Z1 Power Connector For ATCA

1. INTRODUCTION

1.1. Purpose

Testing was performed on the Tyco Electronics Zone 1 (Z1) power connector designed for Advanced Telecommunications Computer Architecture (ATCA™) to determine its conformance to the | requirements of Product Specification 108-2216, Revision C.

1.2. Scope

This report covers the electrical, mechanical, and environmental performance of the Z1 Power Connector for ATCA. Testing was performed at the Engineering Assurance Product Testing Laboratory between 23Jan06 and 20Jun06. The test file number for this testing is CTLB064778-009. Additional | testing was performed between 08Sep06 and 18Sep06, and between 09Oct06 and 27Dec06. The test | file numbers for this testing are CTLB064778-019 and CTLB064778-014. This documentation is on file at and available from the Engineering Assurance Product Testing Laboratory.

1.3. Conclusion

The Z1 Power Connector for ATCA listed in paragraph 1.5. conformed to the electrical, mechanical, and | environmental performance requirements of Product Specification 108-2216, Revision C.

1.4. Product Description

The Z1 Power Connector for ATCA is designed for printed circuit board application for use in high-end telecommunications equipment. The connectors are available in a front board right-angle plug and backplane straight receptacle. Each connector has a housing containing eye-of-needle precision-formed press-fit (compliant pin) contacts: 22, size 22 signal contacts and 8, size 16 power contacts (position 1 through 4 are not populated). The housing has individually numbered position identification marked on the mating face, features a lead-in edge to prevent stubbing of the signal contacts during mating, and are designed with a feature to ensure polarization when mating connectors.

* Trademark
| Indicates change
™Trademark of PICMG PCI Industrial Computer Manufacturers Group Inc.

1.5. 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	Revision	Description
1	25	1766500-1	02	ATCA right-angle press-fit connector
	25	1766501-1	05	ATCA vertical press-fit connector
7	20	1766500-1	02	ATCA right-angle press-fit connector
	20	1766501-1	05	ATCA vertical press-fit connector
14	1	1766500-1	02	ATCA right-angle press-fit connector
	1	1766501-1	05	ATCA vertical press-fit connector
2,3,4,5,6,8, 9,10,11,12	5 each	1766500-1	02	ATCA right-angle press-fit connector
	5 each	1766501-1	05	ATCA vertical press-fit connector
13	5	1766500-1	02	ATCA right-angle press-fit connector
15,16	2 each	1766500-1	02	ATCA right-angle press-fit connector
	1 each	1766501-1	05	ATCA vertical press-fit connector
17	8	1766500-1	02	ATCA right-angle press-fit connector
	8	1766501-1	07	ATCA vertical press-fit connector
18	3	1766500-1	02	ATCA right-angle press-fit connector, surface treatment
	3	1766501-1	07	ATCA vertical press-fit connector, surface treatment

Figure 1

1.6. Environmental Conditions

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

- Temperature: 15 to 35˚C
- Relative Humidity; 25 to 75%

1.7 Qualification Test Sequence

Test or Examination	Test Group (a)																	
	1(b)	2	3	4	5	6	7(c)	8	9	10	11	12	13	14	15	16	17	18
	Test Sequence (d)																	
Visual examination	1	5,8,16	3,6,10	4	4	4	1	2,4,15	2,6,9	4	5	1,3	1,3	1,3	1,4,10	1,4,7	1,8	1,6
Contact resistance	3	4,7,14	4,7	2	3										2,6,8		2,6	2,5
Insulation resistance							3	6,9,13	3,7	2	3							
Voltage proof							4	7,14	4,8	3	4					2,6		
Current overload															3	3		
Current carrying capacity															7			
Temperature rise vs current																	3,7	
Insertion/withdrawal forces		1,15		3														
Gage retention force		2	1,8			2												
Vibration, sinusoidal		3						1										
Mechanical shock		6						3										
Mechanical operation			2(e),5(e)		1(e)				1(e),5(e)		1(e)						4(f)	3(f)
Contact retention in insert												2						
Connector press-fit retention				5														
Probe damage						1												
Polarizing method	2						2											
Static load, transverse			9															
Restricted entry						3												
Contact bending strength													2					
Flammability														2				
Insertion force of mounted virgin right angle connector															5			
Insertion of unmounted virgin right angle connector																5		
Withdrawal force															9			
Rapid change in temperature		9						5										
Damp heat, steady state				1						1								
Electrical load and temperature					2													
Temperature, no electrical load											2							
Dry heat		10						8										
Damp heat, cyclic (first cycle)		11						10										
Damp heat, cyclic (remaining cycles)		13						12										
Cold		12						11										
Temperature life, no electrical load																	5	
Mixed flowing gas																		4

NOTE

(a) See paragraph 1.5.
(b) Completed specimens from this test group were evenly distributed between test groups 2 through 6.
(c) Completed specimens from this test group were evenly distributed between test groups 8 through 11.
(d) Numbers indicate sequence in which tests are performed.
(e) Half the specified number of operations.
(f) Five cycles only.

