

Splicing Wire Connector**1. Purpose:**

This is qualification test. The purpose of this test is to evaluate the performance of Splicing Wire Connector. Testing was performed on below products to determine it compliance with the requirements of product specification 108-137271.

2. Conclusion:

The product met the electrical, mechanical, and environmental performance requirements of TE product specification 108-137271.

3. Test samples:

Samples were taken randomly from current production. The following part numbers were used for test:

Description	Product Part No.
Splicing wire connector	*-2834245-*

4. Test Method**4.1 Examination of Product**

Visual, dimensional and functional per applicable inspection plan.

Requirements: Meets requirements of product drawing

Test Method: In accordance with corresponding clause of IEC 60998-1:2002, IEC 60998-2-2:2002 and UL 486C.

4.2 Marking

For marking not made by moulding, pressing or engraving, the test is made by rubbing the marking by hand for 15 s with a piece of cloth soaked with water and again for 15 s with a piece of cloth soaked with petroleum spirit.

Requirements: Marking shall still be legible after the test.

Test Method: IEC60998-1:2002 Clause 8.4

4.3 Protection Against Electric Shock

The device is connected with a conductor of the smallest and largest specified cross-section, brought to a temperature of $85^{\circ}\text{C} \pm 2^{\circ}\text{C}$. Test finger is applied with a force of 10 N to any openings of the device.

Requirements: Indicator light connected with test finger is dim.

Test Method: IEC60998-1:2002 Clause 9

4.4 Resistance to Aging

Specimens are conditioned for 168 h in oven at 121 °C.

Requirements: No negative impact to insulation of specimens after the test.

Test Method: UL486C Clause 9.5.2.2

4.5 Resistance to Humidity Conditions

The samples are kept 48 h in a humidity cabinet containing air with relative humidity maintained between 91% and 95% and is maintained within 1°C of any convenient value of t between 20°C and 30°C.

Requirement: The samples shall show no damage within the meaning of the standard after the test.

Test method: IEC60998-1:2002 Clause 12.2

4.6 Electric Strength

The device is connected with 14 AWG conductor. A voltage of 3400 V and 60Hz is applied between live parts and external electrode for 1 min.

Requirement: No flashover or breakdown.

Test method: IEC60998-1:2002 Clause 13.4

4.7 Insulation Resistance

Each clamping unit of a connecting device shall be connected alternatively with conductors of the smallest and the largest cross-sectional area. The insulation resistance is then measured with a d.c. voltage of approximately 500 V applied, the measurement being made 1 min after application of the voltage.

Test shall be performed right after test of resistance to humidity conditions.

Requirement: 5 MΩ Min between all clamping units connected together and the body for connecting devices without fixing means or between each clamping unit and all others connected to the body for connecting devices without fixing means.

Test method: IEC60998-1:2002 Clause 13.3

4.8 Resistance to Heat

Samples are kept for 1 h in a heating cabinet at a temperature of 130°C ±5°C.

Requirement: During the test specimens shall not undergo any change impairing their further use.

After the test and after the samples have been allowed to cool to approximately ambient temperature, there shall be no access to live parts which are normally not accessible when the samples are mounted as in normal use, even if the standard test finger is applied with a force not exceeding 5 N.

After the test, markings shall still be legible.

Test method: IEC60998-1:2002 Clause 16

4.9 Clearances and Creepage Distances

Test creepage distances and clearances between live parts and the surface on which the base is mounted.

Requirements: 4mm Min

Test method: IEC60998-1:2002 Clause 17

4.10 Connection Test

This connection and subsequent disconnection shall be made 5 times with 0.2mm² and 5 times with 4mm² conductor. New conductor shall be used each time, except for the 5th time, when the conductor used for the 4th insertion is clamped at the same place.

Requirements: The terminal shall not be damaged in such a way as to impair its further use.

Test method: IEC60998-2-2:2002 Clause 10.104.1

4.11 Wire insertion force

Terminals are fitted with new conductors of 4mm².

Requirements: It shall be possible to fit the conductor into the terminal without undue force. After the test, no wire of the conductor shall have escaped outside the terminal.

Test method: IEC60998-2-2:2002 Clause 10.104.2

4.12 Rotary Pull Force

Specimens are connected with conductors with corresponding mass suspended from the end, subjected to rotary test for 15 min.

Weight of mass: 0.2kg for 0.2mm², 0.9kg for 4mm².

