3M Brand Composite Conductor

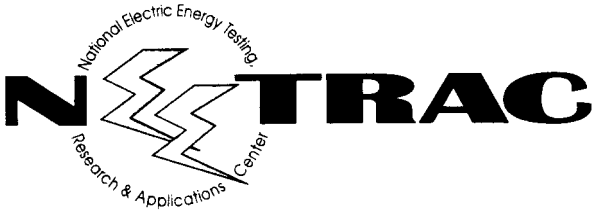
Compression Dead End Terminals for 1272 ACCR

Tensile Tests

3M Company
Purchase Order 0000913901

NEETRAC Project Number: 03-096

June, 2003



A Center of
The Georgia Institute of Technology

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Summary:

3M contracted with NEETRAC to perform tensile tests on 3M Brand 1272 kcmil Composite Conductor with Alcoa Conductor Accessories (ACA) compression end fittings. Three samples were tested, and all three exceed the 3M Rated Breaking Strength (RBS) specifications for this conductor.

Samples:

1) Three (3) samples of 1272 kcmil 3M Composite Conductor, with ACA compression dead-end fittings, catalogue number B9119-A, on one end, provided by Alcoa Conductor Accessories (ACA) on 5/16/03. ACA installed the fittings at their facility in South Carolina. ACA provided labels on the test samples as "#2", "#3", and "#4". ACA retained the sample marked "#1".

References:

1) NEETRAC – 3M Proprietary Information Agreement Dated 3/27/01 (copy located in 01-121 project folder and at GTRC legal department)
2) 3M Purchase Order 0000913901
3) PRJ 03-096, NEETRAC Project Plan
4) ANSI C119.4-1998 (strength requirements for conductor fittings)

Equipment Used:

1) MTS servo-hydraulic long-bed tensile machine, Calibration Control # CQ-0195.

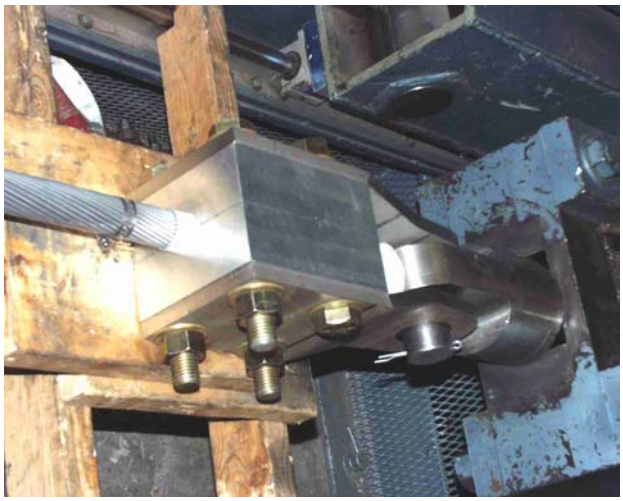
Procedure and Results:

Testing was conducted in accordance with a NEETRAC procedure entitled "PRJ03-096, CONFIDENTIAL – MMC Conductor Evaluation, 1272 Dead-end Fittings Tensile Test". The procedure controls all technical and quality management details for the project.

ACA delivered three samples with the end fittings installed on one end. NEETRAC personnel installed cast-resin lab fittings in accordance with a process that ensures all conductor components are loaded in a manner similar to loading in-service on a long span. This is accomplished by working looseness in the aluminum layers to the free end of the conductor. The free end is broomed to expose

each strand. A special resin is cast on the broomed end to ensure that all layers of the conductor lie in the as-manufactured position.

After the resin cured, the samples were loaded in the tensile machine and pulled to destruction at a rate of 20,000 lbs/min. Photographs 1 and 2 show the lab fitting and the dead-end connector on the 1272 conductor. Figure 1 shows the test data collected from the tensile machines load and crosshead position indicator. Photographs 3 and 4 show the typical breaks.