Figure 2

2. SUMMARY OF TESTING

2.1. Visual Examination - All Test Groups

All specimens submitted for testing were representative of normal production lots. A Certificate of Conformance was issued by Product Assurance. Where specified, specimens were visually examined and no evidence of physical damage detrimental to product performance was observed.

2.2. Contact Resistance - Test Groups 1, 2, 3, 4, 5, 15, 17 and 18

A. Size 16 Contacts

Contact resistance measurements taken at 16 amperes maximum and 2 volts maximum open circuit voltage were less than 2.2 milliohms initially and 2.6 milliohms after testing.

Test Group	Number of Data Points	Condition	Contact Resistance		
			Min	Max	Mean
1	200	Initial	0.75	1.24	0.89
2	40	After vibration	0.77	2.01	0.96
		After mechanical shock	0.78	1.84	0.95
		After damp heat, cyclic	0.78	2.12	1.03
3	40	After 125 cycles of mechanical operation	0.78	1.13	0.93
		After 250 cycles of mechanical operation	0.80	1.26	0.97
4	40	After damp heat, steady state	0.77	1.06	0.90
5	40	After electrical load and temperature	0.86	1.54	1.07
15	8	Initial	0.76	1.00	0.89
		After inserting virgin right angle connector	0.77	1.01	0.90
		After current carrying capacity	0.77	1.03	0.91
17	64	Initial	0.81	1.31	1.03
		After 500 hours of temperature life	0.84	1.36	1.06
		After 1000 hours of temperature life	0.86	2.04	1.16
18	24	Initial	0.82	1.22	1.03
		After 5 days unmated mixed flowing gas	0.82	1.34	1.01
		After 10 days unmated mixed flowing gas	0.90	1.55	1.09
		After 14 days mated mixed flowing gas	0.89	1.45	1.08
		After 20 days mated mixed flowing gas	0.90	1.49	1.07

NOTE *All values in milliohms.*

Figure 3

B. Size 22 Contacts

All contact resistance measurements taken at 100 milliamperes maximum and 20 millivolts maximum open circuit voltage were less than 20 milliohms initially and had a change in resistance (ΔR) of less than 10 milliohms after testing.

Test Group	Number of Data Points	Condition	Contact Resistance		
			Min	Max	Mean
1	550	Initial	5.60	12.33	8.86
2	110	After vibration (ΔR)	-0.41	0.63	-0.10
		After mechanical shock (ΔR)	-0.37	1.10	-0.05
		After damp heat, cyclic (ΔR)	-0.46	0.35	-0.21
3	110	After 125 cycles of mechanical operation (ΔR)	-0.47	0.85	0.03
		After 250 cycles of mechanical operation (ΔR)	-0.42	1.31	0.17
4	110	After damp heat, steady state (ΔR)	-0.24	0.56	-0.03
5	110	After electrical load and temperature (ΔR)	-0.41	0.82	0.02
15	22	Initial	5.75	12.30	8.99
		After inserting virgin right angle connector (ΔR)	-0.36	0.24	-0.10
		After current carrying capacity (ΔR)	-0.82	1.13	-0.08
17	176	Initial	5.44	13.21	9.07
		After 500 hours of temperature life (ΔR)	-1.57	1.44	0.04
		After 1000 hours of temperature life (ΔR)	-1.57	2.82	-0.03
18	66	Initial	5.35	12.98	8.92
		After 5 days unmated mixed flowing gas (ΔR)	-0.80	0.21	-0.10
		After 10 days unmated mixed flowing gas (ΔR)	-0.78	0.21	-0.10
		After 14 days mated mixed flowing gas (ΔR)	-0.88	0.12	-0.14
		After 20 days mated mixed flowing gas (ΔR)	-1.05	0.12	-0.15

NOTE *All values in milliohms.*

Figure 4

2.3. Insulation Resistance - Test Groups 7, 8, 9, 10 and 11

Insulation resistance measurements were greater than 1.0×10^{10} ohms initially and 1.0×10^{8} ohms after environmental testing.

2.4. Voltage Proof - Test Groups 7, 8, 9, 10 and 11

No dielectric breakdown or flashover occurred.

2.5. Current Overload - Test Groups 15 and 16

Unmated specimens were visually examined and no evidence of physical damage detrimental to product performance was observed following current overload testing.

2.6. Current Carrying Capacity - Test Group 15

Maximum temperature rise was less than 30˚C. Mated specimens were visually examined and no evidence of physical damage detrimental to product performance was observed following current carrying capacity testing.

