HYB 58P CAP/PLUG ASS'Y

1. Scope

1.1 Content

This specification defines the test method for 11p Door to Body Connector, terminal and accessories.

1.2 Qualification

When testing the named products, the following specified specifications and standards shall be used.
All tests have to be done using the applicable inspection plan and product.

1.3 Applied Product

2005275-3	Cap assembly
2005281-3	Plug assembly

2. Applicable Documents

The following documents, if they are related, are sequent to this specification.
In case of conflict between the requirements of this specification and the product drawing or in conflict between the requirements of this specification and the referred documents, this specification has precedence

2.1 TE Connectivity Documents

2005275	Customer Drawing (Plug assembly)
2005281	Customer Drawing (Rear holder housing)

2.2 HKMC specification

GMW3191	GM Connector test and validation

A1	**Change Class grade 1**	**YH Ma**	**20.Aug '24**
A	**RELEASED**	**JS KIM**	**26 Mar '20**
LTR	Revision Record	DR/CHK	Date

3. Requirements

<table>
<tr><th colspan="4">Terminal – Mechanical Tests</th></tr>
<tr><th>No.</th><th>Items</th><th>Criteria</th><th>Remark</th></tr>
<tr><td>1</td><td>Crack Corrosion</td><td>Clean contacts or material to be tested by degreasing in a suitable alkaline cleaner or organic
solvent. If necessary, immerse parts for » 30 s in either sulfuric acid (10 % by mass) or nitric
acid (30 % by mass) and then rinse in clean running water. Dry the samples throughly.
Fill the test vessel with the ammonia solution to a depth of » 30 mm. Suspend the cleaned test
samples at a height of 50 mm above the surface of the ammonia solution and seal the test vessel.
Expose the samples for (24 ± 1) h. Following the 24 h ammonia exposure, submerge the samples in either sulfuric acid (10 % by mass) or nitric acid (30 % by mass) at (+23 ± 5) C for (30...60) s.
Examine the parts using at least 10x magnification. Observe and note any cracks.</td><td></td></tr>
<tr><td>2</td><td>Crimp Integrity</td><td>The degree of compression shall be shown in a cross-section through the middle of the cable
A method for the metallographical fine sanding and polishing shall be chosen which generates a
smooth surface without any deformation. Small cavities shall be easily recognized. The zone to
N/A (only for unplated copper/zinc based terminal)
be polished and photographed shall be chosen in the area of maximum compression of the wire
strands. The distance between the cutting zone and the polishing zone shall be large enough
so that there is no change in structure of the polishing zone due to sample preparation.
In cases where the crimp or attachment structure varies significantly from these examples,
alternate sectioning methods may be required.
<table>
<tr><th colspan="2">Test Items</th><th colspan="2">Acceptance Criteria</th></tr>
<tr><td rowspan="6">Crimp Integrity</td><td rowspan="3">Visual Inspection</td><td rowspan="3">No corrosion, discoloration , cracks etc., which could affect the function. Swelling or distortion shall not exceed the tolerances.</td><td>1.6</td></tr>
<tr><td>2.8</td></tr>
<tr><td>5.8</td></tr>
<tr><td rowspan="3">Crimp Integrity</td><td rowspan="3">All wire strands shall be uniformly deformed, honeycomb like structure, enveloped by crimp wings.</td><td>1.6</td></tr>
<tr><td>2.8</td></tr>
<tr><td>5.8</td></tr>
</table></td><td></td></tr>
<tr><td>3</td><td>Terminal Wire Attachment Tensile strength</td><td>1 Using test apparatus, apply force until terminal/conductor separation occurs.
Note: If more than one conductor is attached to one terminal, test each wire individually.
2 Record velocity, tensile strength and location of failure for each test</td><td></td></tr>
</table>

<table>
<tr><td></td><td></td><td>sample.
Note: Ring terminals requiring dip soldering shall be pull tested before dipping.

