ENERGY DEVELOPMENT REPORT (EDR)

EDR-5815
Small AMPACT BAT connectors
P/N 2445483-1 and P/N 2445483-2
ANSI C119.4 – 2022 Class AA Current Cycling Test

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1 Introduction

1.1 Purpose

To evaluate the electrical performance of small AMPACT BAT connectors, Extra Heavy Duty Current Cycling Test has been performed on AMPACT BAT connectors, P/N 2445483-1 in Loop 1 and P/N 2445483-2 in Loop 2, to the requirements of ANSI C119.4 – 2022 Class AA, *Connectors for Use Between Aluminum to Aluminum and Aluminum to Copper Conductors Designed for Normal Operation at or Below 93°C and Copper to Copper Conductors Deigned for Normal Operation at or Below 100°C*. The conductors used in the assembly of the above tests were 4/0 ACSR (Penguin) and 4/0 AAC (Oxlip) in Loop 1, and 2/0 7 str copper conductor and 4/0 AAC (Oxlip) in Loop 2.

1.2 Scope

This report covers the results from the electrical performance of AMPACT BAT connector, P/N 2445483-1 and P/N 2445483-2 in the following two tests:

(1) Extra Heavy Duty **Current Cycling Test** (ANSI C119.4 – 2022 Class AA) of Loop 1, performed on September 15th, 2023 –November 16th 2023.
(2) Extra Heavy Duty **Current Cycling Test** (ANSI C119.4 – 2022 Class AA) of Loop 2, performed on September 20th, 2023–November 16th 2023.

1.3 Conclusion

The small AMPACT BAT connectors, P/N 2445483-1 and P/N 2445483-2, complied with the electrical performance requirements of Extra Heavy Duty Current Cycling Test (ANSI C119.4 – 2022 Class AA; *Connectors for Use Between Aluminum to Aluminum and Aluminum to Copper Conductors Designed for Normal Operation at or Below 93°C and Copper to Copper Conductors Deigned for Normal Operation at or Below 100°C*) using 4/0 ACSR (Penguin) and 4/0 AAC (Oxlip) in Loop 1, and 2/0 7 str copper conductor and 4/0 AAC (Oxlip) in Loop 2. The specimens passed the test criteria of 500 cycles Current Cycling Test per ANSI C119.4 – 2022 Class AA.

1.4 Product Description

AMPACT BAT connectors are used for making connections between aluminum to aluminum or aluminum to copper conductors on bare overhead applications. This assembly provides a method of making tap connections on primary and secondary distribution lines. To accomplish the installation, the wedge is driven between two opposing conductors by tightening the hex bolt with a battery operated or pneumatic impact wrench tool until the C-member is fully extended. This ensures the C-member develops high clamping force on the conductors and the wedge is locked in place to provide a secure and reliable connection. The product drawings of AMPACT BAT connector, P/N 2445483-1 and P/N 2445483-2 are shown in **Figure 1**.

1.5 Test Sequence & Specimens

Table 1: Test/examination sequence

Step	Test or Examination
1	Examination of product
2	500 cycles Current Cycling Test per ANSI C119.4 – 2022 Class AA
3	Examination of product

Table 2: Test specimens

Test Loop	Connector PN	Connector Quantity	Run Conductor	Tap Conductor
Loop 1	2445483-1	4	4/0 ACSR (Penguin)	4/0 AAC (Oxlip)
Loop 2	2445483-2	4	4/0 AAC (Oxlip)	2/0 7 str copper conductor

2 Summary of Testing

2.1 Examination of Product

All specimens were examined visually and functionally before and after the test and were considered to be in satisfactory condition.

2.2 Current Cycling Test on AMPACT BAT connectors (P/N 2445483-1)

The specimens exhibited Thermal Stability on the 25 data points between the 25th and the 510th cycle, and the temperatures of the specimens did not exceed the temperature of the control conductor over the span of the 510 cycles. There was no evidence of physical damage to the test specimens, as shown in **Figure 2**.

