025/110/250 HYBRID CONNECTOR

1. SCOPE

1.1. Content

This specification covers the requirements for product performance, test methods and quality assurance provisions of 025/110/250 HYBRID CONNECTOR SERIES

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

- 2005238: Customer Drawing (025/110/250 HYBRID ISL PLUG ASSY)
- 1897672: Customer Drawing (ABS MODULE ASSY FOR MGH-60)
- 2005243: Customer Drawing (HYB 38P ISL COVER ASS'Y)
- 963294: Customer Drawing (JUNIOR-POWER-TIMER KONTAKTSYSTEM)
- 963292: Customer Drawing (SINGLE WIRE SEAL)
- 963243: Customer Drawing (SINGLE WIRE SEAL (8.2mm DIA))
- 963245: Customer Drawing (SINGLE WIRE SEAL (8.2mm DIA))
- 2005423: Customer Drawing (CAVITY PLUG FOR HYB 38P ISL PLUG ASSY)

3. REQUIREMENTS

3.1. Design and Construction

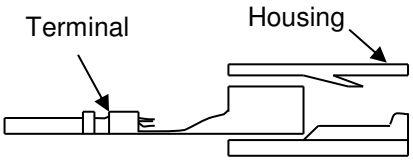
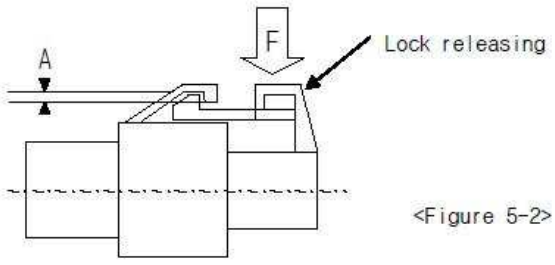
Product shall be of the design, construction, materials and physical dimensions specified on the applicable product drawing.

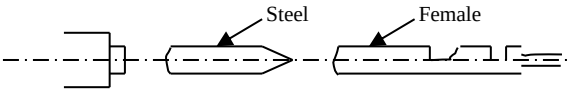
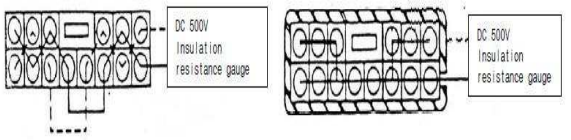
3.2. Ratings

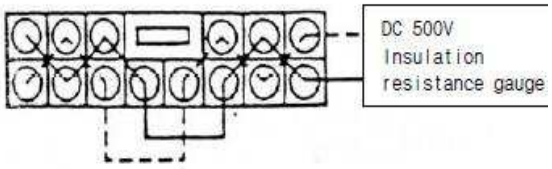
Voltage	Temperature	Humidity
12V DC	25±5℃	65±20%

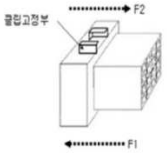
3.3. Test Requirements and Procedures Summary

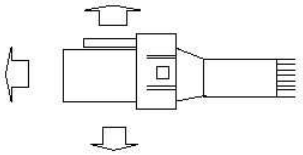
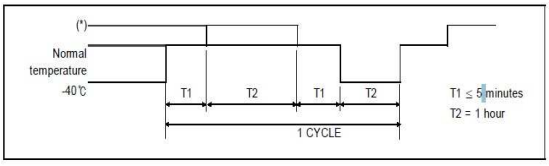
Unless otherwise specified, all tests shall be performed at ambient environmental conditions.

TEST DESCRIPTION	REQUIREMENT	PROCEDURE
Appearance	No crack, damage, distortion are permitted	Using sense of sight and touch.
CONN engage and disengage force	Max 18 kgf and less	Measure force by inserting and disengaging the connector with terminal assembled at constant 50 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 housings	025 series : Min 3kgf 110~250 series : Min 5kgf	Applicated the maximum size wire onto the terminal and insert it by applying a 5 kgf force or hand reversely to the housing.
Engage force between terminal and housing	Max 1.5 kgf	As shown in the following figure 4-1, measure the weight while inserting terminal into fixed housing at 100mm/min speed.  <Figure 4-1>
CONN Clip panel engage and retention force	Engage: Max 12kgf or less Retention: Min 15kgf or more	1. Insert clip into the fixed plate that can be furnished with clip at 50mm/min and measure the force at that time. 2. Pull clip at 50mm/min and measure the force when destroyed or disengaged
Strength of HSG lock	025~040 series : Min 8kgf 050~375 series : Min 10kgf	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 50mm/min. Then measure weight when lock structure is disengaged or destroyed.
HSG lock releasing force	Max 6 kgf	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.  <Figure 5-2>
Terminal retention force	025 series : Min 6kgf 030~060 series : Min 8kgf 070~312 series : Min 10kgf	Fix the housing after inserting crimped terminals. Extend one line of cable in axial direction at a speed of 50mm/min at a position 50~100mm away from crimped part, and measure weight when terminal is disengaged from the housing.

