



The product described in this document has not been fully tested to ensure conformance to the requirements outlined below. Therefore, TE Connectivity (TE) makes no representation or warranty, express or implied, that the product will comply with these requirements. Further, TE may change these requirements based on the results of additional testing and evaluation. Contact TE Engineering for further details.

090III 6P PLUG ASSEMBLY

1. SCOPE

1.1. Content

This specification covers the requirements for product performance, test methods and quality assurance provisions of 090III 6P Plug Assembly

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 has not been completed. The Qualification Test Report number will be issued upon successful qualification testing.

2. APPLICABLE DOCUMENTS AND FORMS

The following documents and forms constitute a part of this specification to the extent specified herein. Unless otherwise indicated, the latest edition of the document applies.

2.1. TE Documents

- 1743184: Customer Drawing (090III 6P PLUG ASSEMBLY FOR FOG S/W)

3. REQUIREMENTS

3.1. Design and Construction

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

3.2. Ratings

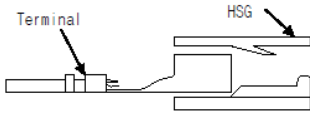
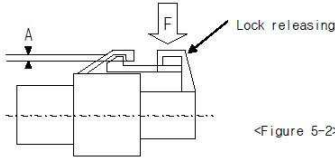
Table with 3 columns: Voltage, Temperature, Humidity. Values: 12V DC, 25±5°C, 60±20%

3.3. Test Requirements and Procedures Summary

Unless otherwise specified, all tests shall be performed at ambient environmental conditions.

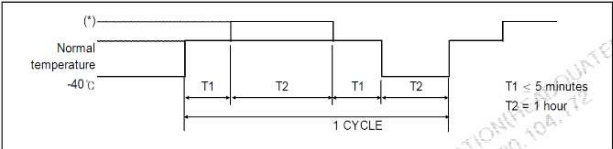
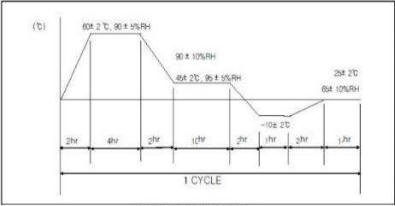
3.3.1 ES91500-00

Table with 3 columns: TEST DESCRIPTION, REQUIREMENT, PROCEDURE. Row: Appearance, No crack, damage, distortion are permitted, Using sense of sight and touch.

CONN engage and disengage force	Min 10kgf	Measure force by inserting and disengaging the connector with terminal assembled at constant 100 mm/min speed. However, remove lock part when measuring disengage force.												
Reverse insertion between housings	It shall not be incorrectly inserted by applying force of 20kgf.	Insert the housing with terminal by pushing it in reverse direction with applying 20kgf.												
Reverse insertion between terminal and housing	It shall not be incorrectly inserted b applying force of 5kgf.	Crimp cable of maximum size on terminal and then insert it into housing by applying force of 5kgf in the reserve direction.												
Engage force between terminal and housing	Max 1.5kgf	As shown in the following figure 5-1, measure the weight while inserting terminal into fixed housing at 100mm/min speed. 												
Strength of HSG lock	Min 8kgf	Combine housing only, fix the one side of housing in completely locked condition, and extend the other side in axial direction at a constant speed of 100mm/min. Then measure weight when lock structure is disengaged or destroyed.												
HSG lock releasing force	Max 6kgf	Apply force (F) to lock releasing part, and measure weight on the point of A=0. However, cut connector and then perform test at the section in order to secure visibility. 												
Terminal retention force	Min 10kgf	Fix the housing after inserting crimped terminals. Extend one line of cable in axial direction at a speed of 100mm/min at a position 50~100mm away from crimped part, and measure weight when terminal is disengaged from the housing.												
Engage and disengage force of terminal	Engage: 0.3~1.0kgf Disengage: 0.15~1.0kgf	Engage and disengage male terminal or steel gauge into or from female terminal at 100mm/min speed												
Crimp strength	Min 20kgf	Fix the crimped terminal and draw the cable at a position 50~100mm away from crimped part in axial direction at 100mm/min speed. Then measure the weight when cable is cut or disengage from the crimped part.												
Voltage Drop	Max 3mV/A	Measure the circuit voltage drop (V) by sending voltage and current described in the table -1 with terminal combined on the connector. Then calculate a voltage drop (VD) in terminal by subtracting cable resistance (L) from the circuit voltage drop (V). <table border="1" data-bbox="771 1753 1347 1879"> <thead> <tr> <th>Application</th> <th>Open voltage</th> <th>Short circuit current</th> <th>Division</th> </tr> </thead> <tbody> <tr> <td>Signal circuit</td> <td>20 ± 5 mV</td> <td>10 mA</td> <td>ECU, Sensor</td> </tr> <tr> <td>Power circuit</td> <td>13 V</td> <td>1 A</td> <td>Other than the above</td> </tr> </tbody> </table>	Application	Open voltage	Short circuit current	Division	Signal circuit	20 ± 5 mV	10 mA	ECU, Sensor	Power circuit	13 V	1 A	Other than the above
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Signal circuit	20 ± 5 mV	10 mA	ECU, Sensor											
Power circuit	13 V	1 A	Other than the above											