Photograph 1, lab end fitting

Photograph 2, 1272 conductor dead end

Photograph 3, Gage section break

Photograph 4, Fitting break

Ultimate load and failure description are as follows:

Sample #	Breaking Load	% RBS	Failure Description
ACA #2	44,600	102	All strands failed in gage section 8” from dead end
ACA #3	45,940	105	All strands failed at dead end
ACA #4	45,490	104	All strands failed in gage section 10” from dead end

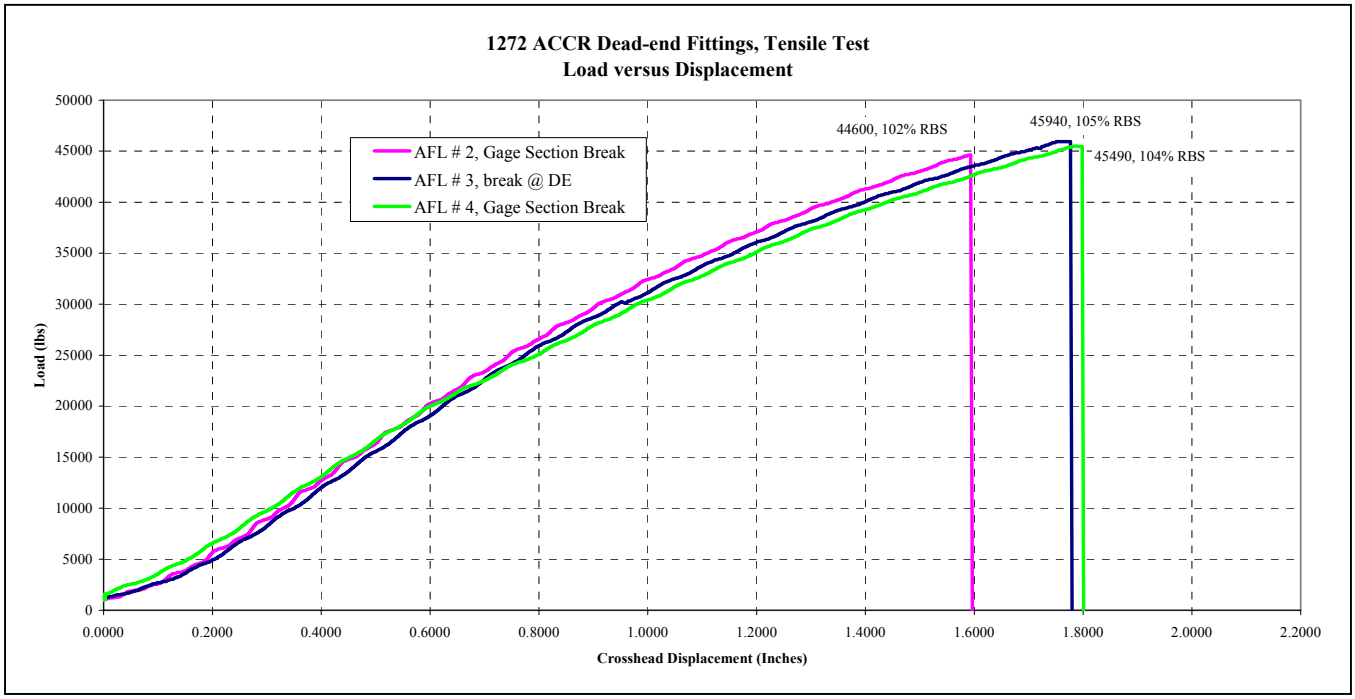


Figure 1, Graphical Presentation of Tensile Test Data

Conclusions:

ANSI C119.4 – 1998 requires “full tension” connectors to hold at least 95% of the conductor RBS. The three samples tested exceeded RBS, and therefore comfortably exceed the tension criterion of the ANSI standard for a full-tension connector. The ANSI standard allows for qualification of splices based on tests of the dead-end, provided it can be shown that the essential design parameters are equivalent.

Acknowledgement:

This material is based upon work supported by the U.S. Department of Energy under Award No. DE-FC02-02CH11111.

Disclaimer:

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