2.7. Temperature Rise vs Current - Test Group 17

Maximum temperature rise was less than 30˚C with size 22 contacts series energized at 1 ampere DC and with all size 16 contacts series energized at 16 amperes DC. Specimens were visually examined and no evidence of physical damage detrimental to product performance was observed following temperature rise versus current.

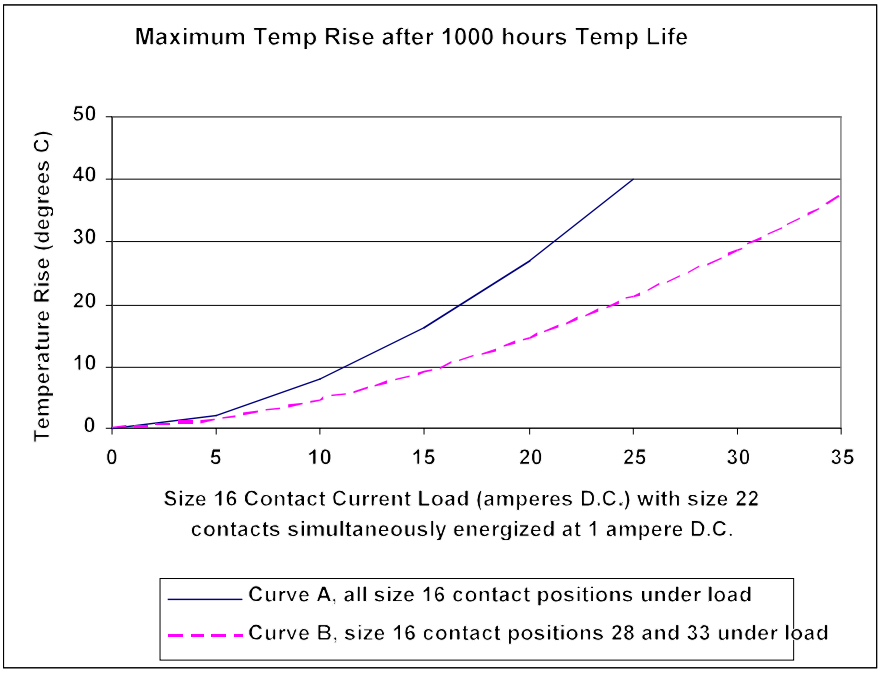


Figure 5
Temperature Rise vs Current

2.8. Insertion/Withdrawal Forces - Test Groups 2 and 4

All connector insertion force measurements were less than 67 N [15.06 lbf]. All connector withdrawal force measurements were greater than 10 N [2.25 lbf].

2.9. Gage Retention Force - Test Groups 2, 3 and 6

A. Size 16 Contacts

All gage retention force measurements were greater than 56 grams [2 ozf].

B. Size 22 Contacts

All gage retention force measurements were greater than 19.8 grams [.7 ozf].

| 2.10. Vibration, Sinusoidal - Test Groups 2 and 8

No discontinuities were detected during vibration testing. Following vibration testing, no cracks, breaks, or loose parts on the specimens were visible.

| 2.11. Mechanical Shock - Test Groups 2 and 8

No discontinuities were detected during mechanical shock testing. Following mechanical shock testing, no cracks, breaks, or loose parts on the specimens were visible.

| 2.12. Mechanical Operation - Test Groups 3, 5, 9, 11, 17 and 18

No physical damage occurred as a result of mating and unmating the specimens the specified number of times.

| 2.13. Contact Retention In Insert - Test Group 12

Contact displacement was less than 0.25 mm [.010 in].

| 2.14. Connector Press-fit Retention - Test Group 4

All connector press-fit retention force measurements were greater than 400 N [90 lbf].

| 2.15. Probe Damage - Test Group 6

A. Size 16 Contacts

All female contacts retained the gage during probe damage test.

B. Size 22 Contacts

All female contacts retained the gage during probe damage test.

| 2.16. Polarizing Method - Test Groups 1 and 7

Specimens could not be mated when subjected to a force of 100.5 N [22.6 lbf] when the connectors were misaligned. The specimens could be aligned and mated properly.

| 2.17. Static Load, Transverse - Test Group 3

There was no displacement of the specimen on the printed circuit board that would impair normal operation.

| 2.18. Restricted Entry - Test Group 6

A. Size 16 Contacts

The test gage did not enter the female contacts.

B. Size 22 Contacts

The test gage did not enter the female contacts.

| 2.19. Contact Bending Strength - Test Group 13

A. Size 16 Contacts

Permanent set was less than 0.127 mm [.005 in].