&lt;Table5-1&gt;

Insulation resistance	Min 100 MΩ		Measure resistance between neighbor terminals and between terminal and housing surface with DC 500V insulation resistance gauge with connector combined.										
Leakage current	10 μA or less		Measure it by applying DC 13V between neighboring terminals.										
High voltage test	There shall be no insulation break		Apply AC 1000V voltage of normal frequency 1 minute between neighboring terminals, and between housing surfaces of terminal, with connector combined.										
Temperature rise	General Connector Max 30 °C		Apply basic current (I=I0*K) of clause 4.3 to the connector with electrodes in series in the room free from wind (normal temperature). And measure a temperature of crimped part after reaching saturation temperature. Then calculate a temperature of crimped part by subtracting ambient temperature from the temperature.										
Twisting Test	Appearance	No crack, damage, distortion are permitted	Apply 8kgf force on the end part of combined connector 10 times each in the (front, rear, left, right) directions perpendicular to axial direction.										
	Max 10mV/A												
Connector Engage and Disengage Endurance Test	Appearance	No crack, damage, distortion are permitted	Make combine connectors engage and disengage at 100mm/min. Perform it 50 times. (Do not use locking device)										
	Max 10mV/A												
Overcurrent cycle test	Appearance	No crack, damage, distortion are permitted											
	Voltage Drop	Max 10mV/A	Condition A										
			Condition B										
	Temperature Rise	Max 40 °C	Condition A										
Condition B													
Engage and disengage connector with terminal assembled 10 times with hands, and apply to following current 1000 cycles for the connector with electrodes in series at 60°C of ambient temperature. <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td rowspan="2">Current application condition A</td> <td>Applied current</td> <td>2 times of basic current</td> </tr> <tr> <td>Current application time</td> <td>1 minute - ON, 9 minutes - OFF</td> </tr> <tr> <td rowspan="2">Current application condition B</td> <td>Applied current</td> <td>5 times of basic current</td> </tr> <tr> <td>Current application time</td> <td>10 seconds - ON, 590 seconds - OFF</td> </tr> </table>				Current application condition A	Applied current	2 times of basic current	Current application time	1 minute - ON, 9 minutes - OFF	Current application condition B	Applied current	5 times of basic current	Current application time	10 seconds - ON, 590 seconds - OFF
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	Current application time	10 seconds - ON, 590 seconds - OFF											
Cold temperature test	Appearance	No crack, damage, distortion are permitted											
	Insulation Resistance	Non-waterproof connector Min 10 kΩ											
	Current Leakage	Non-waterproof connector Max 1 mA											
			Engage and disengage connector with terminal assembled 10 times with hands, and leave it in temperature chamber of -40 °C for 120 hours. Make connector engaged and disengaged 5 times immediately, and drop it onto the concrete surface from 1m height 3 times in the direction of figure 6-1. (Voltage drop & Temperature rise test perform at normal temperature) : <div style="text-align: center;"> </div> <p style="text-align: right;">&lt;Figure 6-1&gt;</p>										