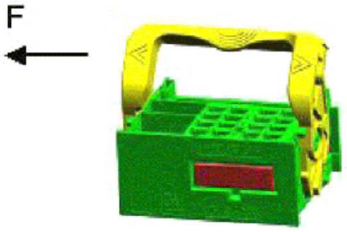
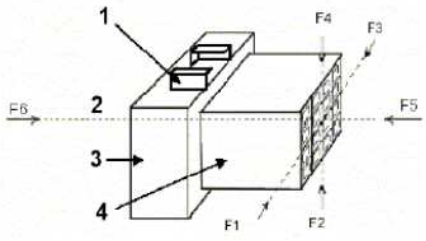
Min 50N (0.35SQ)
Min 70N (0.5SQ)
Min 235N (2.5SQ)
Min 115N (1.0SQ)
Min 235N (2.5SQ)
Min 320N (4.0SQ)</td><td></td></tr>
<tr><td>4</td><td>Terminal-to-Terminal Engagement Force</td><td>None – Documentation purposes only.</td><td></td></tr>
<tr><td>5</td><td>Mechanical Overstress Test</td><td>Perform the terminal-to-terminal engage force test and a dry circuit test. Push the test pin into the female terminal at the maximum force specified in Table 6. Hold it for 60~70 seconds. Extract the test pin and repeat the terminal to terminal engage force. Store the samples at (+23 ± 5) C for 24 h min.
Repeat the dry circuit test.
Table 6: Mechanical Overstress Test
<table>
<tr><th>Terminal Size in mm</th><th>Maximum Push Force in N</th></tr>
<tr><td>0.64</td><td>10</td></tr>
<tr><td>1.5</td><td>20</td></tr>
<tr><td>2.8</td><td>40</td></tr>
<tr><td>6.35</td><td>80</td></tr>
<tr><td>< 6.35</td><td>100</td></tr>
</table></td><td></td></tr>
<tr><td>6</td><td>Terminal Bend Resistance</td><td>Prepare the smallest(with the tninnest insulation) and the largest conductor(with the thickest insulation). Mount the terminal in a fixture. Apply the force specified in Table 21 to the sample as shown in Figure 28 for 15 s and release. Inspect the bend area using at least 10x magnification. Straighten it and re-inspect the area.
Mount a new terminal rotated 180 ˚ and repeat the above procedure. Mount a new terminal rotated 90 ˚ and repeat.
For terminal style “B” designs in Figure 27, repeat the above test procedure with each terminal mounted such that location “2” is firmly retained at the edge of the fixture.</td><td></td></tr>
</table>

<table>
<tr><td></td><td></td><td>
Table 21: Terminal Size and Applied Bending Force
<table>
<tr><th>Terminal Size
in mm</th><th>Applied Force
in N</th></tr>
<tr><td>0.64 ≤ 1.5</td><td>4.0</td></tr>
<tr><td>1.5 ≤ 2.8</td><td>7.0</td></tr>
<tr><td>2.8 ≤ 6.3</td><td>10.0</td></tr>
<tr><td>6.3 ≤ 9.5</td><td>15.0</td></tr>
<tr><td>9.5</td><td>20.0</td></tr>
</table>
</td><td></td></tr>
<tr><td colspan="4">Terminal Electrical Tests</td></tr>
<tr><th>No.</th><th>Items</th><th>Criteria</th><th>Remark</th></tr>
<tr><td>1</td><td>Maximum Current Rating</td><td>Construct 'Draft Free Enclosure' as shown Figure 9. Turn on the power supply and adjust current
to 0 A and voltage to 14 VDC. Slowly increase the power supply in 5 % increments until it is providing 50 % of the intended terminal design current capability. From 50% of design capability
increase the current in 10 % increments. From 80 % of design capability, increase the current in
increments of 5 % of the terminal capability Continue increasing the current in 5 % increments until
thermal stability can no longer be maintained after 15 min. Record the ambient Temperature, the Temperature of each terminal, the measured voltage and current at each increment.
Construct the Base Curve by calculating the mean value of the temperature differences of the 10 test samples and plotting as shown in Figure 10,Base Curve.
Reduce the current values of the base curve by 20 % to create the derating curve (reduced base
curve) as shown in Figure 11.</td><td></td></tr>
<tr><td>2</td><td>Current Cycling</td><td>’ON’ and 15 min ’OFF’ at the Base Curve Current of the terminal from Figure 11, Derating Curve. After 30 min into the first ’ON’ cycle record the total connection resistance and thermocouple
readings. Cycle the current with a duty cycle of 45 min ’ON' and 15min ’OFF’ for 1008 h taking readings at least once daily, or as specified by the test requestor.
<table>
<tr><th>TM'L Size</th><th>Wire Size</th><th>$T_{ambient}$</th><th>Current</th></tr>
<tr><td>1.6</td><td>1.0</td><td>24 °C</td><td>10 Amp.</td></tr>
<tr><td>2.8</td><td>2.5</td><td>24 °C</td><td>25 Amp.</td></tr>
<tr><td>5.8</td><td>4.0</td><td>24 °C</td><td>37 Amp.</td></tr>
</table>
</td><td></td></tr>
<tr><td colspan="4">Connector System – Electrical Tests</td></tr>
<tr><th>No.</th><th>Items</th><th>Criteria</th><th>Remark</th></tr>
<tr><td>1</td><td>Mechanical Shock</td><td>None – Samples are evaluated only after completion of the Vibration with Thermal Cycling Test.</td><td></td></tr>
<tr><td>2</td><td>Thermal Aging</td><td>The test samples shall meet the requirements for Dry Circuit both before and after the environmental tests.</td><td></td></tr>
</table>