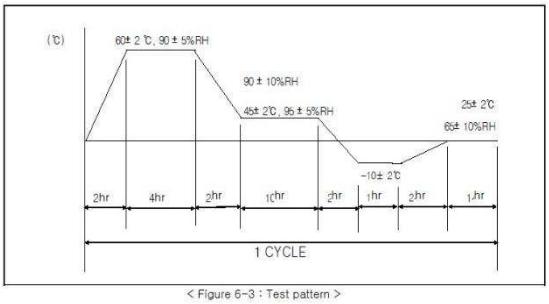
<table>
<tr><td rowspan="2">Terminal engage and disengage force (kgf)</td><td>Engage</td><td>025 series : 0.1~0.5kgf
110~187 series : 0.3~1.5kgf
250 series : 0.5~2.0kgf</td><td rowspan="2">As shown in figure 4-3, engage and disengage male terminal or steel gauge into or from female terminal at 100 mm/min speed.
 
</td></tr>
<tr><td>Disengage</td><td>025 series : 0.1~0.5kgf
110~187 series : 0.15~1.5kgf
250 series : 0.5~2.1kgf</td></tr>
<tr><td>Crimp strength (kgf)</td><td colspan="2">0.3 SQ : Min 6kgf
0.5 SQ : Min 9kgf
2.5 SQ : Min 25kgf
3.0 SQ : Min 35kgf</td><td>Fix the crimped terminal and draw the cable at a position 50~100 mm away from crimped part in axial direction at 100 mm/min speed. Then measure the weight when cable is cut or disengaged from the crimped part</td></tr>
<tr><td>Voltage Drop</td><td colspan="2">025 series : Max 10mV/A
030~070 series: Max 5 mV/A
090~370 series: Max 3 mV/A</td><td>Measure the circuit voltage drop (V) by sending voltage and current described in the table
5-1 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).
1)HARNESS versus UNIT:VD =V(L3+L4)
<table><tr><th>Application</th><th>Open voltage</th><th>Short circuit current</th><th>Division</th></tr><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></table>
<Table5-1></td></tr>
<tr><td>Insulation resistance</td><td colspan="2">Sealed Conn' : Min 250 MΩ</td><td>Measure resistance between neighbor terminals (figure 5-6), and between terminal and housing surface (figure 5-7) with DC 500V insulation resistance gauge with connector combined.
 

<Figure 5-6: Between neighboring terminals> <Figure 5-7: Between neighboring terminal and housing surface></td></tr>
<tr><td>Leakage current</td><td colspan="2">Sealed Conn' : Max 1 μA</td><td>Measure it by applying DC 14V between neighboring terminals (figure 5-6).
 

<Figure 5-6: Between neighboring terminals></td></tr>
<tr><td>High voltage test</td><td colspan="2">No allowed Insulation breakdown</td><td>Measured by applying test potential of 1000 V AC between the adjacent contact between the contact and housing.</td></tr>
<tr><td>Engage and disengage force between HSG and Clip</td><td colspan="2">Engage: Max 6kgf or less
Retention: Min 11kgf or more</td><td>Measure maximum force by engage end disengaging the clip at constant 50mm/min speed
 
</td></tr>
</table>

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.
	Voltage Drop	025 series : Max 10mV/A 090~375series: Max 3 mV/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)
	Voltage Drop	025 series : Max 20mV/A 030~375series: Max 10 mV/A	
Over Current Cycle Test	Appearance	No crack, damage, distortion are permitted	Engage and disengage connector with terminal assembled 10 times with hands, and apply the following current 1000 cycles for the connector with electrodes in series at 60℃ of ambient temperature.
	Voltage Drop	025 series : Max 20mV/A 030~375series: Max 10 mV/A	
	Temperature Rise	Max 40℃	
Cold temperature test	Appearance	No crack, damage, distortion are permitted	Engage and disengage connector with terminal assembled 10 times with hands, and leave it in temperature chamber of -40℃ 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) :  <Figure 6-1>
	Voltage Drop	025 series : Max 20mV/A 030~375series: Max 10 mV/A	
	Insulation Resistance	Sealed conn: Min 250 MΩ — Between terminals / housing surface	
	Current Leakage	Sealed conn :Max 100 μA	
	Temperature Rise	Max 40℃	
	Sealing	Min 0.5kgf/cm^2	
Cold and hot temperature shock test	Appearance	No crack, damage, distortion are permitted	Engage and disengage Connector with terminal assembled 10 times with hands, this repeats 200 CYCLE by below test condition. (ENG ROOM : 120℃, ENG ROOM except : 80℃) 
	Voltage Drop	025 series : Max 20mV/A 030~375series: Max 10 mV/A	
	Sealing	Min 0.5kgf/cm^2	
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.
	Voltage Drop	025 series : Max 20mV/A 030~375series: Max 10 mV/A	
	Sealing	Min 0.5kgf/cm^2	

