NUMBER 108-1

TENTATIVE

DEC 14 1984

PRODUCT SPECIFICATION

AMP* AMPACT* COPPER TAPS

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1.0 SCOPE

1.1 This specification contains performance requirements and qualification test procedures for AMPACT copper taps. AMPACT copper taps consist of an aluminum bronze spring "C" member and a wedge made of a copper alloy. They are intended to provide a reliable electrical and mechanical connection for all solid and stranded copper or Copperweld● conductor combinations.

2.0 APPLICABLE DOCUMENTS

2.1 The following documents constitute a part of this specification to the extent specified herein. In the event of conflict between requirements of this specification and the referenced documents, this specification shall take precedence.

*Trademark of AMP Incorporated
●Trademark of Copperweld Steel Company

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AMP INCORPORATED Harrisburg, Pa.

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NAME AMP AMPACT COPPER TAPS

2.1.1 AMP Documents.

109-13009	Thermal Shock, Test Procedure For
109-13010	Salt Spray and Elevated Temperature Test Procedure For

2.1.2 Military Documents.

MIL-C-45662	Calibration of Standards

2.1.3 Commercial Documents.

ANSI C119.4-1976	American National Standard for Connectors for Use Between Aluminum or Aluminum-Copper

3.0 REQUIREMENTS

3.1 Design and Construction. Taps shall be of the design, construction and physical dimensions specified on the applicable AMP Product Drawing.

3.2 Materials. The materials utilized in the construction of the taps shall be as specified on the applicable AMP Product Drawing.

3.3 Functional Characteristics.

3.3.1 Wire Range. Taps are designed to accommodate various conductor sizes and combinations from #6 AWG through 500 kcmil copper and Copperweld conductors.

3.3.2 Classification. Taps are classified mechanically as Class 3, Minimum Tension, and Class A, Electrically, as described in ANSI specification C119.4-1976.

4.0 QUALITY ASSURANCE PROVISIONS

4.1 General Provisions. The quality provisions specified herein shall be employed in the manufacturing and testing of this product to insure that normal production units continue to meet the performance requirements of this specification.

4.2 Classification of Test.

(A) Qualification Inspection (see 5.0)
(B) Quality Conformance Inspection (see 6.0)

4.3 Test Conditions.

4.3.1 Measurements. Measurements shall be made with instruments that have been calibrated and are certified in accordance with specification MIL-C-45662.

4.3.2 Laboratory Conditions. Unless otherwise specified herein, normal laboratory temperature, humidity, and atmospheric pressure shall be considered acceptable for test purposes.

5.0 QUALIFICATION INSPECTION

5.1 Sample Selection. Taps selected for test shall be representative of current design and construction. Preparation of test samples shall be conducted in accordance with AMP Instruction Sheets governing assembly techniques.

5.2 Test Procedure. Qualification Inspection shall be conducted in accordance with Table I in the sequence specified.

5.3 Sample Preparation. Four taps shall be prepared for each test group in the following manner, as applicable for their respective tests.

5.3.1 Test Group I (Heat Cycle Test). The exposed length of conductor in the heat cycle loop, between the taps and equalizers, shall be determined by conductor size as follows. (NOTE: The exposed length of solid round conductor between taps shall be twice these values, as no equalizers are required.)

Exposed Conductor Length (inches)	Copper
12	up to 2/0
24	above 2/0 to 500 kcmil
36	above 500 kcmil

The loop shall be connected to the power source using additional lengths as those above, of these conductor sizes, joined to the equalizers at each end of the loop. Equalizers are installed on stranded conductors to provide equipotential planes for resistance measurements and to prevent the influence of one tap on the other in the heat cycle loop. These equalizers may be of any form that assures permanent contact with all the strands of the conductor between taps for the duration of the heat cycle test; e.g., a welded equalizer or a short compression sleeve in the center between two taps, if a continuous conductor is used. In addition, for obtaining conduc-

tor temperature, a control conductor shall be installed in the heat cycle loop between two equalizers. It shall be of the same size and type as the test conductor that would run at the higher temperature, and shall be at least twice the length specified in the above table. For temperature measurements at least one thermocouple shall be permanently attached to each tap, as close as possible to the midpoint between the two conductors, and one thermocouple attached at the midpoint of the control conductor.

5.3.2 Test Group II (Thermal Shock/Corrosion). Taps shall be assembled to lengths of conductor as specified in AMP Specifications 109-13009 and 109-13010. Current equalizers shall be installed on stranded conductors twelve inches from the edges of the taps.

5.4 Acceptance. All samples shall meet the requirements specified in the Performance section of this specification, Paragraph 5.5.

5.5 Performance Requirements and Test Methods. AMPACT copper taps shall be designed to meet the performance requirements specified herein. To verify compliance to this specification, production items shall be tested and shall meet the requirements of this specification. Tests shall be conducted in the order specified in Table I.

TABLE I

QUALIFICATION INSPECTION			
Test or Examination	Paragraph	Test Group and Sequence I	II
Examination of Product	5.5.1	1	1
Termination Resistance	5.5.2	2-4*	2-4-6
EEI Heat Cycle	5.5.3	3	
Thermal Shock	5.5.4		3
Corrosion	5.5.5		5
Tensile Strength	5.5.6	5	

*Measurements taken throughout the test as specified.

5.5.1 Examination of Product. When examined as specified, all samples shall be free from any damage or physical defects that would affect the electrical or mechanical performance of the taps.

5.5.1.1 Test Method. Test specimens shall be visually examined before and after assembly to assure proper manu-

facturing and assembly in accordance with the manufacturer's drawings and instructions.