Requirements: During the test, the conductor shall neither slip out of the clamping unit, nor break near the clamping unit, nor shall the conductor be damaged in such a way as to render it unfit for further use.

Test method: IEC60998-2-2:2002 Clause 10.105

4.13 Pull Force

After rotary pull force test, corresponding pull force shall be applied to each conductor tested in accordance with rotary pull force for 1 min.

Pull force: 10 N for 0.2 mm², 60 N for 4 mm².

Requirements: During the test, the conductor shall not come out of the terminal.

Test method: IEC60998-2-2:2002 Clause 10.106

4.14 Temperature Rise

Three connecting devices are connected in series with solid wire, stranded wire and flexible wire of 4mm² and measured at 32A in a heating cabinet at 85°C when the device under test has reached thermal equilibrium.

Requirements: The temperature rise should be max 45K.

Test method: IEC60998-1:2002 Clause 15

4.15 Glow-wire

For parts of insulating material necessary to retain current-carrying parts in position, by the test made at a temperature of 850°C for 5 s.

For parts of insulating material not necessary to retain current-carrying parts in position, by the test made at a temperature of 650°C for 5 s.

Requirements: There is no visible flame and no sustained glowing. Or if flames and glowing on the sample extinguish within 30 s after the removal of the glow-wire, there shall be no ignition of the tissue paper or scorching of the board. 20mΩ Max.

Test method: IEC60998-1:2002 Clause 18

4.16 Resistance to Tracking

Test is performed per proof tracking index of 175 V.

Requirements: Current between different electrodes shall not exceed 0.5A during the test for 2 s min. Specimen shall not be burned or damaged.

Test method: IEC60998-1:2002 Clause 19

4.17 Ball Pressure

Steel ball is placed underneath the sample and kept for 1 h in a heating cabinet at a temperature of 130°C

Requirements: The diameter of the impression caused by the ball is measured and shall be exceed 2 mm.

Test method: IEC 60998-1:2002 Clause 16.3

4.18 Moisture Absorption

The insulation of specimen shall be broken, weighed, and then submerged in distilled water at room temperature for 24 h. After removal from the water, the specimens shall be dried with a soft cloth to remove all surface water before reweighing.

Requirements: After the test, increased weight of specimen shall not exceed 3% of first weigh.

Test method: UL486C Clause 9.9

4.19 Flammability

Apply same test specimen of 125mm × 13mm × 3mm to flame for 10 s for twice. When flaming of the specimen ceases, the cycle shall be repeated again.

Requirements: Duration of flaming is within 30 s after first flame application; duration of flaming is within 60 s after second flame application.

Test method: UL 486C Annex B

5. Unless otherwise stated, the following environmental conditions prevailed during testing:

Temperature: 25°C ± 5°C Relative Humidity: 25% to 75%

6. Test Sequence

Test group	A	B	C	D	E	F	G*	H*	I	J	K*
Examination of product	1, 10	1, 3	1, 3	1, 4	1, 3	1	1, 3	1, 3	1, 5	1	1
Marking	2										
Protection Against Electric Shock	3										
Resistance to Aging	4								2		
Resistance to Humidity	5								4		
Electric Strength	6										
Insulation Resistance	7										
Resistance to Heat	8										
Clearances and Creepage	9										

Test group	A	B	C	D	E	F	G*	H*	I	J	K*
Distances											
Connection Test		2									
Wire Insertion Force			2								
Rotary Pull Force				2							
Pull Force				3							
Temperature Rise					2						
Glow-wire						2					
Resistance to Tracking							2				
Ball-pressure								2			
Moisture Absorption										2	
Flammability											2
Sample size	3pcs	3pcs	3pcs	6pcs	9pcs	3pcs	5pcs	3pcs	21pcs	3pcs	5pcs

*Notes : 1. Thickness of specimen in Group G and Group H is 3mm, same as specimen of insulation materials for the splicing wire connector;

2. Thickness of specimen in Group K is 125mm×13mm×3mm, same as specimen of insulation materials for the splicing wire connector.