B. Size 22 Contacts

Permanent set was less than 0.127 mm [.005 in].

| 2.20. Flammability - Test Group 14

Specimens were extinguished in less than 10 seconds after removal of the test flame.

| 2.21. Insertion Force of Mounted Virgin Right Angle Connector - Test Group 15

All insertion force measurement were less than 67 N [15.06 lbf].

| 2.22. Insertion of Unmounted Virgin Right Angle Connector - Test Group 16

No evidence of physical damage detrimental to product performance was observed after inserting a virgin right angle connector.

| 2.23. Withdrawal Force - Test Group 15

All withdrawal force measurements were greater than 10 N [2.25 lbf].

| 2.24. Rapid Change in Temperature - Test Groups 2 and 8

No evidence of physical damage was visible as a result of exposure to rapid change in temperature.

| 2.25. Damp Heat, Steady State - Test Groups 4 and 10

No evidence of physical damage was visible as a result of exposure to steady state damp heat.

| 2.26. Electrical Load and Temperature - Test Group 5

No evidence of physical damage was visible as a result of exposure to electrical load and temperature.

| 2.27. Temperature, No Electrical Load - Test Group 11

No evidence of physical damage was visible as a result of exposure to temperature without electrical load.

| 2.28. Dry Heat - Test Groups 2 and 8

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

| 2.29. Damp Heat, Cyclic (First Cycle) - Test Groups 2 and 8

No evidence of physical damage was visible as a result of exposure to the first cycle of damp heat.

| 2.30. Damp Heat, Cyclic (Remaining Cycles) - Test Groups 2 and 8

No evidence of physical damage was visible as a result of exposure to the remaining 5 cycles of damp heat.

| 2.31. Cold - Test Groups 2 and 8

No evidence of physical damage was visible as a result of exposure to cold temperature.

| 2.32. Temperature Life, No Electrical Load - Test Group 17

| No evidence of physical damage was visible as a result of temperature life with no electrical load testing.

| 2.33. Mixed Flowing Gas - Test Group 18

| No evidence of physical damage was visible as a result of exposure to the pollutants of mixed flowing
| gas.

3. TEST METHODS

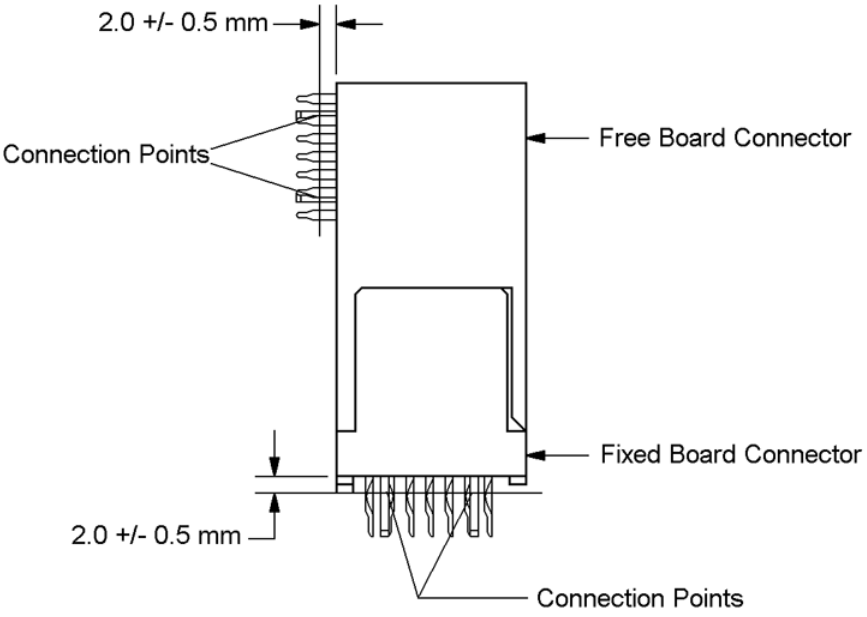
3.1. Visual Examination

A Certification of Conformance was issued stating that all specimens in this test package were produced, inspected, and accepted as conforming to product drawing requirements, and manufactured using the same core manufacturing processes and technologies as production parts.

3.2. Contact Resistance

A. Size 16 Contacts

Contact resistance measurements at specified current were made using a 4 terminal measuring technique. The test current was maintained at 16 amperes with a 2 volt maximum open circuit voltage. Mated and mounted specimens were energized for less than 1 minute before
| measurement (Figure 6).



| Figure 6
Contact Resistance Connection Points

B. Size 22 Contacts

Contact resistance measurements at low level current were made using a 4 terminal measuring technique. The test current for mated and mounted specimens was maintained at 100 milliamperes maximum with a 20 millivolt maximum open circuit voltage (Figure 6).

3.3. Insulation Resistance

Mated and mounted specimens were wired in parallel with a minimum of 8 adjacent contacts energized (Figure 7). Insulation resistance was measured using a test voltage of 100 volts DC applied for 1 minute before the resistance was measured.