The Temperature Stability Factors of the connectors in each cycle were in the specified range between -10°C and 10°C. Their resistance stabilities were also achieved based on the 25 data points between the 25th and the 510th cycle, since the change in connector resistance, measured between two equalizers, was no more than the ±5% of its average resistance for each of the connector temperature measurements recorded at the specified intervals specified in ANSI C119.0-2022.

2.3 Current Cycling Test on AMPACT BAT connectors (P/N 2445483-2)

The specimens exhibited Thermal Stability on the 25 data points between the 25th and the 510th cycle, and the temperatures of the specimens did not exceed the temperature of the control conductor over the span of the 510 cycles. There was no evidence of physical damage to the test specimens, as shown in **Figure 3**.

The Temperature Stability Factors of the connectors in each cycle were in the specified range between -10°C and 10°C. Their resistance stabilities were also achieved based on the 25 data points between the 25th and the 510th cycle, since the change in connector resistance, measured between two equalizers, was no more than the ±5% of its average resistance for each of the connector temperature measurements recorded at the specified intervals specified in ANSI C119.0-2022.

3 Test Methods

3.1 Examination of Product

The specimens were supplied for testing by Energy R&D/Product Development Engineering at TE Connectivity. They were examined visually and functionally.

3.2 Current Cycling Test on AMPACT BAT connectors (P/N 2445483-1 and P/N 2445483-2)

A 510 cycles Current Cycling Test was conducted independently on AMPACT BAT connectors (P/N 2445483-1) and AMPACT BAT connectors (P/N 2445483-2) per ANSI C119.4 – 2022 Class AA. The AMPACT BAT connectors were subjected to a total of 510 cycles. Each cycle consisted of 1.5 hours of "current-ON" period and 1.0 hours of "current-OFF" period. The current set for Loop 1 using 4/0 ACSR (Penguin) and 4/0 AAC (Oxlip) was adjusted to 525 A during the current-ON period of the first 25 cycles to result in the control conductor of 175°C to 180°C above ambient temperature. The current set for Loop 2 using 2/0 7 str copper conductor and 4/0 AAC (Oxlip) was adjusted to 512 A during the current-ON period of the first 25 cycles to result in the control conductor of 175°C to 180°C above ambient temperature. All selected specimens passed the test criteria mentioned in **Section 2.2** and **Section 2.3.**

3.3 Examination of Product

Following the completion of the two independent Current Cycling Tests, the specimens were examined visually and functionally. No obvious change was identified.