High Temperature	Connector Using Part
80℃	Unsealed Connector
120℃	Sealed Connector

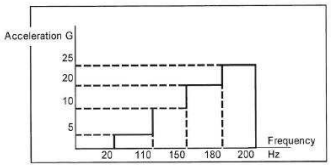
Soldering Test	Not less than 95% applied.			Immerse the terminal post end of the connector in a 250±5℃ lead precipitator for 5 seconds.
Temperature Humidity Test	Appearance	No crack, damage, distortion are permitted		Engage and disengage connector with terminal assembled 10 times with hands, and leave it at 25℃ 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	025 series : Max 20mV/A 030~375series: Max 10 mV/A		
	Insulation Resistance	Sealed conn: Min 250 MΩ	Between terminals	
			housing surface	
	Current Leakage	Sealed conn :Max 100 μA		
	Sealing	Min 0.5kgf/cm^2		
Dust Test	Appearance	No crack, damage, distortion are permitted		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, measure it.
	Voltage Drop	025 series : Max 20mV/A 030~375series: Max 10 mV/A		
	Sealing	Min 0.5kgf/cm^2		
Waterproof Test	Appearance	No crack, damage, distortion are permitted		Make combined connectors engaged and disengaged 10 time hands, and leave it in combined state at 120 ℃ ambient temperature for 40 minutes and then spray water of normal temperature for 20 minutes according to S2 of JIS D0203. Rep 48 cycles of this. * JIS D0203 S2 condition: attach specimen at 400mm distanc from the waterproof pipe with water spray hole or water discha hole, and rotate waterproof pipe 23 times per minute around th axis.
	Insulation Resistance	Sealed conn: Min 250 MΩ	Between terminals	
			housing surface	
	Current Leakage	Sealed conn :Max 100 μA		
	Sealing	Min 0.5kgf/cm^2		
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± 2℃ ENG oil (SAE10W) or equivalent oil and B. Immerge connector in combined state for1 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	025 series : Max 20mV/A 030~375series: Max 10 mV/A		
	Sealing	Min 0.5kgf/cm^2		