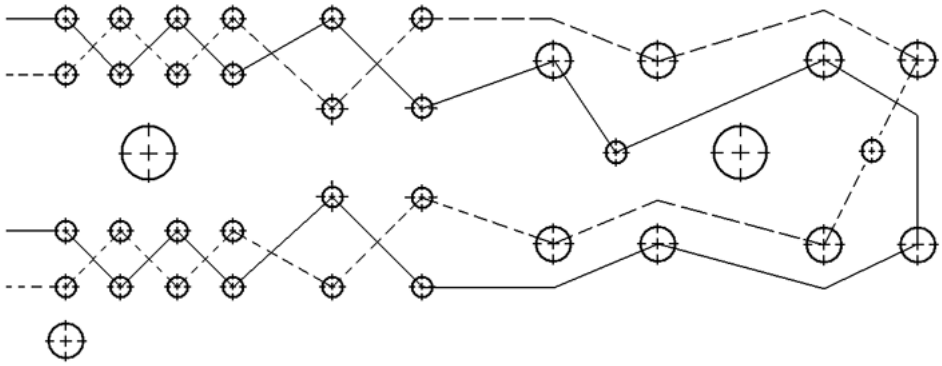


Figure 7
Insulation Resistance and Voltage Proof Measurement Points

3.4. Voltage Proof

Mated and mounted specimens were wired in parallel with two separate energized circuits (Figure 6). A test potential of 1000 volts AC was applied between contact positions 1 through 16. A test potential of 2000 volts AC was applied between contact positions 17 through 34. These potentials were applied for 1 minute with a maximum leakage current of 2 milliamperes and then returned to zero.

3.5. Current Overload

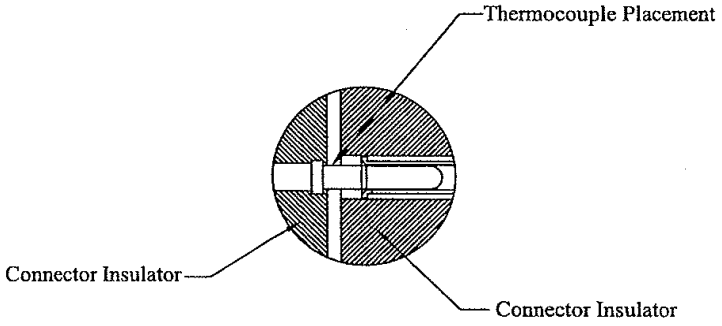
Mated, mounted and unmounted specimens were series wired through contact positions 29 and 34. A separate circuit was series wired through contact positions 28 and 33. Eight AWG wires were attached to circuits 29 and 34, and 16 AWG wires to circuits 28 and 33. Thermocouples were electrically insulated from the contacts and were attached using thermo conductive epoxy to the mating interface of contact positions 29 and 34. The specimens were placed in a draft-free enclosure maintained at 55˚C within a circulating air oven. Contact positions 28 and 33 were energized at 10 amperes DC; contact positions 29 and 34 were simultaneously energized at 60 amperes DC. Specimens were allowed to stabilize for 1 hour after application of the current before measuring contact and housing temperatures. Specimen temperatures were remeasured after 4 additional hours at the same current.

3.6. Current Carrying Capacity

Mated and mounted specimen was placed in a draft-free enclosure. Thermocouples were electrically insulated from the contacts and were attached using thermo conductive epoxy at the mating interface of contact positions 29 and 34. Size 22 contacts were energized at 1 ampere DC; size 16 contacts were simultaneously energized and stabilized at various DC levels. Thermocouple temperatures were measured at the contact mating interface 1 hour after temperature stabilization at 16 amperes DC.

| 3.7. Temperature Rise versus Current

| Mated and mounted specimens were placed in a draft-free enclosure. Size 22 contacts were wired in
| series and energized at 1 ampere D.C., while size 16 contacts were simultaneously wired in series and
| energized at various DC current values. Thermocouple temperature was measured at the size 16
| contact mating interface after temperature stabilization.
|



| Figure 8
| Thermocouple Placement

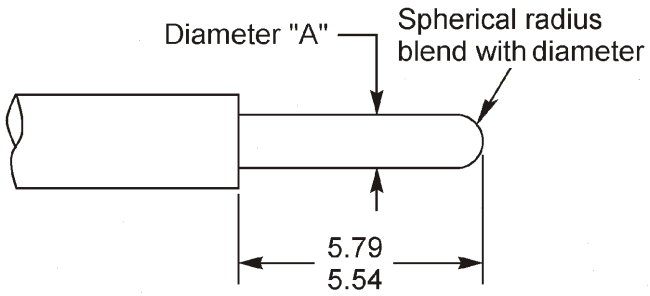
| 3.8. Insertion/Withdrawal Forces

The force required to mate and unmate mounted specimens was measured using a tensile/compression device with the rate of travel at 12.7 mm [.5 in] per minute and a free-floating fixture.

| 3.9. Gage Retention Force

A. Size 16 Contacts

The female contacts of unmated specimens were sized 3 times using a 1.612.7 mm [.0635 in] diameter pin. A 1.562 mm [.0615 in] diameter pin was inserted into the contact and the maximum force to withdraw the pin was recorded. Testing was conducted at a rate of 12.7 mm [.5 in] per
| minute (Figure 9).