Cold and hot temperature shock test	Appearance	No crack, damage, distortion are permitted	Engage and disengage connector with terminal assembled 10 times with hands, and leave it in combined state at $-40^{\circ}\text{C}$ for 2 hours, and perform 200 cycles according of the method specified in the figure 6-2. Then leave it at room temperature for 2 hours or more (** follows table 6-1)  < Figure 6- 2 : Test pattern > <table border="1" data-bbox="769 516 1378 598"> <thead> <tr> <th>Division</th> <th>High temperature (*)</th> <th>Connector using part</th> </tr> </thead> <tbody> <tr> <td>A</td> <td><math>120^{\circ}\text{C}</math></td> <td>waterproof connector</td> </tr> <tr> <td>B</td> <td><math>80^{\circ}\text{C}</math></td> <td>Non-waterproof connector</td> </tr> </tbody> </table> < Table 6- 1 >	Division	High temperature (*)	Connector using part	A	$120^{\circ}\text{C}$	waterproof connector	B	$80^{\circ}\text{C}$	Non-waterproof connector
	Division	High temperature (*)		Connector using part								
A	$120^{\circ}\text{C}$	waterproof connector										
B	$80^{\circ}\text{C}$	Non-waterproof connector										
Voltage Drop	Max 10mV/A											
High temperature test	Appearance	No crack, damage, distortion are permitted	Engage and disengage connector with terminal assembled 10 times with hands, and leave it in combined state at the temperature chamber of the table 6-1 for 300 hours. Then pick it out and leave it until it returns to normal temperature. <table border="1" data-bbox="769 768 1406 850"> <thead> <tr> <th>Division</th> <th>High temperature (*)</th> <th>Connector using part</th> </tr> </thead> <tbody> <tr> <td>A</td> <td><math>120^{\circ}\text{C}</math></td> <td>waterproof connector</td> </tr> <tr> <td>B</td> <td><math>80^{\circ}\text{C}</math></td> <td>Non-waterproof connector</td> </tr> </tbody> </table> < Table 6- 1 >	Division	High temperature (*)	Connector using part	A	$120^{\circ}\text{C}$	waterproof connector	B	$80^{\circ}\text{C}$	Non-waterproof connector
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A	$120^{\circ}\text{C}$	waterproof connector										
B	$80^{\circ}\text{C}$	Non-waterproof connector										
Voltage Drop	Max 10mV/A											
Temperature Humidity Test	Appearance	No crack, damage, distortion are permitted	Engage and disengage connector with terminal assembled 10 times with hands, and leave it at $25^{\circ}\text{C}$ ambient temperature and 65% relative humidity for 25 hours. And perform 5 cycles of the method specified in figure 6-3. Then pick connector out of chamber and dry it for 2 hours or more.  < Figure 6-3 : Test pattern >									
	Voltage Drop	Max 10mV/A										
	Insulation Resistance	Non-waterproof connector Min 10 k $\Omega$										
	Current Leakage	Non-waterproof connector Max 1 mA										
Dust Test	Voltage Drop	Max 10mV/A	Engage and disengage connector with terminal assembled 10 times with hands, and diffuse 1.5kg Portland cement (JIS R5210) with fan (or others) for 10 seconds per 15 minutes while maintaining 150mm distance from wall in the closed container of 900~1200mm length, width and height, with connector combined. After 1 hour, Engage and disengage connector with terminal assembled 3 times with hands. And measure it.									
Oil and liquid test	Appearance	No crack, damage, distortion are permitted	Engage and disengage connector with terminal assembled 10 times with hands, and perform test each sample with connector combined. A. Immerge connector in combined state for 2 hours in mixed oil of $50 \pm 2^{\circ}\text{C}$ ENG oil (SAE10W) or equivalent oil and B. Immerge connector in combined state for 1 hour in car gasoline (JIS K2202) at normal temperature, and then pick it out. C. Immerge connector in combined state for 1 hour in brake liquid (pure product) at normal temperature, and then pick it out. D. Immerge connector in combined state for 1 hour in 100% washer liquid (pure product) at normal temperature, and then pick it out. E. Immerge connector in combined state for 1 hour in 50% LLC (Long life coolant) at normal temperature, and then pick it out.									
	Voltage Drop	Max 10mV/A										

Sulfur gas test	Appearance	No crack, damage, distortion are permitted	Engage and disengage connector with terminal assembled 10 times with hands, and expose it in combined state to sulfur gas of $40\pm 3^{\circ}\text{C}$ , density 10ppm, humidity 90~95%, for 24 hours. Then pick connector out of chamber and dry it for 2 hours or more.
	Voltage Drop	Max 10mV/A	
Complex environment endurance test	Appearance	No crack, damage, distortion are permitted	Engage and disengage connector with terminal assembled 10 times with hands, and leave it in combined state in the temperature chamber of $80^{\circ}\text{C}$ for 48 hours. And then perform the following vibration test. Then measure instant short circuit according to the method of below for 4 hours for X, Y, Z each.
	Crimp Tensile Strength	2.0 SQ: Min 20kgf	
	Voltage Drop	Max 10mV/A	
	Temperature Rise	General Connector Max $40^{\circ}\text{C}$ (9.9A)	
	Instant short circuit	Max $10\mu\text{s}$	

Acceleration G

Frequency Hz

PSD ( $\text{G}^2/\text{Hz}$ )

Frequency

Breakpoint (Hz)	Magnitude ( $\text{G}^2/\text{Hz}$ )
60.0	0.00100
200.0	1.50000
210.0	0.10000
1000.0	0.10000

■ Vibration test A (for non-waterproof connector)

Division	Condition
Ambient temperature/humidity	$80^{\circ}\text{C}$ , 90~95%
Applied current	Basic current (Connector electrodes in series.)
Current application cycle	120 CYCLE (45 minutes-ON, 15 minutes-OFF)
Vibration acceleration	4.4g
Frequency	20Hz ~ 200Hz (sweep time: 3 minutes or less)
Vibration time	40 hours for X, Y, Z each
Connector attaching method	Test mode A, B, C

## 3.4 Applied Part No List

TE Part no	Description
1743184-1/2/3/8 1-1743184-2/3/4/5	090III 6P PLUG ASSY FOR FOG S/W