Contact Retention Testing of Medical CPC Subassemblies

1. INTRODUCTION

1.1. Purpose

Testing was performed on Tyco Electronics Medical Circular Plastic Connector (CPC) plug and receptacle subassemblies to determine the effects of soldering heat on contact retention.

1.2. Abstract

Contact retention of specimens in the "as received" condition were tested along with specimens exposed to soldering heat for comparison. "As received" receptacle data was not available when this report was written. Test data was compiled from test numbers EA20080115T and EA20090067T, this documentation is on file at and available from the Engineering Assurance Product Test Laboratory.

1.3. Conclusion

When comparing mean data, there was a statistically significant difference between "as received" plug specimens and plug specimens tested after exposure to soldering heat. Contact retention forces were higher after heat exposure. Since the retention mechanism geometries and housing materials were the same between the plugs and the receptacles, it can be assumed that similar results could be expected for the receptacles. Statistically significant difference was calculated using a T-Test at 95% Confidence and 99% Reliability.

1.4. Test Specimens

Test specimens were representative of normal production lots. Specimens identified with the following part numbers were used for test:

Test Group	Quantity	Part Number	Description
1	5	1811951-1	7 position plug insert assembly with 26 AWG wire
2	5	1811952-1	6 position plug insert assembly with 26 AWG wire
3	5	1811950-1	10 position plug insert assembly with 28 AWG wire
4	5	1811953-1	5 position plug insert assembly with 22 AWG wire
5	5	1811951-1	7 position plug insert assembly
6	5	1811952-1	6 position plug insert assembly
7	5	1811950-1	10 position plug insert assembly
8	5	1811953-1	5 position plug insert assembly
9	5	1877066-1	5 position receptacle assembly
10	5	1877068-1	7 position receptacle assembly
11	5	1877067-1	6 position receptacle assembly
12	5	1877069-4	10 position receptacle assembly

Figure 1

1.5. Environmental Conditions

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

- Temperature: 22 to 24˚C
- Relative Humidity: 26 to 44%

1.6. Test Sequence

Test or Examination	Test Group (a)											
	1	2	3	4	5	6	7	8	9	10	11	12
	Test Sequence (b)											
Initial examination of product	1	1	1	1	1	1	1	1	1	1	1	1
Resistance to soldering heat	2	2	2	2					2	2	2	2
Contact retention	3	3	3	3	2	2	2	2	3	3	3	3
Final examination of product	4	4	4	4	3	3	3	3	4	4	4	4

NOTE *(a) See paragraph 1.4.*
(b) Numbers indicate sequence in which tests are performed.

Figure 2

2. SUMMARY OF TESTING

2.1. Initial Examination of Product - All Test Groups

Specimens were visually examined and no evidence of physical damage detrimental to product performance was observed.

2.2. Resistance to Soldering Heat - Test Groups 1, 2, 3, 4, 9, 10, 11 and 12

No evidence of physical damage was visible as a result of exposure to soldering heat.

2.3. Contact Retention - All Test Groups

Data summary is shown in Figures 3 and 4. Statistically significant difference was calculated using a T-Test at 95% Confidence and 99% Reliability.

Measurement (All values in pounds)	Plugs							
	Part Number							
	1811951-1		1811952-1		1811950-1		1811953-1	
	Test Group							
	1	5	2	6	3	7	4	8
	Exposed	As Received	Exposed	As Received	Exposed	As Received	Exposed	As Received
Minimum	27.95	27.77	33.34	33.60	26.03	21.14	15.04	6.37
Maximum	39.34	41.73	41.17	37.70	43.05	39.88	29.22	17.33
Mean	36.71	35.98	37.58	35.70	35.00	32.12	21.26	12.26
Standard Deviation	2.06	2.26	1.78	1.20	3.33	2.90	3.95	3.41
N	30	30	30	30	40	40	25	25
Statistically Significant Difference	No		Yes		Yes		Yes	

Figure 3

Measurement (All values in pounds)	Receptacles			
	Part Number			
	1877066-1	1877068-1	1877067-1	1877069-4
	Test Group			
	9	10	11	12
	Exposed	Exposed	Exposed	Exposed
Minimum	17.28	19.58	31.81	16.30
Maximum	34.77	64.05	43.89	38.42
Mean	26.59	44.83	36.89	26.45
Standard Deviation	5.08	8.61	3.16	7.38
N	25	30	30	30

Figure 4

2.4 Final Examination of Product - All Test Groups

Specimens were visually examined and no evidence of physical damage detrimental to product performance (other than the typical destruction due to contact retention testing) was observed.

3. TEST METHODS

3.1. Initial Examination of Product

Specimens were visually examined for evidence of physical damage detrimental to product performance.

3.2. Contact Retention

The force required to dislodge the contact was measured using a tensile/compression device with a free floating fixture. The force was applied to the solder tail end of the contacts at a rate of 12.7 mm per minute until the contact dislodged. Testing was performed in accordance with EIA-364-29B.

3.3. Resistance to Soldering Heat

A Type J thermocouple was welded to the tip of the soldering iron to monitor the temperature during testing. In accordance with IEC 60512-12-5, a Size B iron tip was used and maintained at 350˚C. The gage wire specified in Figure 1 was soldered to the contact using rosin core Sn/Pb solder. Heat was applied to each contact for 10 seconds. Testing was performed in accordance with IEC 60512-12-5.

3.4. Final Examination of Product

Specimens were visually examined for evidence of physical damage detrimental to product performance.