# AMPACT* Aluminum Taps

## 1. SCOPE

### 1.1. Content

This specification covers performance, tests and quality requirements for AMPACT* aluminum taps. AMPACT aluminum taps consist of a spring "C" member and a wedge made from a special aluminum alloy of high ductility and electric conductivity. The "C" member and wedge are factory coated with an inhibitor containing abrasive particles to help clean the contact surface during installation. AMPACT taps use AMPACT cartridges for installation with the proper wire combinations. When connected, these taps provide a reliable electrical and mechanical connection for solid, stranded, or compressed conductor combinations, including AAC, AAAC, ACSR, and ACAR. They may also be used in non-corrosive environments to connect copper conductors or Copperweld™. AMPACT aluminum taps consist of four groups coded by four different colors according to their cartridge power as described in AMPACT Taps Selection Data GP 1931. Taps are designed to accommodate various conductor sizes and combinations from # 14 AWG to 1192.5 kcmil cable and are rated electrically as Heavy-duty Connectors Class (A) as described in ANSI C119.4– 1991/ Section 3.2. They are rated mechanically per the tensile strength of their connection, as Class 3, Minimum Tension - ANSI C119.4 Section 4.4.3.

### 1.2. Qualification

When tests are performed on the subject product line, procedures specified in Figure 1 shall be used. All inspections shall be performed using the applicable inspection plan and product drawing.

### 1.3. Qualification Test Results

Successful qualification testing on the subject product line was completed on 23Feb99. The Qualification Test Report number for this testing is 501-47005. This documentation is on file at and available from Global Engineering and Manufacturing Standards (GEMS).

## 2. APPLICABLE DOCUMENTS

The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the latest edition of the document applies. In the event of conflict between the requirements of this specification and the product drawing, the product drawing shall take precedence. In the event of conflict between the requirements of this specification and the referenced documents, this specification shall take precedence.

### 2.1. AMP Documents

A. GP 1931: AMPACT Tap Selection Data
B. 109-1: General Requirements for Test Specifications
C. 109 Series: Test Specifications as indicated in Figure 1
D. 124-78: Hazard Communication
E. 125-6274: Synthetic Inhibitor
F. Corporate Bulletin 401-76: Cross-reference between AMP Test Specifications and Government or Commercial Documents
G. 409-2106: AMPACT Taps and Application Tooling
H. 501-47005: Qualification Test Report

2.2. Commercial Standard

ANSI C119.4-1991: American National Standard for Connectors, for using Between Aluminum or Aluminum to Copper Over-head Conductors

## 3. REQUIREMENTS

3.1. Design and Construction

Product shall be of the design, construction and physical dimensions specified on the applicable product drawing.

3.2. Materials

Materials used in the construction of this product shall be as specified on the applicable product drawing.

3.3. Safety Requirements

Safety and Health requirements as specified in AMP Specifications 124-78 and 125-6274, shall be employed when testing, handling, storing, manufacturing, and shipping of AMPACT taps.

3.4. Performance and Test Description

Product is designed to meet the electrical, mechanical and environmental performance requirements specified in Figure 1. Unless otherwise specified, all tests shall be performed at ambient environmental conditions per AMP Specification 109-1.

3.5. Test Requirements and Procedures Summary

| Test Description | Requirement | Procedure |
|---|---|---|
| Examination of product. | Meets requirements of product drawing. | Visual, dimensional and functional per applicable quality inspection plan. |
| ELECTRICAL | | |
| Current cycling. | ANSI C119.4, Section 4.2.<br>ANSI C119.4, Section 4.3.<br>See Para 5.1.A.<br>See Note. | ANSI C119.4, Sections 6.6 to 6.10.<br>See Para 5.2.B. |
| MECHANICAL | | |
| Wire pullout tensile. | ANSI C119.4, Section 4.4.<br>See Para 5.2.A. | ANSI C119.4, Section 7.3.<br>See Para 5.2.B. |
| ENVIRONMENTAL | | |
| Thermal shock. | See Note. | AMP Spec 109-13009.<br>See Para 5.3. |
| Salt spray corrosion. | See Note. | AMP Spec 109-13010.<br>See Para 5.4. |

**NOTE** *Shall meet visual requirements, show no physical damage, and meet requirements of additional tests as specified in the Product Qualification and Requalification Test Sequence shown in Figure 2.*

Figure 1

3.6. Product Qualification and Requalification Test Sequence

| Test or Examination | Test Group (a) | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| | Test Sequence (b) | | |
| Examination of product | 1,5 | 1,3 | 1,7 |
| Termination resistance, specified current (c) | 2,4 | | 2,4,6 |
| Current cycling | 3 | | |
| Wire pullout tensile | | 2 | |
| Thermal shock | | | 3 |
| Salt spray corrosion | | | 5 |

**NOTE**

*(a) See Para 4.1.A.*
*(b) Numbers indicate sequence in which tests are performed.*
*(c) Measurements taken throughout the test as specified.*

Figure 2

## 4. QUALITY ASSURANCE PROVISIONS

4.1. Qualification Testing

A. Sample Selection

Samples shall be prepared in accordance with applicable Instruction Sheets and shall be selected at random from current production.