Contact Size	Sizing Gage		Retention Force Gage		
	⌀A (mm max)	⌀A (mm min)	⌀A (mm max)	⌀A (mm min)	Mass (g)
16	1.613	1.608	1.567	1.562	56.0 ± 0.5
22	0.775	0.770	0.754	0.749	19.8 ± 0.5

NOTE
1. *Material: Hardened tool steel*
2. *Surface Roughness: ISO Standard 468*
3. *Ra = 0.15 to 0.25 µm*

| Figure 9

B. Size 22 Contacts

The female contacts of unmated and mounted vertical specimens were sized 3 times using a 0.775 mm [.0305 in] diameter pin. A 0.749 mm [.0295 in] diameter pin was inserted into the contact and the maximum force to withdraw the pin was recorded. Testing was conducted at a rate of 12.7 mm
| [.5 in] per minute (Figure 9).

| 3.10. Vibration, Sinusoidal

Mated and mounted specimens were subjected to sinusoidal vibration having a simple harmonic motion with amplitude of the lesser of 3 mm [.12 in] double amplitude (maximum total excursion) or 20 gravity unit (g's peak). The vibration frequency was varied uniformly between the limits of 10 and 2000 Hz and returned to 10 Hz in 12 minutes. The specimens were vibrated for 2 hours in each of 3 mutually perpendicular planes for a total vibration time of 6 hours. Specimens for test group 2 were monitored for discontinuities of 1 microsecond or greater using a current of 100 milliamperes DC.

| 3.11. Mechanical Shock, Half-sine

Mated and mounted specimens were subjected to a mechanical shock test having a half-sine waveform of 50 gravity units (g peak) and duration of 11 milliseconds. Five shocks in each direction were applied along the 3 mutually perpendicular planes for a total of 30 shocks. Specimens for test group 2 were monitored for discontinuities of 1 microsecond or greater using a current of 100 milliamperes DC.

| 3.12. Mechanical Operation

Specimens were manually mated and unmated 250 times in test groups 3 and 9, 125 times in test
| groups 5 and 11 and 5 times in test groups 17 and 18. Specimens remained unmated for 10 seconds between each mating.

| 3.13. Contact Retention in Insert

Unmated and unmounted specimens were subjected to an axial load applied to the contact and held for 10 seconds. The load was applied to the contact in a direction that would push the contacts into or out of the housing. The amount of contact displacement was measured after initially zeroing the displacement
| at a specified preload force (Figure 10) to remove normal axial contact float. Testing was conducted at a maximum rate of 12.7 mm [.5 in] per minute.

Contact Size	Connector Type	Direction of Force	Test Force (N [lbf])	Preload Force (N [lbf] max)
16	Vertical	Push out	31 [7.0]	8.8 [2.0]
	Vertical	Push in	31 [7.0]	8.8 [2.0]
	Right angle	Push out	31 [7.0]	18 [4.0]
22	Right angle	Push out	25 [5.6]	18 [4.0]
	Vertical	Push in	25 [5.6]	2.2 [0.5]
	Vertical	Push out	6.7 [1.5]	2.2 [0.5]

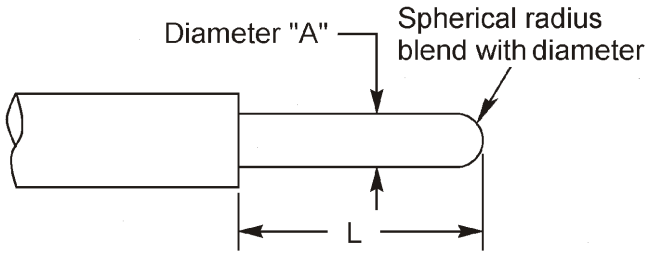
| Figure 10

| 3.14. Connector Press-fit Retention

The force necessary to unseat both unmated and mounted vertical connector, and an unmated and mounted right angle connector from the printed circuit board was measured at maximum rate of 12.7 mm [.5 in] per minute.

| 3.15. Probe Damage

Unmated and mounted vertical specimens were attached to a plate that allowed free rotation, while the axis of the female contact was kept horizontal. The test pin was fully inserted in the female contact and the specified bending moment was supported by the test pin and female contact in the specimen. A 1.59 mm [.0625 in] diameter pin was used for the size 16 contact, and a .762 mm [.030 in] diameter pin was used for the size 22 contact. The test was conducted at the ¾ and the ½ depth, while the specimen was slowly rotated through 360 degrees.