3. Sample size is determined as per Table AA.1 of IEC 60998-2-2:2002, Table 8 of UL486C and specifics of the sample.

7. Test Result

Group	Test Item	N	Condition	Test Result			Requirement	Judgment
				Max	Min	Ave		
A	Examination of Product	3	Initial	No physical damage occurred*			No abnormalities	Pass
	Marking	3	Final	Marking is legible			No abnormalities	Pass
	Protection against electric shock	3	Final	Indicator light is dim			No abnormalities	Pass
	Resistance to aging	3	Final	No physical damage occurred*			No abnormalities	Pass
	Resistance to humidity conditions	3	Final	No physical damage occurred*			No abnormalities	Pass
	Electric strength	3	Final	No flashover or breakdown			No abnormalities	Pass
	Insulation resistance	3	Final	498MΩ	500 MΩ	496MΩ	≥ 5 MΩ	Pass
	Resistance to heat	3	Final	No physical damage occurred*			No abnormalities	Pass
	Clearances and Creepage Distances	3	Final	4.26mm	4.18mm	4.21mm	≥ 4.0mm	Pass

	Examination of Product	3	Final	No physical damage occurred*			No abnormalities	Pass
B	Examination of Product	3	Initial	No physical damage occurred*			No abnormalities	Pass
	Connection Test	3	Final	No physical damage occurred*			No abnormalities	Pass
	Examination of Product	3	Final	No physical damage occurred*			No abnormalities	Pass
C	Examination of Product	3	Initial	No physical damage occurred*			No abnormalities	Pass
	Wire Insertion Force	3	Final	Conductor is fitted into the terminal without undue force. No wire of the conductor shall have escaped outside the terminal.			No abnormalities	Pass
	Examination of Product	3	Final	No physical damage occurred*			No abnormalities	Pass
D	Examination of Product	18	Initial	No physical damage occurred*			No abnormalities	Pass
	Rotary Pull Force(0.2mm ²)	9	Final	Conductor didn't slip out, break or damage physically*			No abnormalities	Pass
	Rotary Pull Force(4mm ²)	9	Final	Conductor didn't slip out, break or damage physically*			No abnormalities	Pass
	Pull Force(0.2mm ²)	9	Final	Conductor didn't slip out, break or damage physically*			No abnormalities	Pass
	Pull Force(4mm ²)	9	Final	Conductor didn't slip out, break or damage physically*			No abnormalities	Pass
	Examination of Product	18	Final	No physical damage occurred*			No abnormalities	Pass
E	Examination of Product	9	Initial	No physical damage occurred*			No abnormalities	Pass
	Temperature Rise	9	Final	33.5K	22.5K	27.0K	≤ 45K	Pass
	Examination of Product	9	Final	No physical damage occurred*			No abnormalities	Pass
F	Examination of Product	3	Initial	No physical damage occurred*			No abnormalities	Pass
	Glow-wire	3	Final	4 s	3s	3s	≤ 30s	Pass
G*	Examination of Product	5	Initial	No physical damage occurred*			No abnormalities	Pass
	Resistance to Tracking	5	Final	No current above 0.5A occurred			No abnormalities	Pass
	Examination of Product	5	Final	No physical damage occurred*			No abnormalities	Pass
H*	Examination of Product	3	Initial	No physical damage occurred*			No	Pass

							abnormalities	
	Ball pressure	3	Final	0.7 mm	0.8 mm	0.9 mm	≤ 2mm	Pass
	Examination of Product	3	Final	No physical damage occurred*			No abnormalities	Pass
I	Examination of Product	21	Initial	No physical damage occurred*			No abnormalities	Pass
	Resistance to aging	21	Final	No physical damage occurred*			No abnormalities	Pass
	Resistance to humidity conditions	21	Final	No physical damage occurred*			No abnormalities	Pass
	Electric strength	21	Final	No breakdown or flashover			No abnormalities	Pass
	Examination of Product	21	Final	No physical damage occurred*			No abnormalities	Pass
J	Examination of Product	3	Initial	No physical damage occurred*			No abnormalities	Pass
	Moisture absorption	3	Final	2.73%	2.55%	2.64%	≤ 3%	Pass
K*	Examination of Product	5	Initial	No physical damage occurred*			No abnormalities	Pass
	Flammability	5	Final	1 st flaming			≤ 30s	Pass
				6 s	4s	5 s		
				2 nd flaming			≤ 60s	
15 s	11s	13 s						
Examination of Product	5	Final	No physical damage occurred*			No abnormalities	Pass	

***Notes:**

1. "No physical damage" means no structural damage, failed connection and no change in electrical performance of specimen after the test.
2. Thickness of specimen in Group G and Group H is 3mm, same as specimen of insulation materials for the splicing wire connector;
3. Thickness of specimen in Group K is 125mm×13mm×3mm, same as specimen of insulation materials for the splicing wire connector.

END