

**“Merrimack” ACSS/TW/HS285 Conductor
Tensile/Elongation Tests**

Southwire Company

NEETRAC Project Number: 05-230

November, 2005



Requested by:

Mr. Uday Sinha

Southwire Company

Principal Investigator:

Janeen J. McReynolds

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Reviewed by:

Paul Springer

Paul Springer, PE

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SUMMARY

Mr. Uday Sinha of Southwire Company requested that NEETRAC perform tensile tests on five (5) samples of 1433 “Merrimack” ACSS/TW/HS285 conductor. All samples exceeded the rated breaking strength (RBS) values demonstrating that the published value is appropriate for use in line designs in accordance with standard practices. Elongation measurements are provided for engineering information.

SAMPLES

One 500 ft. reel of 1433.6 kcmil “Merrimack” ACSS/TW/HS285 conductor with extra high strength steel core; Properties: 54 x 0.0978” Al/ 19 x 0.0978” St; OD: 1.34”; RBS: 48,400 lb

PROCEDURE

Samples were cut from the reel using a procedure that preserves the “as-manufactured” stress in each conductor strand. They were subsequently terminated with resin fittings, and mounted in the MTS hydraulic tensile machine. The tests were conducted in two runs, the first run measuring elongation and the second run determining the ultimate tensile strength. For the elongation measurement, a cable extensometer was installed on each sample. The free-span conductor length is 19 feet. The active gage section between knife-edges on the cable extensometer is 18 feet, +/- 1/16”. Tension is controlled automatically. Load, crosshead position, elongation, and temperature data were saved to a computer file. For both tests, each sample was pre-loaded to 1000 lb and pulled at a rate of 24,000 lb/min. The elongation samples were pulled to 75% RBS, relaxed to 1000 lb, and the cable extensometer removed to protect it from the ultimate tensile test. Then, each sample was pulled to destruction. Both data files were processed to produce the load versus strain charts.

RESULTS

Table 1 shows results for the five test samples.

Table 1, Loads, % RBS, % Strain, and Failure Modes for Merrimack ACSS/TW/HS285 Samples				
Sample #	Max. Load, lb	% RBS	% Strain	Failure Mode/Comments
One	50,600	105	5.13	Steel strands failed; aluminum intact
Two	50,870	105	6.11	Steel strands failed; aluminum intact
Three	50,910	105	6.25	Steel strands failed; aluminum intact
Four	48,950	101	3.70	Steel strands failed; aluminum intact
Five	51,150	106	5.88	Steel strands failed; aluminum intact

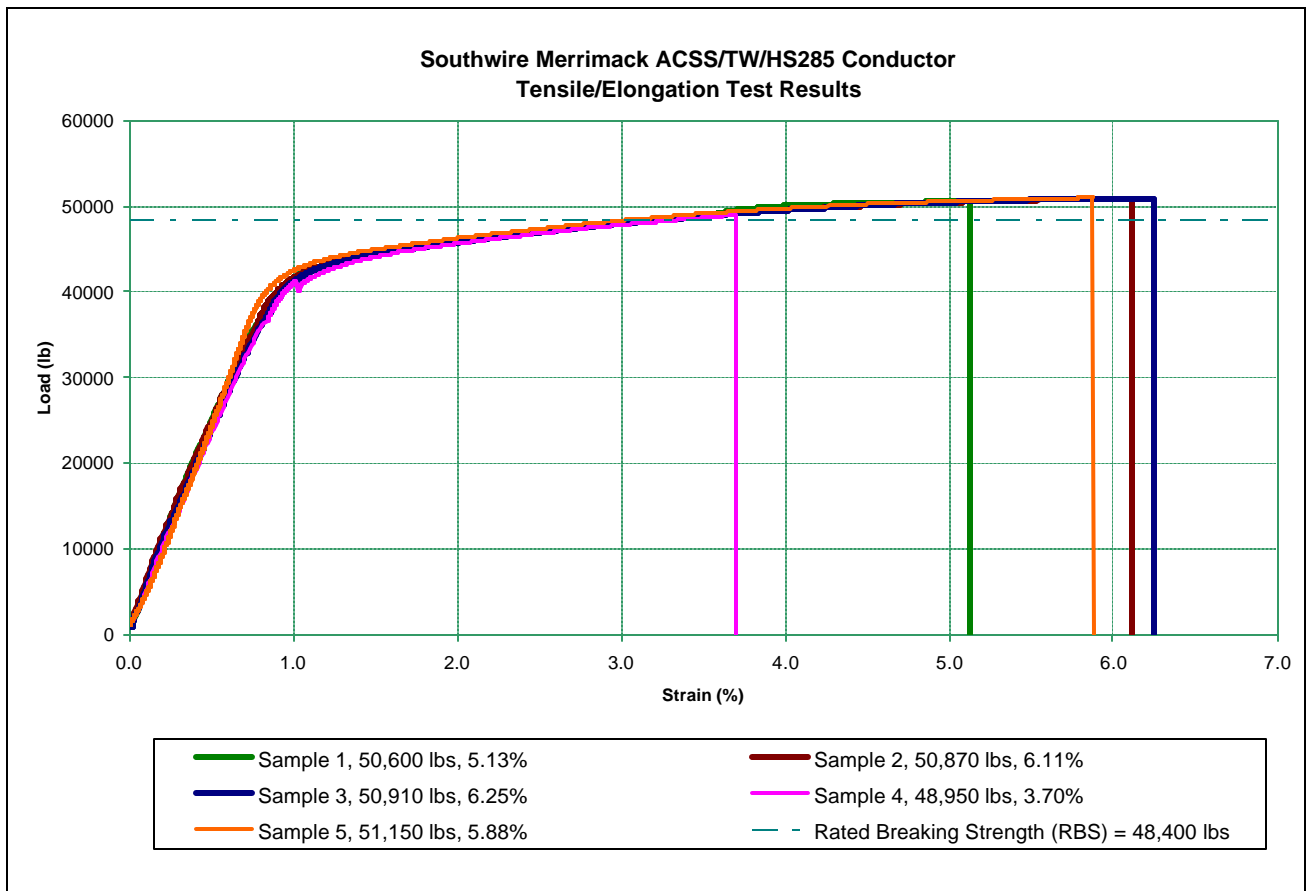


Figure 1, Load versus Strain for Samples 1 through 4, Merrimack ACSS/TW/HS285 Composite Conductor

CONCLUSIONS

Test results support use of a rated breaking strength of 48,400 lb for the Merrimack ACSS/TW/HS285 conductor with extra high strength steel core.

EQUIPMENT LISTING

- 1) MTS Servo-hydraulic tensile machine, Control # CQ 0195 (load and crosshead data)
- 2) Dynamics Research Corporation (DRC)/NEETRAC cable extensometer, Control # CQ 3002 (strain data)
- 3) Yokogawa DC100 data acquisition system, Control # CN 3022 (temperature data)

REFERENCES AND STANDARDS LISTING

- 1) ASTM E4, (Calibration of Load Testing Machines)
- 2) ASTM B857, Standard Specification for Shaped Wire Compact Concentric-Lay-Stranded Aluminum Conductors, Coated-Steel Supported (ACSS/TW)