AMP

QUALIFICATION TEST REPORT

AMP* PIDG* TERMINALS
Per MIL-T-7928

501-31 Rev. 0

Product Specification:	MIL-T-7928
CTL No.:	CTL3022-003
Date:	April 17, 1986
Classification:	Unrestricted
Distribution:	11

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AMP

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CORPORATE TEST LABORATORY

Qualification Retention Test
AMP PIDG Class 2 Terminals per
MIL-T-7928, Group C

1. Introduction

1.1 Purpose

Testing was conducted to determine that AMP PIDG Class 2 Terminals continue to comply with the Group C Inspection requirements of MIL-T-7928, paragraph 4.6.4.2.

1.2 Scope

This report covers electrical and mechanical performance of these terminals, made by the General Products Division of the General Products Group. Terminals, representative of current production, were subjected to inspection and were accepted by the Product Assurance Department of the division. They were submitted to the laboratory on Oct. 2, 1985. Testing was performed between Dec. 9, 1986 and Jan. 17, 1986.

1.3 Conclusions

All samples met the Group C periodic inspection requirements specified in MIL-T-7928 for Class 2 terminals.

1.4 Product Description

AMP Pre-Insulated Diamond Grip (PIDG) terminals consist of a tin plated copper body with a copper sleeve and an insulating sleeve which fit over the terminal barrel. AMP Class 2 crimping tools produce crimps for a given size wire and terminal that are precisely alike in appearance and performance. The resulting termination is extremely resistant to vibration, shock and critical environments, and its tensile strength approaches that of the wire itself.

1.5 Test Samples

The following nylon insulated terminals were subjected to the Group C Inspection Test sequence of MIL-T-7928:

AMP Part No.	Military Part No.	Description	
		Wire Range	Stud Size
36153	M25036-103	22-18	#10
36161	M25036-112	12-10	#10
51864	M25036-107	16-14	#6
53073	M25036-145	26-24	#6

These terminals are typical of the product line from wire sizes 10 to 26 AWG. Other catalog numbers represent variations of the tongues and bolt hole sizes.

Class 2 hand crimping tools used to prepare test samples were Cat. #59250 for wire sizes 14 to 26 AWG and Cat #59239-4 for wire sizes 10 to 12 AWG.

1.6 Test Sequence as specified in MIL-T-7928

Samples were subjected to the test sequence listed below:

Inspection	Requirement Paragraph	Method Paragraph
Group I		
Current Cycling	3.5.2	4.7.3
Voltage Drop	3.5.1	4.7.2
Group II		
Vibration	3.5.6	4.7.7
Voltage Drop	3.5.1	4.7.2
Tensile Strength	3.5.7	4.7.8
Group III		
Immersion (105°C)	3.5.8	4.7.9.1
Dielectric Withstanding Voltage	3.5.3	4.7.4
Group IV		
Flammability	3.5.10	4.7.11
Group V		
Salt Spray (corrosion)	3.5.4	4.7.5
Voltage Drop	3.5.1	4.7.2
Tensile Strength	3.5.7	4.7.8
Group VI		
Heat Aging (105°C)	3.5.9	4.7.10.1
Dielectric Withstanding Voltage	3.5.3	4.7.4
Group VII		
Low Temperature Crimp	3.5.11	4.7.12
Dielectric Withstanding Voltage	3.5.3	4.7.4
Group VIII		
Axial Load	3.5.5.2	4.7.6.3 & 4.7.6.4
Dielectric Withstanding Voltage	3.5.3	4.7.4

2. Summary of Test Results

2.1 Group I

Eight samples of each terminal, crimped on wire, were subjected to current cycling. After 50 current cycles at the specified currents, all samples met the voltage drop requirement.

Test Methods:

Eight samples of each size terminal, four crimped on the smallest and four crimped on the largest wire size for which it was designed, were current cycled. Samples were attached to 3-foot lengths of wire. One cycle consisted of 30 minutes of current "on" time, followed by 15 minutes of current "off" time.

Following current cycling, voltage drop measurements were taken at the current specified. The measurements were taken after the temperature of the conductors had stabilized. The average voltage drop reported has had an equal length of wire measurement deducted from the measured values.

