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## 250 SERIES POSITIVE LOCK MK-II CONNECTOR

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### 1. SCOPE

#### 1.1. Content

This specification covers the requirement for product performance, test methods and quality assurance provisions for 250 SERIES POSITIVE LOCK MARK-II CONNECTOR.

Applicable product description and part numbers are as shown in Appendix 1

#### 1.2. Qualification

When tests are performed on the subject product line, procedures specified in Figure 1 shall be used. All inspections shall be performed using the applicable inspection plan and product drawing.

#### 1.3. Qualification Test Results

Successful qualification testing on the subject product line was completed. The specifications are

109-5000: Test specification, General Requirement for Test Methods

501-5004: Qualification Test Report

501-134136: Qualification Test Report

#### 1.4. Revision Summary

Revisions to this specification include:

1. Initial release of specification.

### 2. DEFINITIONS OF TERMS

The terms used in this specification shall be defined as follows

- 2.1 Contact: An electrically conductive metallic member, used independently or as a component of a connector assembly to form circuit connection by contacting
- 2.1. Housing: A dielectric component member of a connector and an insulating material that forms encapsulation for contact(s).
- 2.2. Connector: An assembly consisting of housing and wire-crimped contacts formed to make circuit connection.

### 3. MATERIALS USED

- 3.1. Contact: Contacts shall be fabricated pre-tinned brass or plain brass.
- 3.2. Housing: Housing shall be molded 6/6 NYLON resin, conforming to UL flame retardant Grade of 94V-2 and 94V-0
- 3.3. Customer Tab: Customer tab shall be made of 70% copper, 30% zinc brass with or without tinplating, conforming to JIS H 3100, C2600P-1/2H.
- 3.4. WARNING: At least one mating component, contact or tab, must be tin plated in tests and application. Combinations of unplated contacts mated with unplated tabs is not allowed.

Product Description	Part Number	Remarks
Receptacle contact	2238283-X 170327-X 2238156-X	#22 - #18 AWG
Receptacle contact	2238278-X 170328-X 2238155-X	#18 - #14 AWG
Receptacle contact	170329-X 2238285-X	#15 - #10 AWG
Positive Lock Housing	172076-X	1 Pos.
Positive Lock Housing	174429-X 1969761-1	4 Pos.

Table 1

#### 4. PRODUCT DESIGN FEATURE, CONSTRUCTION AND DIMENSIONS

- 4.1. Contact: Product design feature, construction and dimensions of contacts shall be confirming to applicable customer product drawing(s). Receptacle contact is formed to accept tab contact when mated in housing, having a function to lock the tab in place when contact is pulled by crimped wire. The tab contact can be unmated with ease, when separating force is applied by pulling on housing.
- 4.2. Housing: Product design feature construction and dimensions of housing shall be confirming to applicable customer product drawing(s). A pair of locking detents that lowers in housing cavity, hook on rolling arches to secure receptacle contact in housing position.

#### 5. APPLICABLE WIRES AND TEMPERATURE RATING

- 5.1. Applicable wire size

Product Part No.	170327-X	170328-X	170329-X
Wire			
Wire Size (mm <sup>2</sup> )	0.31 - 0.89	0.76 - 2.09	1.75 - 5.2
Insulation Diameter (mm)	1.5 - 3.1	2.2 - 3.4	3.0 - 5.1

Table 2

- 5.2. Temperature Rating

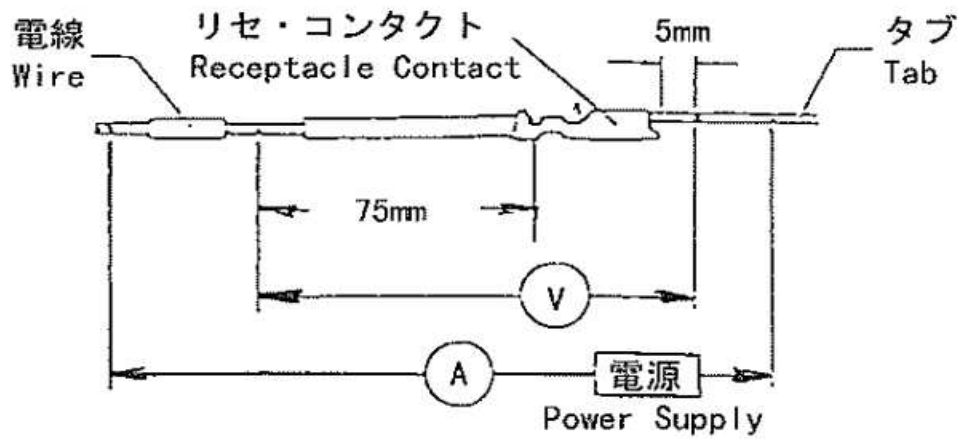
Housings: -40°C to +105°C UL94V-0  
-40°C to +120°C UL94V-2