4 Appendix

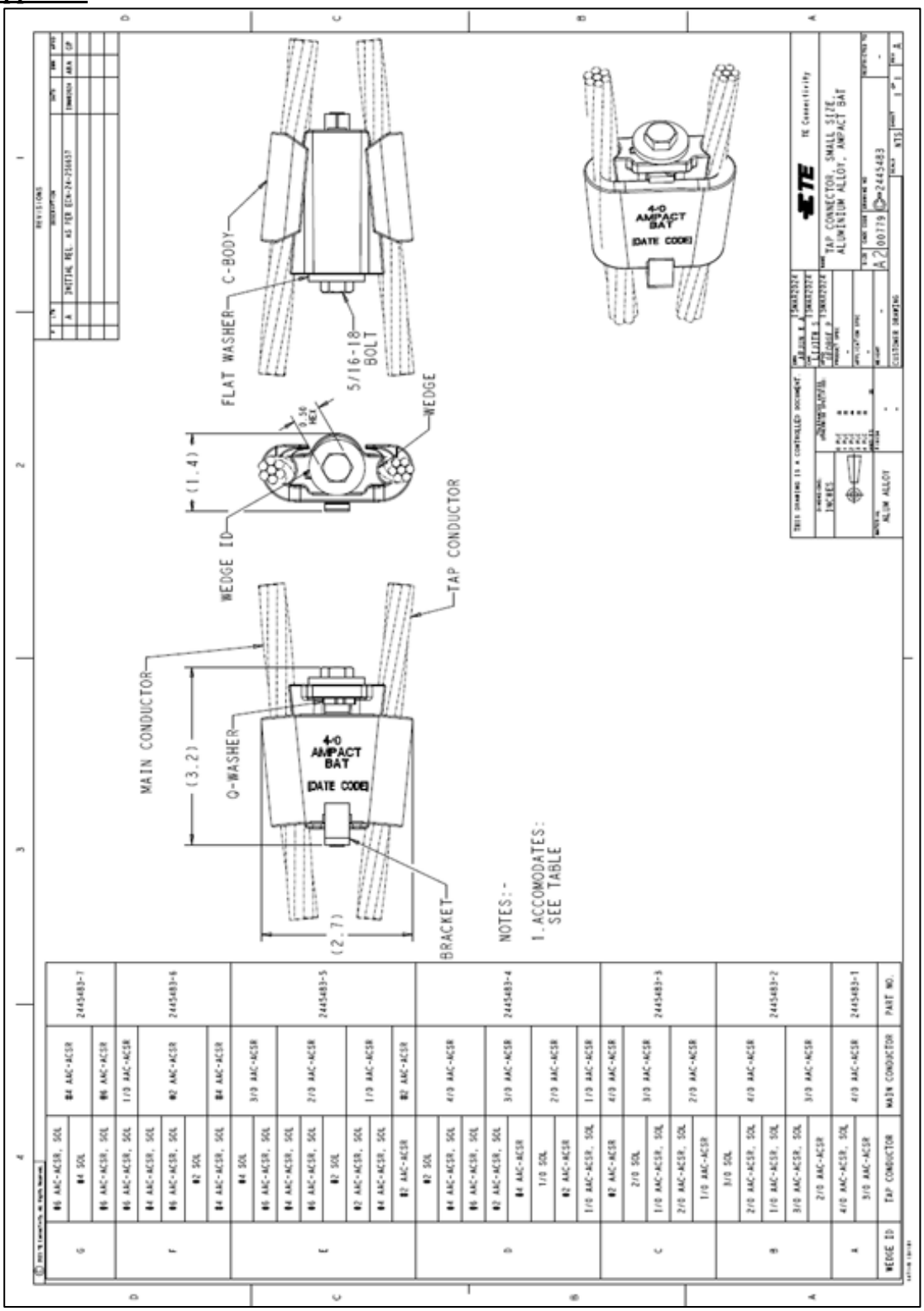

Figure 1: Product drawing of AMPACT BAT connectors in the test

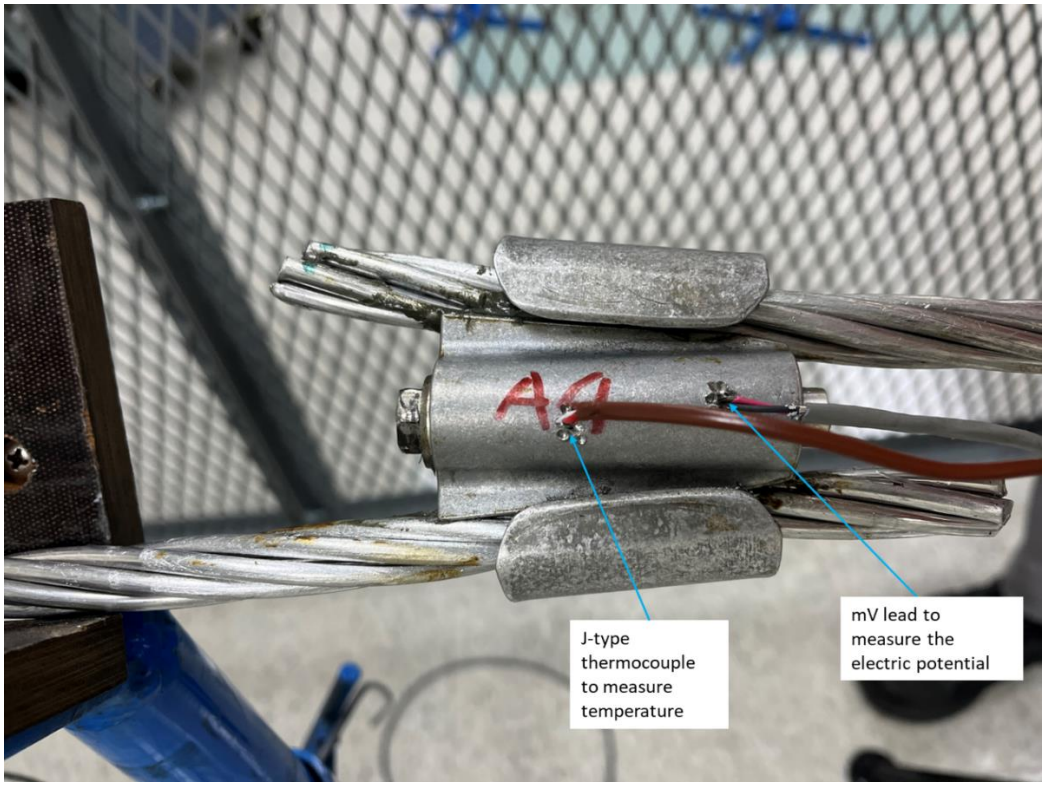

Figure 2: Appearance of the Connector 