Testing of THERMOLIGN® Repair Splice

For

477-kcmil 3M™ Composite Conductor

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Scope

This report will cover the description and results of laboratory testing of PLP's THERMOLIGN® Repair Splice and 477-kcmil 3M™ Composite Conductor (also known as ACCR – Aluminum Conductor Composite Reinforced) manufactured by 3M Company.

The specific tests included in this report are:

- Sustained Load Test
- Sustained Heat Test

Sustained Load Test

The PLP Repair Splice is intended for repair of conductor with up to 1/3 of the aluminum strands broken. After completing the design of the Repair Splice for the 477 ACCR conductor, a room temperature sustained load test was conducted to verify the holding strength.

The purpose of this test is to determine that the 477 ACCR Repair Splice will hold at a high tension level (77% RBS) at room temperature (20°C) for an extended period of time (168 continuous hours), per ANSI C119.4.

The test sample consisted of a 50 ft. length of 477 ACCR conductor terminated on both ends with PLP Dead-End Assemblies. To simulate the maximum repairable damage, 8 strands (31% of the 26 aluminum strands) were cut. The PLP Repair Splice consists of one layer of aluminum alloy rods. These were directly applied over the ACCR conductor in the region to be repaired.

The tension (15,000 lbs) was maintained throughout the test period with the 55K Tensile Equipment. The test sample successfully completed the 168 continuous hours, and then was tensioned in the same 55K Tensile Equipment until a failure occurred. The sample failed at a load of 20,630 lbs (106% RBS). ANSI C119.4 requires the connector to hold at least 95% RBS, therefore the repair splice satisfies this requirement.

Sustained Heat Test

The purpose of this test is to demonstrate that the performance of the 477 Repair Splice will not be affected by continuous operation at an elevated temperature, specifically, after being exposed to 240°C for a period of 168 hours. For ACCR, 240°C is the emergency operating temperature.

The test span consisted of a 50 ft length of 477 ACCR conductor, terminated at both ends with a PLP Dead-End Assembly. To simulate the maximum repairable damage, 8 strands (31% of the 26 aluminum strands) were cut. The PLP Repair Splice consists of one layer of aluminum alloy

rods. These were directly applied over the ACCR conductor in the region to be repaired. A tension of 15% RBS (2,920 lbs) was maintained throughout the test period using a tension beam/weight basket arrangement. The conductor was heated by applying approximately 1,000 Amps of AC current, supplied by a pair of heavy duty power supplies.

After exposure to the sustained heat, the test sample was loaded into the 55K Tensile Equipment, then tensioned at a rate of 10,000 lbs/minute until a failure occurred. The failure load was 20,449 lbs (105% RBS).

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