Contacts: -40°C to +125°C Pre-tinned Brass or Unplated Brass  
-40°C to +130°C Pre-tinned Phos Bronze or Nickel plated Phos Bronze

## 6. PERFORMANCE REQUIREMENTS AND TEST METHOD

### 6.1. Performance Requirement and Test Method

Item	Test item	Standard requirement				Test conditions and method
6.1.1	Visual Examination	No defective abnormalities such as cracks, breakage, damages, loose of parts, rust and fusion that are detrimental to connector functions shall be present.				Visually and tactually inspect parts for appearance in accordance with applicable Q.I.P. (Quality Inspection Procedure) for presence of stated defects.
Item	Test item	Standard requirement				Test conditions and method
6.1.2	Crimp Tensile Strength	Wire size		Tensile strength		EIA-364-8 Contact crimped with wires of specified size shown in Table 6, are subject to the test by applying an axial pull-off load to crimped wire on tensile testing machine after being fastened on the head. The head is operated to travel with the speed at a rate of 100mm a minute. Crimp tensile strength is determined when the wire is broken or is pulled off from the wire crimp. For this test, insulation crimp is excluded.
		mm <sup>2</sup>	(AWG)	N (min.)	(kg)	
		0.3	(#22)	49	5.0	
		0.5	(#20)	78.4	8.0	
		0.75	(#18)	117.6	12.0	
		1.25	(#16)	205.8	21.0	
		2.0	(#14)	313.6	32.0	
		3.0	(#12)	411.6	42.0	
		5.0	(#10)	490	50.0	
6.1.3	Contact Retention Force	57.8N (5.9 kg) min.				EIA-364-29 Fasten contact-loaded connector assembly on to head of tensile testing machine, and apply an axial pull off load to wire end of loaded contact, by operating the head to travel with the speed at a rate of 100mm a minute. Contact retention force is determined when the contact is dislodged from housing. For this test, wire of 0.75 mm <sup>2</sup> (#18) or greater shall be used.
6.1.4	Contact Locking Strength	Initial 78.4N (8kg) min. Final 68.6N (7kg) min.				EIA-364-13 Contact crimped on an approx. 100mm-long, 1.25mm <sup>2</sup> (#16) or greater wire and loaded in housing, is mated with the counterpart tab contact. Sample connector is fastened on the head of tensile testing machine so that the mated tab is pulled by operating the head to travel with the speed at a rate of 100 mm a minute. Mated/Locked contact retention force is determined

						when locking device disengages locking or is broken by the load.
6.1.5	Connector Mating Force	Mating Force	1 Pos.	34.3N (3.5kg)	Max.	EIA-364-13  Fasten contact loaded connector and counterpart tab contact on tensile testing machine in the manner that the mate and unmate as the head is operated. Apply axial load to push in and pull off the part by operating the head to travel with the speed at a rate of 100mm a minute. For this test contact locking device is set not being in effect.
			4 Pos.	117.6N (12kg)	Max.	
6.1.6	Connector Unmating Force	Unmating Force	1 Pos.	5.88N (0.6kg)	Min.	
			4 Pos.	23.52N (2.4kg)	Min.	
Item	Test item	Standard requirement				Test conditions and method
6.1.7	Termination resistance	Initial 3 mΩ Max. Final 6.1 mΩ Max.				EIA-364-23  Subject mated contact assembled in housing to 20mV Max open circuit at 100mA. Termination resistance is calculated after deducting the resistance of the crimped wire of 75mm in length. Fig 1.
		<div></div> <p>Fig. 1</p>				
6.1.8	Insulation resistance	1000MΩ Min.				EIA-364-21 Impressed voltage 500VDC test between adjacent circuits of unmated connectors. Fig 2.