		All test samples shall meet the visual requirements. All mechanical assists and/or other elements required to separate connectors for service must function without breakage.	
3	Heavy duty test	Maximum allowed temperature rise on the terminal at the end of each cycle is 50°C. RTotal Connection measured shall be in accordance with Table 10 in Section 4.17, Dry Circuit.	
4	Temperature Humidity cycling	Test samples shall meet the dry circuit requirements both before and after temperature/humidity cycling. All test samples shall meet the visual requirements. All mechanical assists and/or other elements required to separate connectors for service must function without breakage.	

Connector System – Mechanical tests

No.	Items	Criteria				Remark
1	Terminal to Connector Engagement Force		TPA in open position	TPA in fully seated position		
		1.6 TAB/REC.	15N	30N		
		2.8 TAB/REC.	15N	30N		
		5.8 TAB/REC.	30N	60N		
2	Terminal from connector Extraction Force	Terminal Size (mm)	Primary Lock Only (N)	Primary Lock & TPA/PLR and Post-Moisture Conditioning (N)	Post-Thermal Aging and Post-Temp/Humidity Cycling (N)	
		0.64	30	60	50	
		</=1.5	50	80	70	
		</=2.8	60	100	90	
		</=6.3	90	120	110	
		>6.3	100	150	140	
3	Connector to Connector Engagement Force	The maximum force is 75N.				
4	Locked Connector Disengagement Force	The minimum force is 120N.				
5	Unlocked Connector Disengagement Force	The maximum force for both disconnecting the unlocked connector pairs and disengaging the primary lock is 100N.				
6	Connector Polarization(Coding) Feature Effectiveness	The connection system shall withstand a minimum mating force of three times the force measured. Appearance : No corrosion, cracks, discoloration, etc.,which could affect the function. Swelling or distortion shall not exceed the tolerances. Polarization Feature : Shall withstand 3 times of the mating force. There should be no terminal to terminal contace under 150N.				
7	Terminal Position Assurance	TPA Pre-Lock Force	More than 20N			
		TPA Closing Force with properly Assembled Terminals	30N or less			
		TPA Closing Force with One Improperly Assembled Terminals	60N or more			
		Closed TPA Locking Force	More than 25N			
8	Lever and Slide "Open" Position Retention	Mount the samples in the fixture with the slide or lever in the open position. Apply a 50N force in direction F. : Min. 50Newton Mount new conn'rs. Apply a 150N force to close the slide or lever. : Min. 150Newton				

<table>
<tr><td></td><td></td><td>Mount new conn'rs. Apply an increasing force to the slide or lever until the pre-lock position is defeated : Shall withstand the force to defeat the pre-lock posi. Without permanent damage or deformation</td><td></td></tr>
<tr><td>9</td><td>Lever and Slide, Side Force Strength</td><td>Apply a 100N force in direction "F", as shown in Figure 4 at the rate of (50±10)mm/min with the lever or slide in both the open and closed positions. - ①
Apply a 100N force in direction opposite to direction "F" at the rate of (50±10)mm/min with the lever or slide in the open and closed positions. - ②
Position the slide or lever in a position approximately halfway between the open and closed positions
Apply a 60N force in direction "F" at the rate of (50±10) mm/min. - ③
Apply a 60N force in the direction opposite to direction "F" at the rate of (50±10) mm/min. - ④
F
 