Test Results:

Voltage Drop:

Wire Size	Average Voltage Drop Difference	Required Voltage Drop Difference	DC Test Current	DC Cycling Current
10	-0.56 mv.	+3.0 mv.	55.0 a.	68.75 a.
12	-1.25 mv.	+3.0 mv.	41.0 a.	51.25 a.
14	-0.80 mv.	+3.0 mv.	32.0 a.	40.00 a.
16	-1.23 mv.	+3.0 mv.	22.0 a.	27.50 a.
18	-0.96 mv.	+3.0 mv.	16.0 a.	20.00 a.
22	-1.27 mv.	+3.0 mv.	9.0 a.	11.25 a.
24	-1.09 mv.	+4.0 mv.	4.5 a.	5.63 a.
26	-1.18 mv	+5.0 mv.	3.0 a.	3.75 a.

2.2 Group II

Eight samples of each terminal, crimped on wire, were vibrated for 18 hours in two mutually perpendicular planes, then were measured for termination resistance. This was followed by tensile testing. All samples passed the vibration, termination resistance and tensile requirements of the specification.

Test Methods:

Four samples of each size terminal, crimped on one end of 12 inch lengths of the smallest and largest wire sizes for which they were designed, were rigidly mounted to the vibration fixture by their normal mounting means. The other end was mounted to a stable support 12 inches back from the vibration table, with all slack removed. The terminals were vibrated in accordance with MIL-STD-202, Method 201 for 18 hours in each of two mutually perpendicular axes. Following vibration, the terminals were measured for voltage drop as described in Para. 2.1 above, after which the terminals were pulled to destruction, using a head speed of 1 inch per minute.

Test Results:

Voltage Drop:

Wire Size	Average Voltage Drop Difference	Required Voltage Drop Difference	DC Test Current
10	-0.53 mv.	+3.0 mv.	55.0 a.
12	-1.14 mv.	+3.0 mv.	41.0 a.
14	-0.82 mv.	+3.0 mv	32.0 a.
16	-1.01 mv.	+3.0 mv	22.0 a.
18	-0.71 mv.	+3.0 mv.	16.0 a.
22	-1.25 mv.	+3.0 mv	9.0 a.
24	-1.05 mv	+4.0 mv.	4.5 a.
26	-1.01 mv	+5.0 mv	3.0 a.

Tensile Strength:

Wire Size	Maximum Force (lbs.)	Minimun Force (lbs.)	Required Force (lbs.)
10	249	210	150
12	160	123	110
14	116	96	70
16	83	72	50
18	62	60	38
22	31	29	15
24	18.1	16.4	10
26	9.5	7.8	7

2.3 Group III

Eight samples of each terminal, crimped on wire, were immersed in hydraulic fluid and eight additional samples of each terminal, crimped on wire, were immersed in lubricating oil, each for a period of 20 hours. Then the samples were subjected to the dielectric withstanding test of 1.5 kv. ac for one minute. There was no breakdown or flashover on any sample, meeting the requirement of the specification.

Test Methods:

Eight samples of each size terminal, four crimped on the smallest and four crimped on the largest size wire for which it was designed, were immersed in hydraulic oil (MIL-H-5606) for 20 hours. Eight additional samples, as above, were submerged in lubricating oil (MIL-L-7808) for 20 hours. After samples were removed from the oils, they were air dried for an hour, and the excess oil was wiped off. Then the tongues of the terminals were sealed with wax up to the crimp area. Each sample was submerged above the crimp area in a 5% salt water solution and a potential of 1.5 kv. ac was applied between the wire and the water for one minute.

2.4 Group IV

Two samples of each terminal were tested for flammability. Burn times ranged from zero to one second, which complies with the specification requirement of 30 seconds, maximum.

Test Method:

Two crimped samples were subjected to the flammability test specified in MIL-T-7928. The tip of a 2 inch gas flame was applied for a period of 20 seconds to one half the length of insulation. When the flame was removed, the burn time of the insulation was observed.

2.5 Group V

Eight samples of each terminal, crimped on wire, were exposed to a 5% salt spray for 48 hours. Then the samples were measured for voltage drop and tensile tested. All samples passed the termination resistance and tensile requirements of the specificaton.

