, apply $196\text{N} \cdot \text{cm}$ (T) Force in right-left directions At every 1mm graduation along the disengaging full stroke. Making one disengagement a cycle repeat for 25 cycles to the traverse directions or manually repeat mating/unmating of connectors for 50 cycles with Kojiri motion mode. Fig. 5.
		 <p>Fig. 5</p>	
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 $50 \pm 2^\circ\text{C}$ for 2 hours. After the duration's, rinse in tap 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 $50 \pm 2^\circ\text{C}$ for 2 hours. After the duration, rinse in tap water for 5 minutes, and have it dried before subsequent measurement.

Para.	Test items	Requirements	Procedures			
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 Names	Temperature	Duration
			1	Engine Oil (SEA 10w)	50± 2°C	60 min.
			2	Kerosene Linse	Room Temp	5 min.
			3	Motor Gasoline's	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 of 50± 5 ppm concentration per JIS K 6301, Para. 16, at 40± 2°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 arc light beam per JIS D 0205, Para. 5.4. (WAN -1S), Aging Tester, at 63± 3°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 Port 1 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 1hour. After completion of duration, reoat mating/ unmating for 3 cycles.			

Para.	Test items	Requirements	Procedures
3.5.25	Temperature Rising	50 °C 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 temperature 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 µA max.	Suspend mated connector in a closed chamber. Subject it to heat at 120± 3°C for 40 minutes followed by sprinkling of water at room temperature for 20 minutes. Marking this a cycles, repeat for 48 cycles per. JIS D 0203. SI 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 20-200 Hz 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°C, -30± 3°C, in 80~95% R.H. atmosphere. Fig. 8.

Para.	Test items	Requirements	Procedures		
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 Positions	Reduction Coefficient
		0.2	7	1	1
		0.3	9	2~3	0.75
		0.5	11	4~5	0.6
0.85	14.5	6~8	0.55		
1.25	18.5	9~12	0.5		
<p>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 20~200 Hz 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.		

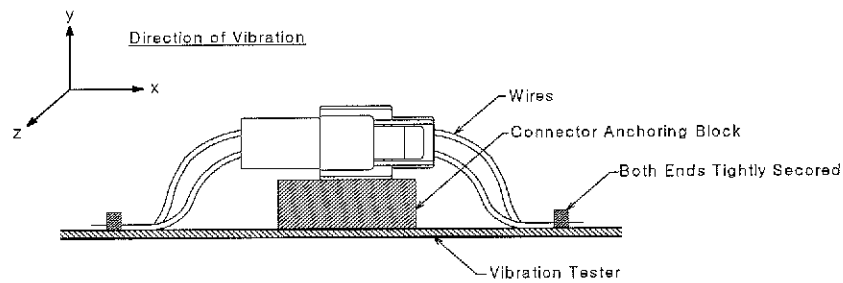


Fig. 7

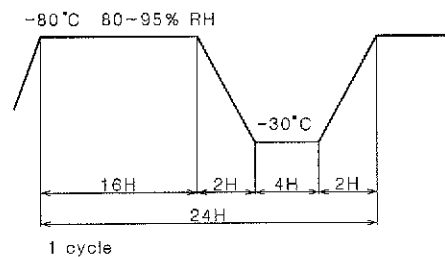


Fig. 8

4. Product Qualification and Requalification Testing :

Test of Examination	Sample Groups											
	Test Sequence											
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 Sparating 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

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

Fig. 7

5. Requirements :

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	86.7~107 Kpa (650~800 mmHg)

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, AMP Application Specification, Crimping .070 & .250 Series 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 sample shall be consisting of more than 10 pieces contacts for testing contact, and more than 2 sets of connectors for testing connector.

5.2.3 Wires Used :

The wires to be employed for the tests shall be the ones specified in Table 8.

Wire Size		Wire Strand Composition		Cross-Sectional Area		Remarks
Nominal	AWG	Strand Diameter (mm)	Number Of Strands	mm ²	CMA	
0.2	#24	0.20	7	0.22	434	Wires AV and thin wires(AVS) for automobiles. JISC 3406
0.3	#22	0.26	7	0.37	733	
0.5	#20	0.32	7	0.56	1111	
0.85	#18	0.32	11	0.88	1746	
1.25	#16	0.32	16	1.29	2540	

Fig. 11.

5.3 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, AMP Application Specification, Crimping .070 & .250 Series 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+ Connector.

6. Revision History

Current Revision	New Revision	Changes	Reason for Change	EC No.
-	O	-	-	FC00-0053-02-

7. SPECIFICATION APPROVAL

Prepared by,

Y.J. YOUN

Youn 29/MAR/02

Checked By,

J.K. Song

JCS with 29/MAR/02

Product Engineer

Senior Product Engineer

Approved by,

C.S. Lee

CS Lee 29/MAR/02

Product Engineering Manager