<table>
<tr><th colspan="2">Test Items</th><th colspan="2">Acceptance Criteria</th></tr>
<tr><td rowspan="3">Lever and Slide, Side Force Strength</td><td rowspan="2">Appea-rance</td><td rowspan="2">No corrosion, cracks, discoloration, etc., which could affect the function. Swelling or distortion shall not exceed the tolerances.</td><td>Initial</td></tr>
<tr><td>After Test</td></tr>
<tr><td rowspan="3">Lever and Slide, Side Force Strength</td><td rowspan="2">Shall withstand 100 N in the open & closed position.</td><td>In the open posi.</td></tr>
<tr><td>In the closed posi.</td></tr>
<tr><td>Shall withstand 60 N in the midpoint posi.</td><td>In the mid posi.</td></tr>
</table></td><td></td></tr>
<tr><td>10</td><td>Connector Mounting Feature Mechanical Strength</td><td>Manufacture a mounting feature with the correct dimensions to fit the conn'rs on test. With the conn'r attached to that, apply a force at a rate of 50 mm/min in the direction F1~F6 until the breakage of the mounting feature or until the force specified in the acceptance criteria is reached.
Figure 6: (3D View) TEST SEQ. 25K
1 Mounting Feature
2 Mating Axis
3 Mounting Connect
4 Non-mounting
 
</td><td></td></tr>
</table>

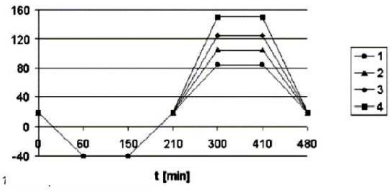
<table>
<tr><td></td><td></td><td>
<table>
<tr><th colspan="2">Test Items</th><th colspan="2">Acceptance Criteria</th></tr>
<tr><td rowspan="7">Connector Mounting Feature Mechanical Strength</td><td rowspan="2">Appea–rance</td><td colspan="2" rowspan="2">No corrosion, cracks, discoloration, etc., which could affect the function. Swelling or distortion shall not exceed the tolerances.</td><td>Initial</td></tr>
<tr><td>After Test</td></tr>
<tr><td rowspan="5">Connector Mounting Feature Mechanical Strength</td><td>F1</td><td rowspan="5">Min. 50N</td></tr>
<tr><td>F2</td></tr>
<tr><td>F3</td></tr>
<tr><td>F4</td></tr>
<tr><td>F5</td></tr>
<tr><td></td><td>F6</td><td>Min. 110 N</td></tr>
</table>
</td><td></td></tr>
<tr><td>11</td><td>Connector Position Assurance [CPA]</td><td>
① CPA Lock and Unlock Force
Using a mated connector pair, close the CPA at a uniform rate of (50 ± 10) mm/min until fully
seated and locked. Open the CPA at a uniform rate of (50 ± 10)mm/min until fully opened.
② CPA Closing Force on Unmated Connectors
Using an unmated connector, close the CPA at a uniform rate of (50 ± 10) mm/min until
fully seated and locked. Record the peak force.
③ CPA Extraction Force
Using an unmated conn'r, apply a force to the CPA in the opposite direction to the normal
closing direction at a uniform rate of (50 ± 10) mm/min until fully detached.
<table>
<tr><th colspan="2">Test Items</th><th colspan="2">Acceptance Criteria</th></tr>
<tr><td rowspan="6">CPA Extraction Force</td><td rowspan="2">Appea–rance</td><td colspan="2" rowspan="2">No corrosion, cracks, discoloration, etc., which could affect the function. Swelling or distortion shall not exceed the tolerances.</td><td>Initial</td></tr>
<tr><td>After Test</td></tr>
<tr><td>CPA Lock Force</td><td colspan="3">Max. 22 N</td></tr>
<tr><td>CPA Unlock Force</td><td colspan="3">20~40N</td></tr>
<tr><td>CPA Closing Force on Unmated Conn'r</td><td>Over 3P</td><td>80N Min.</td></tr>
<tr><td>CPA Extraction Force</td><td>Over 3P</td><td>80N Min.</td></tr>
</table>
</td><td></td></tr>
<tr><td colspan="4">Connector System - Electrical Tests</td></tr>
<tr><td>1</td><td>MECHANICAL SHOCK / VIBRATION SEQUENCE</td><td>Divide the test samples into 2 groups of 5 and the first group shall be monitored continuously.
Measure the dry circuit resistance on the terminated lead pairs. Set the power supply to provide100 mA.</td><td></td></tr>
</table>

Perform the Mechanical Shock Test according to EN 60068-2-27 and Table 11, Mechanical ☞ Vibration with Thermal cycling
Perform the Vibration with Thermal Cycling Test according to the Table 12, Figure 16, 17, 18.Shock.

