Foaming Proof Connector

1. INTRODUCTION

1.1. Purpose

Testing was performed on Foaming Proof Connector to determine its conformance to the requirements of product specification 108-5410 Revision K.

1.2. Scope

This report covers the electrical, mechanical, and environmental performance of Foaming Proof Connector. Testing was performed at the Shanghai Electrical Components Test Laboratory between 02Mar2020 and 19Aug2020. The test file number for this testing is on filed and maintained at the TE Shanghai Electrical Components Test Laboratory under TP-20-00181-RECORD, TP-20-00409-RECORD, TP-20-01197-RECORD and TP-20-01481-RECORD.

1.3. Conclusion

All part numbers listed in Paragraph 1.4 conformed to the electrical, mechanical, and environmental performance requirements of product specification 108-5410 Revision K.

1.4. Test Specimens

Test Group	Quantity	Part Number	Description
1	10	5-368571-1	Foaming Proof Plug Housing
	10	5-368572-1	Foaming Proof Cap Housing
	10	2369500-1 (2232901-1)	PDL Receptacle Contact L with 20AWG
	10	1743729-1	FG Receptacle Contact L with 20AWG
	20	2369503-1 (177917-1)	PDL Tab Contact L with 20AWG
2	5	2369500-1 (2232901-1)	PDL Receptacle Contact L with 20AWG
	5	1743729-1	FG Receptacle Contact L with 20AWG
	10	2369503-1 (177917-1)	PDL Tab Contact L with 20AWG
3	20	5-368571-1	Foaming Proof Plug Housing
	10	5-368572-1	Foaming Proof Cap Housing
	15	2369501-1 (2232902-1)	PDL Receptacle Contact S with 24AWG
	15	1743728-1	FG Receptacle Contact S with 24AWG
	15	2369503-1 (177917-1)	PDL Tab Contact L with 20AWG

	10	2-2360442-4	Foaming Proof Upper TPA 24AWG
	10	2-2360443-4	Foaming Proof Lower TPA 24AWG
	5	2-2360442-0	Foaming Proof Upper TPA 20AWG
	5	2-2360443-0	Foaming Proof Lower TPA 20AWG
4	5	5-368571-1	Foaming Proof Plug Housing
	5	5-368572-1	Foaming Proof Cap Housing
5	5	2369500-1 (2232901-1)	PDL Rec Contact L with 20AWG
	5	2369501-1 (2232902-1)	PDL Rec Contact S with 24AWG
	5	1743729-1	FG Receptacle Contact L with 20AWG
	5	1743728-1	FG Receptacle Contact S with 24AWG
	5	2369503-1 (177917-1)	PDL Tab Contact L with 20AWG
	5	2369502-1 (177916-1)	PDL Tab Contact S with 24AWG
6	12	5-368571-1	Foaming Proof Plug Housing
	12	5-368572-1	Foaming Proof Cap Housing
	6	2369500-1 (2232901-1)	PDL Rec Contact L with 20AWG 15cm long
	6	1743729-1	FG Receptacle Contact L with 20AWG 15cm long
	12	2369503-1 (177917-1)	PDL Tab Contact L with 20AWG 15cm long
	6	2369501-1 (2232902-1)	PDL Receptacle Contact S with 24AWG 15cm long
	6	1743728-1	FG Receptacle Contact S with 24AWG 15cm long
	12	2369502-1 (177916-1)	PDL Tab Contact S with 24AWG 15cm long
7	10	5-368571-1	Foaming Proof Plug Housing
	10	5-368572-1	Foaming Proof Cap Housing
	10	2369501-1 (2232902-1)	PDL Receptacle Contact S with 24AWG
	10	1743728-1	FG Receptacle Contact S with 24AWG
	10	2369503-1 (177917-1)	PDL Tab Contact L with 20AWG
	10	2-2360442-4	Foaming Proof Upper TPA 24AWG
	10	2-2360443-4	Foaming Proof Lower TPA 24AWG
	10	2-2360442-0	Foaming Proof Upper TPA 20AWG
	10	2-2360443-0	Foaming Proof Lower TPA 20AWG
8	10	5-368571-1	Foaming Proof Plug Housing
	10	5-368572-1	Foaming Proof Cap Housing

	10	2369500-1 (2232901-1)	PDL Rec Contact L with 20AWG 15cm long
	10	1743729-1	FG Receptacle Contact L with 20AWG 15cm long
	20	2369503-1 (177917-1)	PDL Tab Contact L with 20AWG 15cm long
9	4	5-368571-1	Foaming Proof Plug Housing
	4	5-368572-1	Foaming Proof Cap Housing

Figure 1

1.5. Test Sequence

Test or Examination	Test Groups (a)								
	1	2	3	4	5	6	7	8	9
	Test Sequence (b)								
Low Level Contact Resistance (LLCR)	2,5						1,3,5	1,3	
Insulation Resistance								4	
Dielectric Withstanding Voltage								5	
Temperature Rising						1			
Sinusoidal Vibration							4		
Mechanical Shock							2		
Connector Mating Force	1								
Connector Un-mating Force	3								
Durability operation	4								
Contact Mating Force		1							
Contact Un-mating Force		2							
Contact Insertion Force			1						
Contact Retention Force			2						
Housing Locking Strength				1					
Crimp Tensile Strength					1				
Humidity-Temperature Cycling								2	
GWEPT 750 & 850°C									1

NOTE
a) See Paragraph 1.4.
b) Numbers indicate sequence in which tests shall be performed.