Contact Size	¾ Depth		½ Depth		Test Pin For Probe Damage	
	L (mm max)	L (mm min)	L (mm max)	L (mm min)	⌀A (mm max)	⌀A (mm min)
16	13.630	13.370	9.130	8.870	1.600	1.575
22	4.521	4.267	3.048	2.794	0.775	0.762

NOTE

1. *Material: Hardened tool steel*
2. *Surface Roughness: ISO Standard 468*
3. *Ra = 0.15 to 0.25 µm*
4. *Bending Moment: Size 16 = 0.226 N•m; Size 22 = .020 N•m*

Figure 11

3.16. Polarizing Method

Mounted specimens were misaligned and attempted to mate using a force of 100.5 N [22.6 lbf]. Then the specimens were aligned properly and attempted to mate at a maximum rate of 12.7 mm [.5 in] per minute.

3.17. Static Load, Transverse

Force was applied to the specified areas of unmated and mounted specimens for a period of 60 seconds. The force was applied using a 3.2 mm [.125 in] diameter probe at a maximum rate of 12.7 mm [.5 in] per minute. F1 was 100 N [22.5 lbf], F2 was 75 N [16.9 lbf] and F3 was 50 N [11.2 lbf].

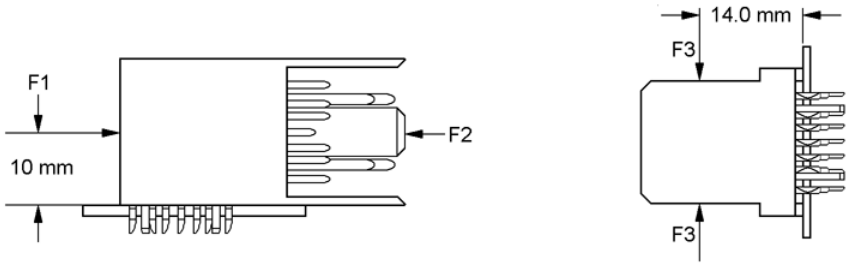


Figure 12

| 3.18. Restricted Entry

A. Size 16 Contacts

A 22 N [5 lbf] axial force was applied to unmated and mounted vertical specimens using a 1.875 mm [.0738 in] diameter probe for 5 seconds at a maximum rate of 12.7 mm [.5 in] per minute.

B. Size 22 Contacts

A 22 N [5 lbf] axial force was applied to unmated and mounted vertical specimens using a 1.1 mm [.043 in] diameter probe for 5 seconds at a maximum rate of 12.7 mm [.5 in] per minute.

| 3.19. Contact Bending Strength

A. Size 16 Contacts

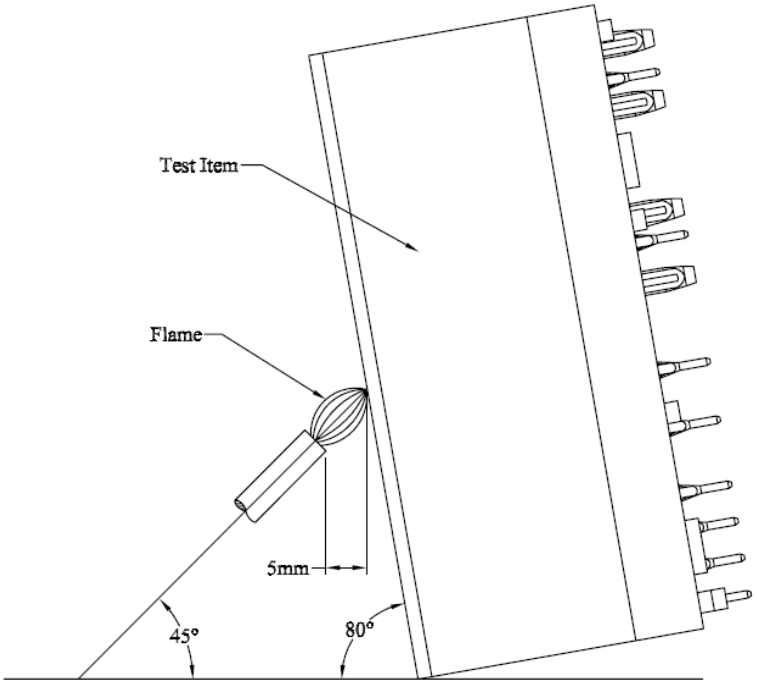
A 0.1 N•m [0.9 lbf-in] force was applied to the contacts of unmated and unmounted right angle specimens for 60 seconds at a distance of 80 percent of the contact length from the housing support. Contact set was measured after removal of the force.