Table 11: Mechanical Shock	Test No.	
	1	2
Acceleration [g]	100	25
Nominal shock duration [ms]	11	15
Nominal shock shape	half sine	half sine
Number of shocks per axis (positive and negative)	3 × 6 = 18	500 × 6 = 3000

☞ Vibration with Thermal cycling
Perform the Vibration with Thermal Cycling Test according to the Table 12, Figure 16, 17, 18.

Figure 16: Thermal Cycle

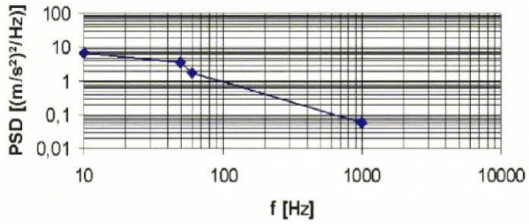


1
2 Temperature class 2
3 Temperature class 3
4 Temperature class 4
t Time in min
T Temperature in °C

Table 12: Thermal Cycle Requirements

Time in min	Temperature in °C			
	Class 1	Class 2	Class 3	Class 4
0	+20	+20	+20	+20
60	-40	-40	-40	-40
150	-40	-40	-40	-40
210	+20	+20	+20	+20
300	+85	+100	+125	+155
410	+85	+100	+125	+155
480	+20	+20	+20	+20

Figure 19: Body (Sprung Masses) Random Vibration Schedule



PSD Power Spectral Density in $(m/s^2)^2/Hz$
F Frequency in Hz
Test according to EN 60068-2-64
Test Duration = (22...24) h for each X, Y, Z coordinate axis of the parts.
RMS Acceleration = 20.9 m/s^2.

Table 15: Body (Sprung Masses) Random Vibration Schedule

Frequency in Hz	Power Spectral Density in $(m/s^2)^2/Hz$	Acceleration Power Density in G^2/Hz
10	7	0.073
50	3.5	0.036
60	1.75	0.018
1000	0.06	0.0006

Test Items		Acceptance Criteria		
Mechanical Shock / Vibration	Appearance	No corrosion, cracks, discoloration, etc., which could affect the function. Swelling or distortion shall not exceed the tolerances.		Initial
				After Test
	$R_{Dry\ Circuit}$ (unit: mΩ)	5mΩ Max.	1.6	Initial
				After Test
		5mΩ Max.	2.8	Initial
				After Test
		3.5mΩ Max.	5.8	Initial
				After Test
	Electrical Discontinuity	Shall be no loss of electrical continuity (resistance >7Ω >1μs)		

<table>
<tr>
<td>2</td>
<td>Thermal Aging</td>
<td>Set the temperature chamber to the maximum ambient temperature specified in Table 1. Place the samples in the chamber and heat age for 1008 h. Remove the samples from the chamber and let rest at ambient temperature and humidity for 24 h min. Measure the dry circuit resistance.
<table>
<tr><th colspan="2">Test Items</th><th colspan="3">Acceptance Criteria</th></tr>
<tr><td rowspan="7">Thermal Aging</td><td>Appea-rance</td><td colspan="2">No corrosion, cracks, discoloration, etc., which could affect the function. Swelling or distortion shall not exceed the tolerances.</td><td>Initial</td></tr>
<tr><td></td><td colspan="2"></td><td>After Test</td></tr>
<tr><td rowspan="6">RDry Circuit (unit: m Ω)</td><td rowspan="2">5mΩ Max.</td><td rowspan="2">1.6</td><td>Initial</td></tr>
<tr><td>After Test</td></tr>
<tr><td rowspan="2">5mΩ Max.</td><td rowspan="2">2.8</td><td>Initial</td></tr>
<tr><td>After Test</td></tr>
<tr><td rowspan="2">3.5mΩ Max.</td><td rowspan="2">5.8</td><td>Initial</td></tr>
<tr><td>After Test</td></tr>
</table>
</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Heavy duty test</td>
<td>1 Complete the dry circuit test per paragraph 4.17, Dry Circuit, and record the results
2 Set the power supply to provide the maximum de-rated current for the terminal and cable
taken from the border of Area 2 in Figure 11, Derating Curve, for the largest wire size
at the specified test temperature, i.e., +80 C or +100 C.
3 Connect the thermocouple leads a data logger.
4 Set the temperature chamber to +80 C for temperature classes (1...3) in Table 1 and +100 C
for temperature class 4 in Table 1.
5 Run themaximum de-rated current through the test samples at the respective test
temperature for 5 h.
6 Transfer the samples to -40 C and cool for 2 h at 0 A.
7 Repeat the above test procedure for a total of 5 cycles.
8 After 5 cycles, store the samples at (+23 ± 5) C for 24 h min.
9 Perform a dry circuit test and record the results for each terminal pair.
<table>
<tr><th>Terminal</th><th>wire</th><th>$T_{ambient}$</th><th>Current</th></tr>
<tr><td>1.6</td><td>1.0mm^2</td><td>(+80 ~ −40)℃</td><td>7 Amp</td></tr>
<tr><td>2.8</td><td>2.5mm^3</td><td>(+80 ~ −41)℃</td><td>17Amp</td></tr>
<tr><td>5.8</td><td>4.0mm^4</td><td>(+80 ~ −42)℃</td><td>27Amp</td></tr>
</table>
</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Thermal Shock</td>
<td>Divide the samples into two groups of 5 and perform the thermal shock test. The first group shall be set according to the Figure 14(1. refer to mechanical shock/vibration seq. in this seq.) and monitored throughout the test. Set the chamber to the minimum ambient temperature for the class and place and soak the samples for 30 minutes.</td>
<td></td>
</tr>
</table>