Figure 2

1.6. Environmental Conditions

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

- Temperature: 15°C to 35°C
- Relative Humidity: 20% to 80%

2. SUMMARY OF TESTING

Test Group	Test Item	Test Specimen	Unit	Min	Max	Ave	Requirement	Judgment
1	Connector Mating Force	PDL Rec	N	3.2	5.4	4.4	19.6 Max	OK
		FG Rec		6.1	9.9	8.0		OK
	Low Level Contact Resistance (Initial)	PDL Rec	mΩ	3.08	3.64	3.33	10 Max	OK
		FG Rec		2.52	3.07	2.73		OK
	Connector Un-mating Force	PDL Rec	N	7.2	8.6	7.9	3.92 Min	OK
		FG Rec		10.0	15.5	12.5		OK
	Durability operation (25 cycles)	PDL Rec	-	-	-	-	No physical damage	OK
		FG Rec		-	-	-		OK
	Low Level Contact Resistance (Final)	PDL Rec	mΩ	3.56	4.64	3.92	20 Max	OK
		FG Rec		2.74	3.88	3.26		OK
2	Contact Mating Force	PDL Rec	N	0.91	1.92	1.61	9.8 Max	OK
		FG Rec		3.62	6.61	5.14		OK
	Contact Un-mating Force (1st)	PDL Rec	N	1.3	3.02	2.07	0.58 Min	OK
		FG Rec		4.03	4.98	4.48		OK
	Contact Un-mating Force (25th)	PDL Rec	N	0.76	1.32	0.95	0.39 Min	OK
		FG Rec		0.89	2.3	1.64		OK
3	Contact Insertion Force	PDL Rec #24 in Plug	N	4.5	5.6	5.0	6.86 Max	OK
		FG Rec #24 in Plug		4.1	5.1	4.7		OK
		PDL Tab #20 in Cap		5.1	6.6	6.1		OK
	Contact Retention Force	PDL Rec #24 from Plug Without TPA	N	52.6	61.7	55.8	41.16 Min	OK
		PDL Rec #24 from Plug With TPA		56.2	62.2	58.1		OK
		FG Rec #24 from Plug Without TPA		61.0	63.5	62.2		OK

		FG Rec #24 from Plug With TPA		57.8	66.3	61.8		OK
		PDL Tab #20 from Cap Without TPA		71.75	77.56	74.18		OK
		PDL Tab #20 from Cap With TPA		106.3	116.6	110.9		OK
4	Housing Locking Strength	Plug Locking Latch	N	93.9	100.1	96.6	34.3 Min	OK
5	Crimp Tensile Strength	PDL Rec with 20AWG	N	89.31	101.03	97.23	58.8 Min	OK
		PDL Rec with 24AWG		48.34	59.75	51.18	29.4 Min	OK
		FG Rec with 20AWG		94.63	99.97	97.56	58.8 Min	OK
		FG Rec with 24AWG		49.50	51.78	50.78	29.4 Min	OK
		PDL Tab with 20AWG		84.66	96.03	90.23	58.8 Min	OK
		PDL Tab with 24AWG		48.66	54.50	51.38	29.4 Min	OK
6	Temperature Rising	PDL Rec with 20AWG_7A	Δ℃	15.9	16.8	16.2	30 Max	OK
		FG Rec with 20AWG_7A		13.9	16.8	15.2		OK
		PDL Rec with 24AWG_4A		12.0	15.4	13.4		OK
		FG Rec with 24AWG_4A		10.0	14.7	12.4		OK
7	Low Level Contact Resistance (Initial)	PDL Rec	mΩ	0.84	1.24	1.09	10 Max	OK
		FG Rec		0.31	0.54	0.40		OK
	Mechanical Shock	PDL Rec	-	-	-	-	No physical damage nor electrical discontinuity greater than 1 µs	OK
		FG Rec	-	-	-	-		OK
	Low Level Contact Resistance (Final)	PDL Rec	mΩ	1.11	1.66	1.28	20 Max	OK
		FG Rec		0.24	0.63	0.49		OK
	Sinusoidal Vibration	PDL Rec	-	-	-	-	No physical damage nor electrical discontinuity greater than 1 µs	OK
		FG Rec	-	-	-	-		OK
	Low Level Contact Resistance (Final)	PDL Rec	mΩ	1.20	1.89	1.57	20 Max	OK
		FG Rec		0.45	0.92	0.58		OK