<table>
<tr><td rowspan="3">Ozone Test</td><td>Appearance</td><td colspan="2">No crack, damage, distortion are permitted</td><td rowspan="3">Engage and disengage Connector with terminal assembled 10 times with hands, and samples keep at 40℃ and 50±5pphm Ozone for 100hour. Then pick connector out of chamber and dry it for 2hours or more.</td></tr>
<tr><td>Voltage Drop</td><td colspan="2">025 series : Max 20mV/A
030~375series: Max 10 mV/A</td></tr>
<tr><td>Sealing</td><td colspan="2">Min 0.5kgf/cm^2</td></tr>
<tr><td rowspan="5">SaltWater Test</td><td>Appearance</td><td colspan="2">No crack, damage, distortion are permitted</td><td rowspan="5">Engage and disengage connector with terminal assembled 10 times with hands, and put it in 35℃ temperature regulation chamber, spray 5% salty water for 24 hours according to JIS Z2371, and, maintain room temperature without spray for 1 hour, Then repeat this four times. Then pick connector out of chamber and dry it at room temperature for 2 hours or more.</td></tr>
<tr><td>Voltage Drop</td><td colspan="2">025 series : Max 20mV/A
030~375series: Max 10 mV/A</td></tr>
<tr><td rowspan="2">Insulation Resistance</td><td rowspan="2">Sealed conn:
Min 250㏁</td><td>Between terminals</td></tr>
<tr><td>housing surface</td></tr>
<tr><td>Current Leakage</td><td colspan="2">Sealed conn :Max 100 ㎂</td></tr>
<tr><td rowspan="3">Sulfur (SO2) gas test</td><td>Appearance</td><td colspan="2">No crack, damage, distortion are permitted</td><td rowspan="3">Engage and disengage connector with terminal assembled 10 times with hands, and expose it in combined state to sulfur gas of 40±3℃, density 10ppm, humidity 90~95%, for 24 hours. Then pick connector out of chamber and dry it for 2 hours or more.</td></tr>
<tr><td>Voltage Drop</td><td colspan="2">025 series : Max 20mV/A
030~375series: Max 10 mV/A</td></tr>
<tr><td>Sealing</td><td colspan="2">Min 0.5kgf/cm^2</td></tr>
<tr><td>Crash Impact test</td><td>Instant short circuit</td><td colspan="2">Max 10 ㎲</td><td>Engage and disengage connector with terminal assembled 10 times with hands, and apply the impact of 1960, 3920, 5880, 9822 ㎨ in each direction.</td></tr>
<tr><td rowspan="6">Complex environment endurance test</td><td>Appearance</td><td colspan="2">No crack, damage, distortion are permitted</td><td rowspan="6">Engage and disengage connector with terminal assembled 10 times with hands and leave it in combined state in the temperature chamber of 120℃ or 80℃ (follows table 7) for 48 hours.
And then perform the following vibration test. Then measure instant short circuit according to the method of clause 4.16 for 4 hours for X, Y, Z each.
1) Wave Test A
<table><tr><th>Division</th><th>Condition</th></tr><tr><td>Ambient temperature/humidity</td><td>80℃, 90~95%</td></tr><tr><td>Applied current</td><td>Basic current (Connector electrodes in series.)</td></tr><tr><td>Current application cycle</td><td>120 CYCLE (45 minutes-ON, 15 minutes-OFF)</td></tr><tr><td>Vibration acceleration</td><td>4.4G</td></tr><tr><td>Frequency</td><td>20Hz ~ 200Hz (sweep time: 3 minutes or less)</td></tr><tr><td>Vibration time</td><td>40 hours for X, Y, Z each</td></tr><tr><td>Connector attaching method</td><td>Test mode A, B, C</td></tr></table></td></tr>
<tr><td rowspan="4">Crimp Tensile Strength</td><td>0.3SQ</td><td>Min 6kgf</td></tr>
<tr><td>0.5SQ</td><td>Min 9kgf</td></tr>
<tr><td>2.5SQ</td><td>Min 25kgf</td></tr>
<tr><td>3.0SQ</td><td>Min 35.0kgf</td></tr>
<tr><td>Voltage Drop</td><td colspan="2">025 series : Max 20mV/A
030~375series: Max 10 mV/A</td></tr>
</table>

	Temperature Rise	Max 40℃	2) Sine Wave Test B
	Instant short circuit	Max 10㎲	3) Random Wave Test
	Sealing	Min 0.5kgf/cm^2	

2) Sine Wave Test B

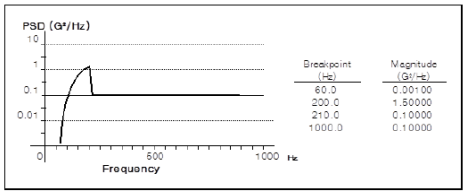
Division	Condition
Ambient temperature/humidity	120℃
Applied current	Basic current (Connector electrodes in series.)
Current application cycle	120 CYCLE (45 minutes-ON, 15 minutes-OFF)
Vibration acceleration	Follow figure 6-8
Frequency	20Hz ~ 200Hz (sweep time: 3 minutes or less)
Vibration time	40 hours for X, Y, Z each
Connector attaching method	Test mode A, B, C



(Figure 6-8)

3) Random Wave Test

Division	Condition
Ambient temperature	120℃
Applied current	Basic current (Connector electrodes in series.)
Current application cycle	120 CYCLE (45 minutes-ON, 15 minutes-OFF)
Vibration acceleration	Follow figure 6-9
Vibration time	8 hours for X, Y, Z each
Connector attaching method	Test mode D, E, F



(Figure 6-9)

3.4. Applied Part No List

TE Part no	Description
963243-1	SINGLE WIRE SEAL (8.2mm DIA)
963245-1	SINGLE WIRE SEAL (8.2mm DIA)
963292-1	SINGLE WIRE SEAL
963294-1	JUNIOR-POWER-TIMER Kontaksystem

2005238-1	025/110/250 HYBRID 38P ILS PLUG ASSY
1-2005238-2	025/110/250 HYBRID 38P ILS PLUG ASSY
2-2005238-3	025/110/250 HYBRID 38P ILS PLUG ASSY
3-2005238-4	025/110/250 HYBRID 38P ILS PLUG ASSY
2005243-2	HYB 38P ISL COVER ASSY
1-2005243-3	HYB 38P ISL COVER ASSY
2-2005243-2	HYB 38P ISL COVER ASSY
3-2005243-3	HYB 38P ISL COVER ASSY
2005423-3	CAVITY PLUG FOR HYB 38P ISL PLUG ASS'Y
1879672-1	ABS MODULE ASSY FOR MGH-60
1-1897672-1	ABS MODULE ASSY FOR MGH-60