<table>
<tr>
<td></td>
<td></td>
<td>Set the chamber to the maximum ambient temperature and place and soak the samples for 30 min.
For temp. class 1, transfer the samples between temperature extremes 100 times.
For temp. class 2, 3 and 4, transfer the samples between temperature extremes 300 times.
<table>
<tr><th>Class</th><th>Ambient Operating Temperature in °C</th><th>Typical Installation Position</th></tr>
<tr><td>1</td><td>-40...+85</td><td>Passenger compartment or trunk</td></tr>
<tr><td>2</td><td>-40...+105</td><td>Under hood/chassis</td></tr>
<tr><td>3</td><td>-40...+125</td><td>On engine</td></tr>
<tr><td>4</td><td>-40...+155</td><td>On engine (hot locations)</td></tr>
</table>
Table 1: Temperature Class
<table>
<tr><td colspan="2">Test Items</td><td colspan="3">Acceptance Criteria</td><td></td></tr>
<tr><td rowspan="8">Thermal Shock</td><td>Appea-rance</td><td colspan="3">No corrosion, cracks, discoloration, etc., which could affect the function. Swelling or distortion shall not exceed the tolerances.</td><td>Initial</td></tr>
<tr><td></td><td colspan="3"></td><td>After Test</td></tr>
<tr><td rowspan="6">Dry Circuit Resistance (unit: mΩ)</td><td>5mΩ Max.</td><td>1.6</td><td>Initial</td></tr>
<tr><td></td><td></td><td>After Test</td></tr>
<tr><td>5mΩ Max.</td><td>2.8</td><td>Initial</td></tr>
<tr><td></td><td></td><td>After Test</td></tr>
<tr><td>3.5mΩ Max.</td><td>5.8</td><td>Initial</td></tr>
<tr><td></td><td></td><td>After Test</td></tr>
<tr><td>Electrical Discontinuity</td><td colspan="3">Shall be no loss of electrical continuity (resistance >7Ω >1㎲)</td><td></td></tr>
</table>
</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Temperature Humidity Cycling</td>
<td>Place the samples in to the thermal chamber and cycle 10 times per the schedule shown below using
the min. and max. operating temperatures for the class.
<table>
<tr><td colspan="2">Test Items</td><td colspan="3">Acceptance Criteria</td><td></td></tr>
<tr><td rowspan="10">Temperature Humidity Cycling</td><td>Appea-rance</td><td colspan="3">No corrosion, cracks, discoloration, etc., which could affect the function. Swelling or distortion shall not exceed the tolerances.</td><td>Initial</td></tr>
<tr><td></td><td colspan="3"></td><td>After Test</td></tr>
<tr><td>Function</td><td colspan="3">All mechanical assists and/or other elements must function without breakage.</td><td></td></tr>
<tr><td rowspan="6">Dry Circuit Resistance (unit: mΩ)</td><td>5mΩ Max.</td><td>1.6</td><td>Initial</td></tr>
<tr><td></td><td></td><td>After Test</td></tr>
<tr><td>5mΩ Max.</td><td>2.8</td><td>Initial</td></tr>
<tr><td></td><td></td><td>After Test</td></tr>
<tr><td>3.5mΩ Max.</td><td>5.8</td><td>Initial</td></tr>
<tr><td></td><td></td><td>After Test</td></tr>
<tr><td>Electrical Discontinuity</td><td colspan="3">Shall be no loss of electrical continuity (resistance >7Ω >1㎲)</td><td></td></tr>
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</td>
<td></td>
</tr>
<tr>
<td colspan="4">Unsealed connector – Environmental Tests</td>
</tr>
</table>