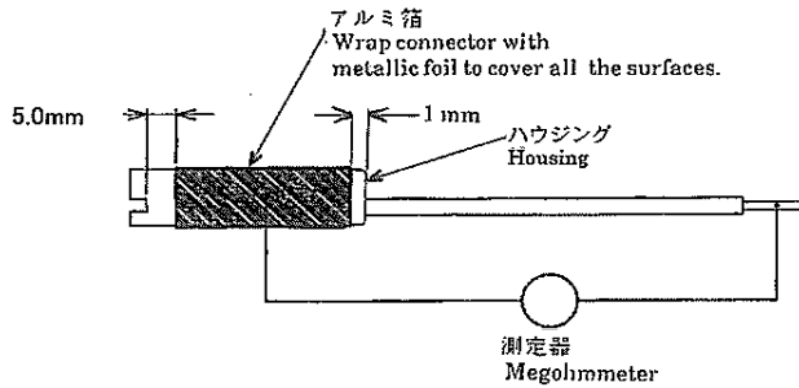
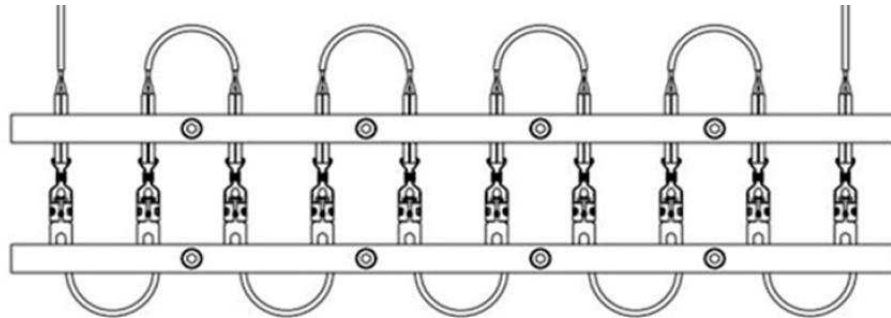


Fig.2

Item	Test item	Standard requirement	Test conditions and method
6.1.9	Dielectric Strength	No abnormalities, such as breakdown and flashover, shall occur, and withstand test potential of 2000V AC for 1 minute.	EIA-364-20 2kVAC for 1 minute. Test between connector/earth of unmated connectors. Fig. 2
6.1.10	Temperature Rise	30°C Max. under loaded specified current or rating current.	EIA-364-70 Measure temperature rise by energized current. Table 6.
6.1.11	Vibration (Low Frequency)	No electrical discontinuity greater than 1u sec. Shall occur. 6.1 mΩ Max. (Final)	EIA-364-28 Subject mated connectors to 10-55-10 Hz traversed in 1 minute at 1.52mm amplitude 2 hours each of 3 mutually perpendicular planes. 100mA applied mounting Figure 3.
			
		Fig.3	
Item	Test item	Standard requirement	Test conditions and method
6.1.12	Humidity	Termination Resistance 6.1mΩ Max. Insulation Resistance 100MΩ Min. Dielectric strength No abnormalities of electrical break-down and flashover shall be evident at test potential of 2000V AC for 1 minute.	EIA-364-31 Mated connector, 90-95% R.H., 40°C 96 hours.

6.1.13	Thermal shock	Termination Resistance 6.1mΩ Max.	EIA-364-32 Subject terminals inserted into housing to 5 cycles between -40°C/30 min. and 105°C/30min.
6.1.14	Salt Spray	Termination Resistance 6.1mΩ Max.	EIA-364-26 Subject mated connectors to 5% salt connection for 96 hours: After the test, rinse the sample in water, sit it for one (1) hour for drying at room temperature.

## 6.2. Test Sequence

<div> <div>Group</div> <div>Item</div> <div>Test Item</div> </div>	Item	Test Sequence (a)					
		1	2	3	4	5	6
Visual Examination	6.1.1					1	1
Crimp Tensile Strength	6.1.2	1					
Contact Retention Force	6.1.3		1				
Contact Locking Strength	6.1.4			1			11
Connector Mating Force	6.1.5					2	
Connector Unmating Force	6.1.6					3	
Termination Resistance	6.1.7						2,4,6,8,10
Insulation Resistance	6.1.8					4,7	
Dielectric strength	6.1.9					5,8	
Temperature Rising	6.1.10				1		
Vibration (Low Frequency)	6.1.11						3
Humidity	6.1.12					6	5
Thermal Shock	6.1.13						7
Salt Spray	6.1.14						9

Number indicate sequence in which the tests are performed

## 7. QUALITY ASSURANCE PROVISIONS

### 7.1. Test Conditions

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

Temperature	15-30°C
Relative Humidity	45-75%
Atmospheric Pressure	86.6-106.7 KPa

Table 5

### 7.2. Tests

#### 7.2.1. Test Specimens

Test specimens employed for the tests shall be confirming to the requirements of applicable customer product drawings, and prepared in accordance with 114-5042, AMP Application Specification, Crimping Contacts for “250 Series Positive Lock Connector”, by crimping on the wires of specified sizes as shown in Table 5, with the use of AMP specified applicable application tooling. Unless otherwise specified, no sample shall be reused.

#### 7.2.2. Number of samples

More than 10 sets of samples shall be prepared for performance evaluation testing per one sample group.

#### 7.2.3. Applicable Wires and Test Current

Wire of the following sizes and test current shall be used for the tests.