4 of Loop 1 after the 510 cycles Current Cycling Test

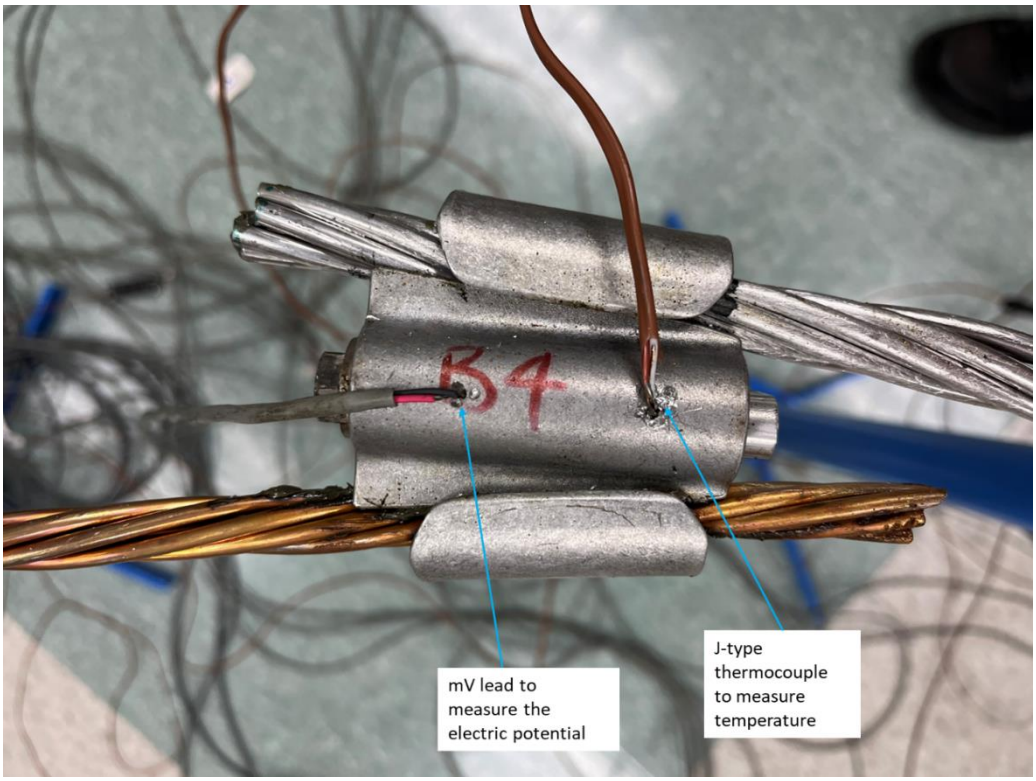

Figure 3: Appearance of the Connector 4 of Loop 2 after the 510 cycles Current Cycling Test