<table>
<tr><th>No.</th><th>Items</th><th>Criteria</th><th>Remark</th></tr>
<tr><td>1</td><td>Thermal Aging</td><td>Set the temperature chamber to the maximum ambient temperature specified in Table 1, temperature
for the class rating of the connector under test. Place the samples in the chamber and heat age for
Remove the samples from the chamber and let rest at ambient temperature and humidity for 24h mi
<table>
<tr><th colspan="2">Test Items</th><th colspan="3">Acceptance Criteria</th></tr>
<tr><td rowspan="11">Thermal Aging</td><td rowspan="2">Appea-rance</td><td rowspan="2" colspan="2">No corrosion, cracks, discoloration, etc., which could affect the function. Swelling or distortion shall not exceed the tolerances.</td><td>Initial</td></tr>
<tr><td>After Test</td></tr>
<tr><td>Function</td><td colspan="3">All mechanical assists and/or other elements must function without breakage.</td></tr>
<tr><td rowspan="2">Isolation Resistance (unit: GΩ)</td><td rowspan="2" colspan="2">100MΩ Min.</td><td>Initial</td></tr>
<tr><td>After Test</td></tr>
<tr><td rowspan="2">Dielectric Strength (unit: μA)</td><td rowspan="2">No current leakage</td><td>Terminal & Terminal</td><td></td></tr>
<tr><td>Terminal & Housing</td><td></td></tr>
<tr><td rowspan="6">RDry Circuit (unit: mΩ)</td><td rowspan="2">5mΩ Max.</td><td rowspan="2">1.6</td><td>Initial</td></tr>
<tr><td>After Test</td></tr>
<tr><td rowspan="2">5mΩ Max.</td><td rowspan="2">2.8</td><td>Initial</td></tr>
<tr><td>After Test</td></tr>
<tr><td rowspan="2">3.5mΩ Max.</td><td rowspan="2">5.8</td><td>Initial</td></tr>
<tr><td>After Test</td></tr>
</table>
</td><td></td></tr>
<tr><td>2</td><td>Corrosion Sequence</td><td>☞ Mount connector pairs in both a vertical and horizontal orientation within the test chamber.
(1) Use ISO 16750-4, Salt Fog Test, for a period of 6 days per the following test cycle:
(2) Perform the Salt Fog (Mist) Test per IEC 60068-2-11 Ka.
(3) Perform the dry circuit resistance test, visual inspection, terminal form conn'r extraction force</td><td></td></tr>
</table>