8	Low Level Contact Resistance (Initial)	PDL Rec	mΩ	3.05	4.15	3.56	10 Max	OK
		FG Rec		2.70	3.81	3.36		OK
	Humidity-Temperature Cycling	PDL Rec	-	-	-	-	No physical damage	OK
		FG Rec	-	-	-	-		OK
	Low Level Contact Resistance (Final)	PDL Rec	mΩ	2.93	4.96	4.15	20 Max	OK
		FG Rec		2.73	3.71	3.13		OK
	Insulation Resistance	PDL Rec	GΩ	20.11	50.56	30.24	0.5 Min	OK
		FG Rec		20.23	310.6	80.50		OK
	Dielectric Withstanding Voltage	PDL Rec	-	N/B	N/B	N/B	No breakdown nor flashover	OK
		FG Rec	-	N/B	N/B	N/B		OK
9	GWEPT 750°C	Plug	Sec	-	-	0	Te-Ti<2s	OK
		Cap		-	-	0		OK
	GWEPT 850°C	Plug		-	-	0	Te≤Ta+30s	OK
		Cap		-	-	0.5		OK

Figure 3

3. TEST METHODS

3.1 Low Level Contact Resistance (LLCR)

Testing was performed in accordance with EIA 364-23 using a test current of 100 mA and a test voltage limited to 20mV.

3.2 Insulation Resistance

EIA-364-21

Apply 500 VDC and hold for 2 minutes.

Test between contacts in adjacent circuits and between housing and contacts in a mated connector.

3.3 Dielectric Withstanding Voltage

EIA-364-20

Hold at 2.2 kV AC at sea level for 1 minute.

Current Leakage: 5 mA (maximum)

Test between contacts in adjacent circuits and between housing and

all contacts in a mated a connector.

3.4 Temperature Rising

EIA-364-70, Method 1

Measure the temperature rise above ambient created by the energizing current.

Measurement must be taken at a place where there is no influence from air convection.

Contacts to be assembled in housing with all circuits connected. The thermocouple is to be attached to the contact in the center circuit.
Stabilize at a single current level until 3 consecutive readings at 5 minute intervals are within 1°C.

3.5 Sinusoidal Vibration
EIA-364-28
Subject mated connectors to 10-55-10 Hz traversed in 1 minute at 1.52mm amplitude
Apply 2 hours in each of 3 mutually perpendicular planes.

3.6 Mechanical Shock
EIA-364-27
Subject mated connector to 50G's half-sine shock pulse of 11 ms duration.
3 drops each to normal and reversed directions of X, Y and Z axis.
Total of 18 drops.

3.7 Connector Mating Force
EIA-364-13, Method A
Operation Speed: 100 mm/min
Measure the force required to mate connectors without locking latches.

3.8 Connector Un-mating Force
EIA-364-13, Method A
Operation Speed: 100 mm/min
Measure the force required to unmate connectors without locking latches.

3.9 Durability operation
EIA-364-9
Manually mate and unmate connectors for 25 cycles.

3.10 Contact Mating Force
EIA-364-37, Method A
Operation Speed: 100 mm/min
Measure force required to mate contact.

3.11 Contact Un-mating Force
EIA-364-37, Method A
Operation Speed: 100 mm/min
Measure force required to unmate contact.

3.12 Contact Insertion Force

EIA-364-5

Measure the force required to insert contact into housing.

3.13 Contact Retention Force

EIA-364-29, Method A

Operation Speed: 100 mm/min

Measure the axial force required to remove contact crimped with wire from the housing.

3.14 Housing Locking Strength

EIA-364-98

Operation Speed: 100 mm/min

Ensure that locking latches are fully engaged.

3.15 Crimp Tensile Strength

EIA-364-8

Operation Speed: 100 mm/min

Apply an axial pull force to the crimped wire.

Contact to be secured to the tester. Insulation barrel crimp to be disabled.

3.16 Humidity-Temperature Cycling

EIA-364-31

Subject mated specimen to 10 cycles between 25°C and 65°C at 80-98% RH.

Measurements to be recorded after specimens are held for 3 hours at ambient temperature and humidity.

1 cycle is 24 hours.

3.17 GWEPT 750 & 850°C

IEC 60335-1

Specimens, wooden board and wrapping tissue is preconditioned under the condition of 25°C and 50 %R.H. for 24 h.

The extremity of the wire is positioned horizontally and bring into contact with the specimen with a force between 0.85 N and 1.05 N for a period of 30 s.

Penetration depth is less than 7 mm, and wrapping tissue is positioned at (200±5) mm below the place where the glow-wire is applied to the specimen.

Test Temperature: 750°C and 850°C

Duration of glow tip application Ta: 30 s.

Measure the time of flaming