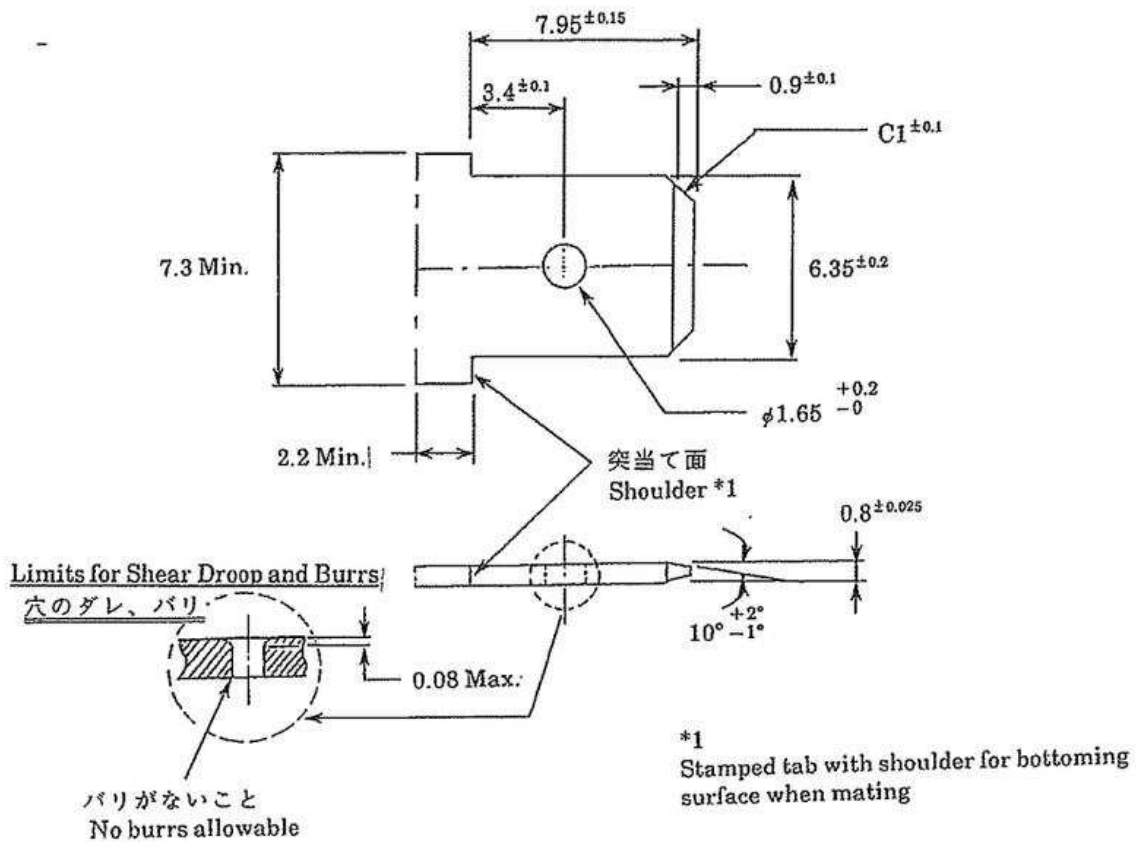
Wire size		Composition of Wire				Applicable JIS and JCS Specification	(A) (DC) Test current
mm <sup>2</sup> (AWG)		Calculated cross-section of Conductor (mm <sup>2</sup> )	Number of Conductor	Diameter of Conductor (mm)	Insulation Diameter (mm)		
0.3	(#22)	0.31	12	0.18	1.5	JCS-246	3
0.5	(#20)	0.51	20	0.18	2.2	JIS-C-3406	5
0.62	(#19)	0.62	12	0.26		N/A	6
0.75	(#18)	0.76	30	0.18	2.8	JIS-C-3316	7
1.0	(#17)	1.02	20	0.26		N/A	9.5
1.25	(#16)	1.27	50	0.18	3.1	JIS-C-3316	12
1.5	(#15)	1.52	38	0.26		N/A	13.5
2.0	(#14)	1.96	37	0.26	3.4	JIS-C-3316	15
2.7	(#13)	2.72	57	0.26		N/A	17.5
3.0	(#12)	3.30	41	0.32	4.1	JIS-C-3406	20
3.9	(#11)	3.92	82	0.26		N/A	21.75

5.0	(#10)	5.22	65	0.32	4.6	JIS-C-3406	25
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Table 6

#### 7.2.4. Mating Tab Design

Tab contact used for mating with “250 Series Positive Lock Contacts” must be of the design specified in Fig.4.



(Note)

1. Use 7/3brass confirming to JIS H3100, C2600P-1/2Hard for tab material.
2. Material shall be plain metal except when used with unplated terminals material shall be tin plated.
3. This tab design is applicable to the tab used for testing product performance. And for the design of actual mating part tab, refer to AMP recommended tab drawing of the following number.  
1 Pos.: CP