B. Size 22 Contacts

A 0.025 N•m [.22 lbf-in] force was applied to the contacts of unmated and unmounted right angle specimens for 60 seconds at a distance of 80 percent of the contact length from the housing support. Contact set was measured after removal of the force.

| 3.20. Flammability

Unmated and unmounted vertical and right angle specimens were subjected to a needle flame test.
| The length of time for specimen burn was measured after removal of the test flame (Figure 13).



| Figure 13

| 3.21. Insertion Force of Mounted Virgin Right Angle Connector

The force required to mate a mounted vertical connector with a virgin mounted right angle connector was measured using a tensile/compression device with a free floating fixture and a rate of travel of 12.7 mm [.5 in] per minute.

| 3.22. Insertion of Unmounted Virgin Right Angle Connector

An unmounted vertical connector was mated with a virgin unmounted right angle connector.

| 3.23. Withdrawal Force

The force required to unmate a mounted connector was measured using a tensile/compression device with a free floating fixture and a rate of travel of 12.7 mm [.5 in] per minute.

| 3.24. Rapid Change in Temperature

Mated specimens were subjected to 5 cycles of thermal shock with each cycle consisting of 30 minute dwells at -55 and 125˚C. The transition between temperatures was less than 1 minute.

| 3.25. Damp Heat, Steady State

Unmated specimens were subjected to a relative humidity of 90 to 95% RH and a temperature of 55˚C for a period of 21days.

| 3.26. Electrical Load and Temperature

Mated and mounted specimens were exposed to 80˚C for 500 hours in the energized condition. Size 16 contacts were energized at 16 amperes, size 22 contacts were energized at 1 ampere.

| 3.27. Temperature, No Electrical Load

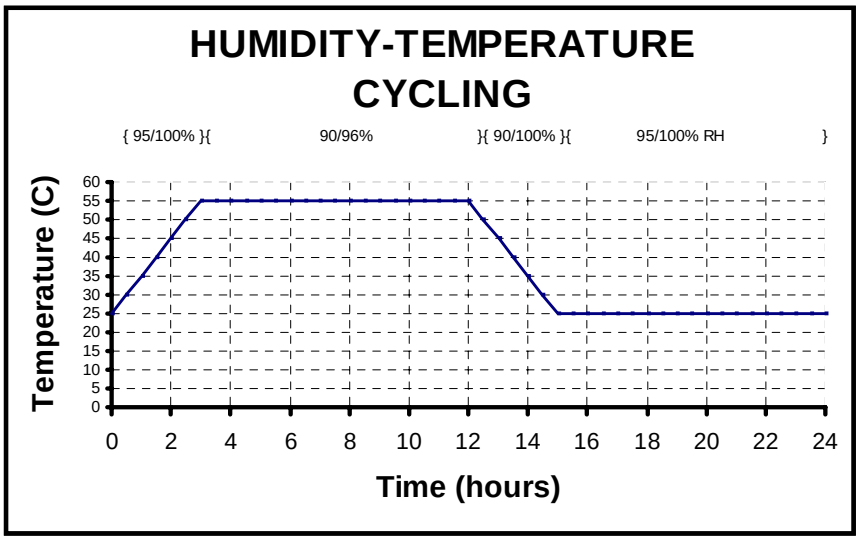
Mated specimens were exposed to 80˚C for 500 hours.

| 3.28. Dry Heat

Mated specimens were exposed to 125˚C for 16 hours.

| 3.29. Damp Heat, Cyclic (First Cycle)

Mated specimens were exposed to 1, 24 hour cycle of humidity-temperature cycling between 25 and
| 55˚C while maintaining high humidity (Figure 14).



| Figure 14

| 3.30. Damp Heat, Cyclic (Remaining Cycles)

Mated specimens were exposed to 5, 24 hour cycles of humidity-temperature cycling between 25 and
| 55˚C while maintaining high humidity (Figure 14).

| 3.31. Cold

Mated specimens were exposed to -55˚C for 2 hours.

| 3.32. Temperature Life, No Electrical Load

| Mated and mounted specimens were exposed to 105˚C for 1000 hours.

| 3.33. Mixed Flowing Gas

| Specimens were exposed for 20 days to a mixed flowing gas Class IIA exposure. Class IIA exposure is
| defined as a temperature of 30˚C and a relative humidity of 70% with the pollutants of Cl_2 at 10 ppb, NO_2
| at 200 ppb, H_2S at 10 ppb and SO_2 at 100 ppb. Mounted specimens were exposed in the unmated
| condition for the first 10 days, followed by 10 days exposure in the mated condition.