2.5 Group V (continued)

Test Methods:

Eight samples of each size terminal, four crimped on the smallest and four crimped on the largest size wire for which it was designed, were exposed to 48 hours of 5% salt spray in accordance with MIL-STD-202, Method 101, condition B. Then they were rinsed in distilled water and air dried for a minimum of one hour. They were measured for voltage drop as described in Para. 2.1, and pulled to destruction as described in Para 2.2.

Test Results:

Voltage Drop:

Wire Size	Average Voltage Drop Difference	Required Voltage Drop Difference	DC Test Current
10	-0.63 mv.	+3.0 mv.	55.0 a.
12	-1.09 mv.	+3.0 mv.	41.0 a.
14	-0.95 mv.	+3.0 mv.	32.0 a.
16	-1.26 mv.	+3.0 mv.	22.0 a.
18	-0.88 mv.	+3.0 mv.	16.0 a.
22	-1.31 mv.	+3.0 mv.	9.0 a.
24	-1.18 mv	+4.0 mv.	4.5 a.
26	-1.35 mv.	+5.0 mv.	3.0 a.

Tensile Strength:

Wire Size	Maximum Force (lbs.)	Minimum Force (lbs.)	Required Force (lbs.)
10	214	202	150
12	168	154	110
14	121	110	70
16	86	81	50
18	65	64	38
22	31	30	15
24	20.7	18.0	10
26	11.1	9.8	7

2.6 Group VI

Eight samples of each terminal, crimped on wires, were conditioned at 121°C for 120 hours. The cooled samples were subjected to the dielectric withstanding test of 1.5 kv. ac for one minute. There was no breakdown or flashover on any sample, meeting the requirements of the specification.

Test Methods:

Eight samples of each size terminal, four crimped on the smallest and four crimped on the largest wire for which it was designed were placed in a circulating air oven at 121°C for 120 hours. After cooling to room temperature, they were dielectrically tested as described in Para. 2.3.

2.7 Group VII

Eight samples of each terminal were conditioned at -5°C for one hour, then crimped to the specified wires while at that temperature. Then they were exposed to -65°C for one hour. After reaching room temperature, they were subjected to the dielectric test of 1.5 kv. for one minute. There was no evidence of rupture, cracking, breakdown or flashover on any sample, meeting the requirements of the specification.

Test Methods:

Eight samples of each size terminal were placed in a circulating air oven for one hour at -5°C. While at that temperature, four were crimped on the smallest and four were crimped on the largest size wire for which they are designed. The assemblies were placed in a circulating air oven for one hour at -65°C, allowed to return to room temperature, and were dielectrically tested as described in Para. 2.3.

2.8 Group VIII

Five uncrimped samples of each size terminal were subjected to the axial load test specified in MIL-T-7928. The insulation on the terminals did not move more than 1/32 inch, meeting the requirements of the specification.

Five additional samples were crimped on the smallest wire for which it was designed, and exposed to 96 hours of 90%-95% humidity at 40°C. Then they were subjected to the axial load test, followed by the dielectric test of 1.5 kv. for one minute. The insulation on the terminals did not move more than 1/32 inch and there was no breakdown or flashover, meeting the requirements of the specification.

2.8 Group VIII (continued)

Test Method

On the five uncrimped samples, four 0.022 inch diameter holes were drilled through the insulation overhang. Uninsulated wires were inserted through the holes and were fastened together to equally distribute the load on the insulation sleeve. An eight pound force was applied to try to pull the insulation away from the wire barrel.

The five samples crimped on the smallest wire were subjected to 90%-95% relative humidity at 40°C for 96 hours described in MIL-STD-202, Method 103, Condition B. Then the samples were tested by applying an eight pound load between the crimped conductor and a suitable test jig positioned under the insulation overhang. The free end of the crimped conductor and the test jig were fastened in the jaws of the tensile machine, and the load was applied at a rate less than one inch per minute. This was followed by dielectric testing as described in Para. 2.3

3. Test Equipment Calibration

3.1 Calibrated Equipment

Calibrated test equipment used for this program is on a periodic calibration schedule which complies with MIL-STD-45662. Calibration of test equipment is performed by AMP Corporate Metrology, with standards that are traceaable to the National Bureau of Standards.

3.2 Uncalibrated Equipmment

Uncalibrated equipment (ovens, chambers, power supplies and the like) used for this program was monitored with calibrated equipment.

4. Validation

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