Figure 4: Loop 1 after the 510 cycles Current Cycling Test

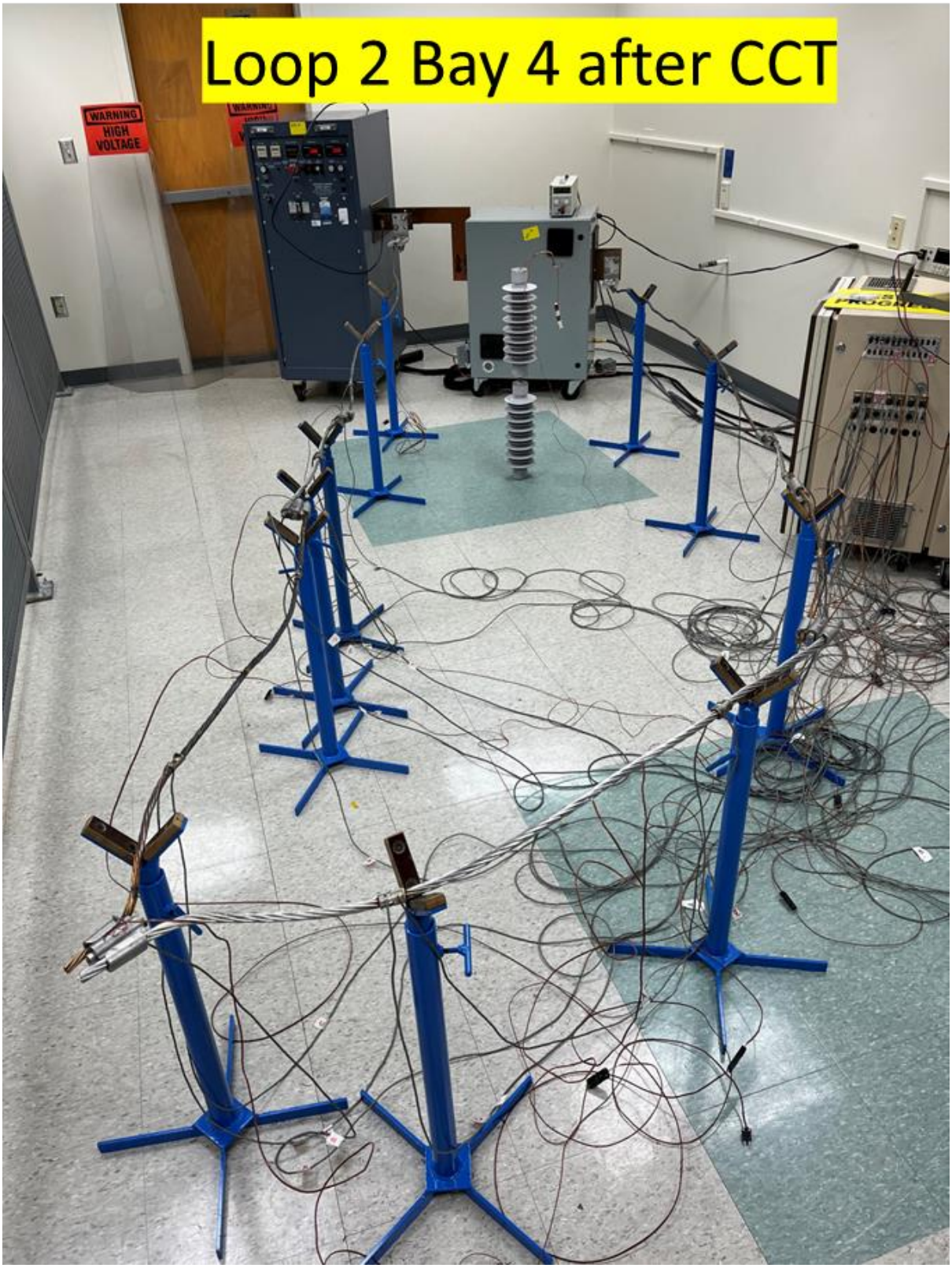

Figure 5: Loop 2 after the 510 cycles Current Cycling Test

Table 3: Test equipment used

Current Cycling Test Loop	Calibration #	Calibration Date	Calibration Due Date
Loop 1	52191	August 8th, 2023	August 2024
Loop 2	52190	March 1st, 2023	March 2024