Test group 1 shall consist of 4 samples with unused bare conductors of the same size & type shall be prepared for each test group as specified in their respective test Specification per ANSI C119.4, Section 6.2. Current equalizers (welded or compression sleeves), shall be installed on stranded conductors to provide a permanent contact with all conductor strands and prevent the influence of 1 tap on the other per ANSI C119.4, Section 6.3. The exposed length of conductor between the taps and equalizers shall be determined by the conductor size per ANSI C119. 4, Section. 6.4 -Table 4, (see Figure 3 below). A control conductor used for determining the test current shall be installed in the current cycle loop (between two equalizers for stranded conductors). The control conductor shall be the same type and size as the test conductor in the current cycle loop. Its length shall be twice the length of the tested conductor given in Figure 3.

| Conductor Length (inches) | Conductor Type | |
|---|---|---|
| | Aluminum | Copper |
| 12 | Up through 4/0 AWG | Up through 2/0 AWG |
| 24 | Over 4/0 AWG to 795 Kcmil | Over 2/0 AWG to 500 Kcmil |
| 36 | Over 795 Kcmil | Over 500 Kcmil |

**NOTE**

*The exposed length of solid round conductor between taps shall be twice the values shown in Figure 3 due to the fact that no equalizers are required.*

Figure 3

Test group 2 shall consist of 2 wire combinations as follows: The largest conductor diameter of the highest rated tensile strength and the smallest conductor diameter of the highest rated tensile strength. Three samples of each tap/wire combination shall be tested. Conductors used in tests shall be unused bare conductors. When testing taps are assembled to stranded conductors, a suitable dead-ending procedure shall be performed to ensure simultaneous loading of all strands.

Test Group 3 shall consist of 4 taps assembled to lengths of aluminum to copper conductors as specified in AMP Specifications 109 -13009 and 109 -13010. Current equalizers (welded or compression sleeves) shall be installed on the stranded conductors 12 inches from the tap edges.

B. Test Sequence

Qualification inspection shall be verified by testing samples as specified in Figure 2.

4.2. Requalification Testing

If changes significantly affecting form, fit or function are made to the product or manufacturing process, product assurance shall coordinate requalification testing, consisting of all or part of the original testing sequence as determined by development/product, quality and reliability engineering.

4.3. Acceptance

Acceptance is based on verification that the product meets the requirements of Figure 1. Failures attributed to equipment, test setup or operator deficiencies shall not disqualify the product. If product failure occurs, corrective action shall be taken and samples resubmitted for qualification. Testing to confirm corrective action is required before resubmittal.

4.4. Quality Conformance Inspection

The applicable AMP quality inspection plan shall specify the sampling acceptable quality level to be used. Dimensional and functional requirements shall be in accordance with the applicable product drawing and this specification.

## 5. TEST REQUIREMENTS AND PROCEDURES

5.1. Current Cycling - Test Group 1

A. Test Requirements

When connected as specified, samples shall indicate electrical stability for terminated connectors. The resistance of connection, when measured as specified, shall be stable through out test. The resistance variation allowed for stability does not vary by more than ± 5 % from the average of the measured values in the specified interval per ANSI C119.4, Section 4.2. Tap temperature shall not exceed the temperature of the control conductor, and the temperature difference between the control conductor and each tap shall show a stable condition with maximum decrease of 10°C below the average of all temperature differences in the specified interval per ANSI C119.4, Sec 4.3.

B. Test Procedure

The samples and the control conductor shall be installed in the current cycle loop in the same horizontal plane, with at least an 8 inch separation between conductors. They shall be located at least 1 foot from walls and 2 feet from the floor and the ceiling. The loop is connected to the power source using additional lengths as those shown in Figure 3, for those conductor sizes, joined to the equalizers at each end of the loop. Samples shall be subjected to 25 Cycles at sufficient current to raise temperature of the control conductor to 100°C. The values of the initial test current are suggested in Table 5 of ANSI C119.4, Section 6.8. Each current cycle shall consist of a current ON and a current OFF period. The length of the current ON period shall be from 1 to 2 hours depending on the size of the control conductor as listed in Table 6 of ANSI C119.4, Section 6.9. Resistance measurements shall be taken at ambient temperature (at the end of a current OFF period), across each tap, between the potential points located either in the center of solid conductor or 1 conductor diameter back from the edge of equalizer adjacent to the connector. Ambient temperature shall be measured concurrently with each set of resistance measurements and resistance shall be corrected to 20°C. Temperature measurements shall be taken on all taps and control conductor near the end of the specified current ON cycle. The temperature shall be measured by means of thermocouples that have been permanently installed for the current cycling tests.

5.2. Wire Pullout Tensile - Test Group 2

A. Test Requirements

Samples shall provide a reliable mechanical connection that meet the requirements for tensile testing of the terminated connectors per ANSI C119.4, Section 4.4. When tested as specified, taps shall not break or separate from cable (wire) until attaining tensile load of 200 pounds or 5 % of the rated cable strength of the weaker conductor.

B. Test Procedure

Samples shall be placed in the testing machine in a manner to ensure that all strands of the entire conductor are subjected to the same load simultaneously and they are in line with the connector. Apply tensile axial load at rate not exceeding ¼ inch per minute per foot of sample wire length, until the tap breaks or separates from conductor. Record the peak load and failure mode. See ANSI C119.4 Section 7.3.

5.3. Thermal Shock - Test Group 3

Samples shall be subjected to 5 cycles of thermal shock per AMP Specification 109- 13009. Each cycle shall consist of:

2.5 hours at 150°C
15 minutes at 0°C (melting ice water), immediately from the oven
30 minutes at 150°C
20.75 hours at room temperature

5.4. Salt Spray Corrosion - Test Group 3

Samples shall be subjected to a 30 day salt spray corrosion test per AMP Specification 109-13010. Each daily exposure shall consist of:

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