5.5.2 Termination Resistance.

A. Heat Cycle Test. When measured as specified, each tap shall indicate electrical stability throughout the test from the 25th to the 500th cycle, by a variation of not more than 5% from the average of the measured values in this interval.

B. Thermal Shock and Corrosion. When measured as specified, the voltage drop across tap terminations shall not deviate more than 250% from the intitial measurements (Step 2, Table I) to measurements made after either Thermal Shock or Corrosion.

5.5.2.1 Test Method. Measurements shall be taken across each tap, with the probe points located on the equalizers 1/8 inch back from the edge adjacent to the tap, or at a similar distance on a solid conductor. A non-heating magnitude of direct current shall be used for measurements.

5.5.3 Heat Cycle Test. Throughout the test, as specified, the temperature of taps shall not exceed that of the control conductor, and the temperature difference between the control conductor and each tap shall show a condition of stability from the 25th to the 500th cycle. Stability is indicated by a decrease of this difference of not more than 10°C from the average of the measured differences in this interval for this tap. In addition, taps shall meet the requirements for Termination Resistance throughout the test as specified in Paragraph 5.5.2.A.

5.5.3.1 Test Method. Taps shall be subjected to Heat Cycle Test in accordance with ANSI C119.4-1976, Class A, as stated herein. A total of 500 "current on/current off" cycles shall be performed. Testing shall be performed in a draft-free room at an ambient temperature of 20° to 35°C. The test current shall be adjusted to produce a temperature rise above ambient of 100°C on the control conductor, the adjustment to be made during the heating periods of the first 25 cycles. This current shall be used for the remainder of the test, regardless of the deviation of the control conductor temperature. Each heating cycle shall consist

of equal "current on" and "current off" periods of the following duration, based on conductor size.

Current on Period	Copper Conductor
1 hour	Up to 4/0
1-1/2 hours	Over 4/0 to 500 kcmils
2 hours	Over 500 to 1000 kcmils

NOTE: The length of these time periods in which resistance and temperature measurements are made shall be extended for the time required to take the measurements.

A. Mounting. The Heat Cycle test chain may be installed in the form of a loop, a "U", or a "zig-zag" configuration in which the taps shall be mounted in a horizontal position with at least eight inches distance between adjacent taps. The chain shall be a minimum distance of one foot from any walls and two feet from the floor or ceiling.

B. Measurements. Resistance and temperature measurements shall be made at the beginning of the test and at the following intervals, conforming as close as possible to normal working hours:

Every 25 cycles to the 125th cycle,
every 40 cycles to the 250th cycle, and
every 80 cycles to the 500th cycle.

Resistance measurements shall be made in accordance with Paragraph 5.5.2.1 at the end of the specified "current off" periods. The ambient temperature shall be recorded along with each set of resistance measurements, and the resistance values corrected to 20°C. Temperature measurements shall be taken on taps and the control conductor at the end of the specified "current on" heating periods.

5.5.4 Thermal Shock. After five cycles of Thermal Shock as specified, taps shall meet the requirements for Termination Resistance, Paragraph 5.5.2.B.

5.5.4.1 Test Method. Taps shall be subjected to five cycles of Thermal Shock in accordance with AMP Specification 109-13009, each cycle consisting of:

2½ hours @ 150°C
15 minutes @ 0°C (melting ice water), immediately from the previous environment
30 minutes @ 150°C
20 hours at room temperature

5.5.5 Corrosion. Upon completion of the 30-day Salt Spray test as specified, taps shall meet the requirements for Termination Resistance, Paragraph 5.5.2.B.

5.5.5.1 Test Method. Taps shall be subjected to a 30-day Salt Spray Corrosion test in accordance with AMP Specification 109-13010, each daily exposure consisting of:

15 hours in a 5% salt spray atmosphere
1 hour in a drying oven @ 100°F
8 hours @ room temperature

5.5.6 Tensile Strength. When tested as specified, the taps shall not break or become separated from the cable until attaining a tensile force of 200 pounds or 5% of the rated cable strength of the weaker conductor, whichever is larger, for conductors larger than #6. For conductor sizes #6 and smaller, the force value shall be 100 pounds.

5.5.6.1 Test Method. Test specimens shall be placed in a tensile testing machine and an axial force applied to the conductors at a rate of 1/4 inch per minute per foot of length between jaws until the tap breaks or becomes separated from the conductor. When testing taps assembled to stranded conductors, a suitable deadending procedure shall be performed on the cable ends to assure simultaneous loading of all strands.

6.0 QUALITY CONFORMANCE INSPECTION

6.1 Sample Selection. Unless otherwise specified, sampling procedures shall be in accordance with MIL-STD-105. Sampling and Acceptable Quality Levels shall be as specified in the applicable AMP Quality Inspection Plan. Dimensional requirements shall be in accordance with the applicable AMP Product Drawing.

6.2 Test Procedure. Taps supplied in accordance with this specification shall meet the requirements for Quality Conformance Inspection, Table II. Examination and test shall be conducted in the sequence specified.

TABLE II

QUALITY CONFORMANCE INSPECTION	
Test or Examination	Test Method
Examination of Product	Quality Inspection Plan
Tensile Strength	Paragraph 5.5.6

NOTE - Additional testing and evaluation of this product may result in specification changes, therefore the values shown herein are strictly tentative. AMP, by the issuance of this tentative specification, makes no representation or warranty that the product described herein will comply with these specifications and no such representation or warranty should be or is implied.