<table>
<tr>
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<td>
<table>
<tr><th colspan="3">Test Items</th><th colspan="3">Acceptance Criteria</th></tr>
<tr><td rowspan="15">Corrosion Sequence</td><td rowspan="2">Appea–rance</td><td rowspan="2"></td><td colspan="2" rowspan="2">No corrosion, cracks, discoloration, etc., which could affect the function. Swelling or distortion shall not exceed the tolerances.</td><td>Initial</td></tr>
<tr><td>After Test</td></tr>
<tr><td rowspan="2">Isolation Resistance (unit: GΩ)</td><td rowspan="2"></td><td colspan="2" rowspan="2">100MΩ Min.</td><td>Initial</td></tr>
<tr><td>After Test</td></tr>
<tr><td rowspan="2">Dielectric Strength (unit: μA)</td><td rowspan="2"></td><td rowspan="2">No current leakage</td><td>Terminal & Terminal</td><td></td></tr>
<tr><td>Terminal & Housing</td></tr>
<tr><td rowspan="6">Terminal Extraction Force (unit: N)</td><td rowspan="6"></td><td colspan="2" rowspan="2">Min. 100 N</td><td>1.6 TAB</td></tr>
<tr><td>1.6 REC</td></tr>
<tr><td colspan="2" rowspan="2">Min. 100 N</td><td>2.8 TAB</td></tr>
<tr><td>2.8 REC</td></tr>
<tr><td colspan="2" rowspan="2">Min. 120 N</td><td>5.8 TAB</td></tr>
<tr><td>5.8 REC</td></tr>
<tr><td rowspan="6">RDry circuit (unit: mΩ)</td><td rowspan="2"></td><td rowspan="2">5mΩ Max.</td><td rowspan="2">1.6</td><td>Initial</td></tr>
<tr><td>After Test</td></tr>
<tr><td rowspan="2"></td><td rowspan="2">5mΩ Max.</td><td rowspan="2">2.8</td><td>Initial</td></tr>
<tr><td>After Test</td></tr>
<tr><td rowspan="2"></td><td rowspan="2">3.5mΩ Max.</td><td rowspan="2">5.8</td><td>Initial</td></tr>
<tr><td>After Test</td></tr>
</table>
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<tr>
<td>3</td>
<td>Thermal Shock</td>
<td>Set the continuity monitoring equipment to monitor the current through the resistror during the test. (refer to Figure 14)
Set the chamber to the minimum ambient temperature for the class and place and soak the samples for 30 minutes.
Set the chamber to the maximum ambient temperature and place and soak the samples for 30 minutes.
For temp. class 1, transfer the samples between temp. extremes 100 times.
For temp. class 2, 3 and 4, transfer the samples between temp. extremes 300 times.</td>
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<table>
<tr><th colspan="2">Test Items</th><th colspan="3">Acceptance Criteria</th></tr>
<tr><td rowspan="10">Thermal Shock</td><td rowspan="2">Appea-rance</td><td colspan="2" rowspan="2">No corrosion, cracks, discoloration, etc., which could affect the function. Swelling or distortion shall not exceed the tolerances.</td><td>Initial</td></tr>
<tr><td>After Test</td></tr>
<tr><td rowspan="2">Dielectric Strength (unit: μA)</td><td colspan="2" rowspan="2">No current leakage</td><td>Terminal & Terminal</td></tr>
<tr><td>Terminal & Housing</td></tr>
<tr><td>Isolation Resistance (unit: GΩ)</td><td colspan="2">100MΩ Min.</td><td>Initial
After Test</td></tr>
<tr><td rowspan="6">Rdry circuit (unit: mΩ)</td><td rowspan="2">5mΩ Max.</td><td rowspan="2">1.6</td><td>Initial</td></tr>
<tr><td>After Test</td></tr>
<tr><td rowspan="2">5mΩ Max.</td><td rowspan="2">2.8</td><td>Initial</td></tr>
<tr><td>After Test</td></tr>
<tr><td rowspan="2">3.5mΩ Max.</td><td rowspan="2">5.8</td><td>Initial</td></tr>
<tr><td>After Test</td></tr>
<tr><td>Electrical Discontinuity</td><td colspan="3">Shall be no loss of electrical continuity (resistance >7Ω >1μs)</td></tr>
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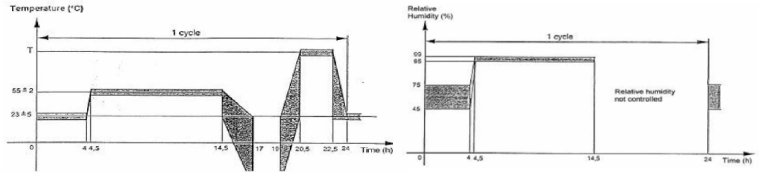
<tr>
<td>4</td>
<td>Temperature Humidity Cycling</td>
<td>Place the samples in to the thermal chamber and cycle 10 times per the schedule shown below using the min. and max. operating temperatures for the class.
 
</td>
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</table>

Test Items		Acceptance Criteria		
Temperature Humidity Cycling	Appea-rance	No corrosion, cracks, discoloration, etc., which could affect the function. Swelling or distortion shall not exceed the tolerances.		Initial
				After Test
	Function	All mechanical assists and/or other elements must function without breakage.		
	Isolation Resistance (unit: GΩ)	100MΩ Min.		Initial
				After Test
	Dielectric Strength (unit: μA)	No current leakage	Terminal & Terminal	
			Terminal & Housing	
	$R_{Dry\ Circuit}$ (unit: mΩ)	5mΩ Max.	1.6	Initial
				After Test
		5mΩ Max.	2.8	Initial
				After Test
		3.5mΩ Max.	5.8	Initial
				After Test
	Electrical Discontinuity	Shall be no loss of electrical continuity (resistance >7Ω >1μs)		