

Lo-Sag Conductor Manufactured by Nexans

Test Material

The Nexans conductor has a core which consists of a carbon fiber center, surrounded by a plastic sheath which is then wrapped in an aluminum tube. Trapezoidal fully annealed aluminum strands are then stranded over the core. The maximum continuous operating temperature specified by the manufacturer was 180°C.



Figure 2-44. Nexans Lo-Sag conductor cross-section

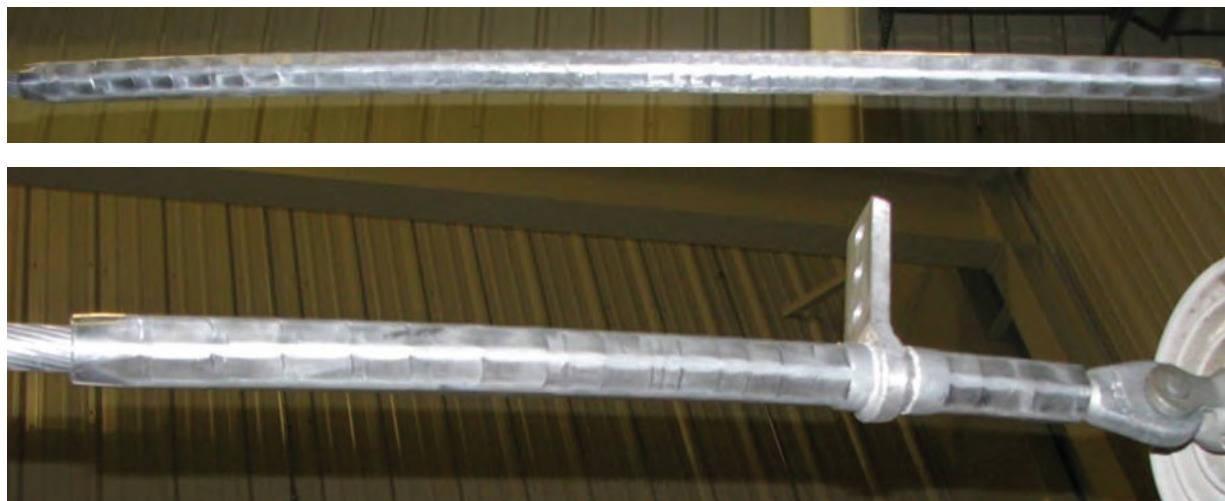


Figure 2-45. Nexans Lo-Sag conductor with Dervaux two-stage compression connector installed

Conductor Specific Test and Measurement Parameters

1500-amps was applied to the Lo-Sag conductor-connector system. Within the controlled parameters of the indoor lab, the surface temperature of the Lo-Sag conductor at 1500-amps was 180°C.

Results

Thermal Performance and Line Tension

Dead-ends

Figure 2-46 shows the dead-end thermal profiles as well as the tension profile for the Nexans line.

The tension on line 3 is shown in orange. The tension dropped slightly from the start to the end of the tests. The line was not re-tensioned for the duration of the tests as the drop in tension was not greater than 20% of the original tension value. The Nexans Lo-Sag conductor has a rated operating temperature of 180°C.

The maximum dead-end temperatures were about 100°C for the duration of the tests. The temperatures remained constant and there were no excessive temperature excursions noted.

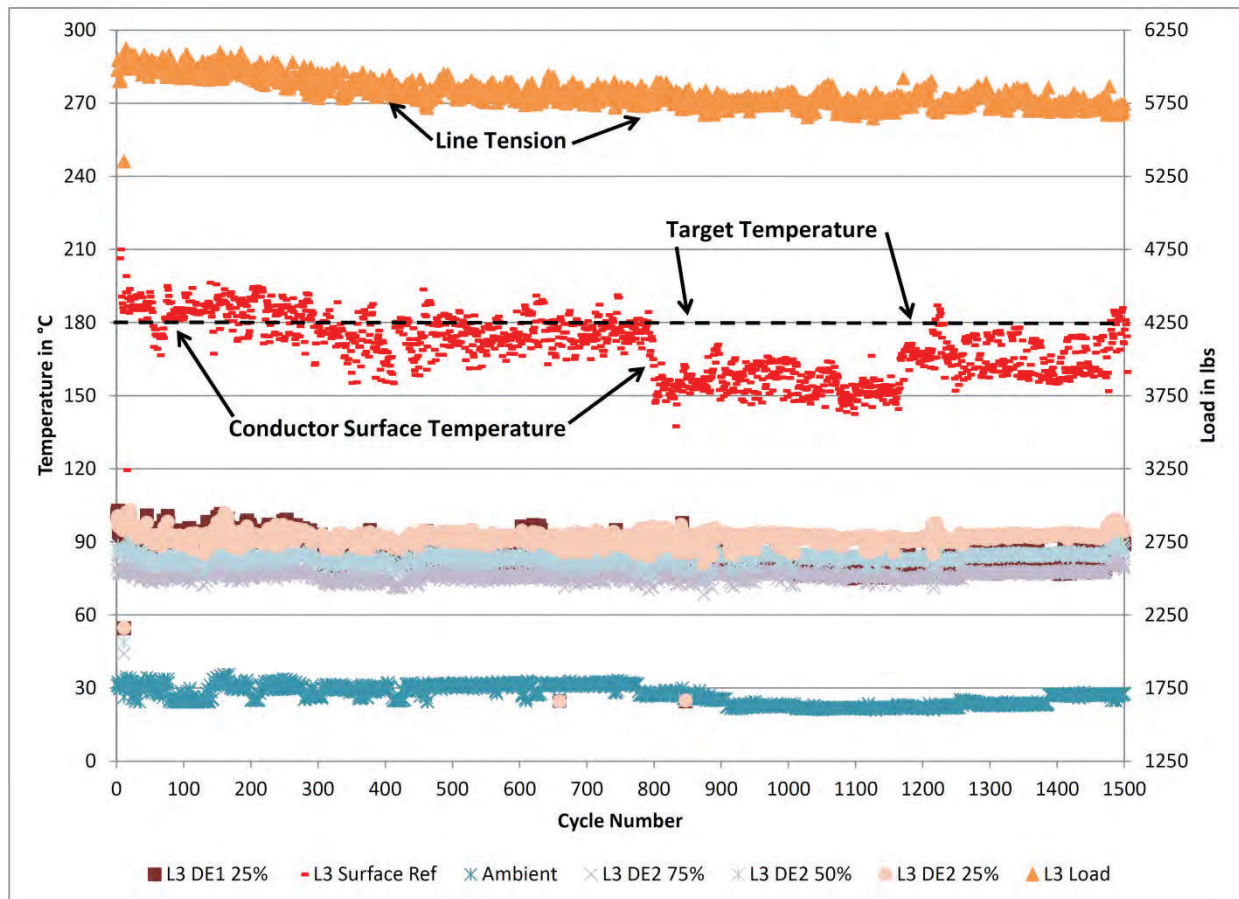


Figure 2-46. Nexans Lo-Sag Dead-end Thermal and Tension Profiles

Splices

Figure 2-47 shows the splice thermal profiles as well as the tension profile for the Nexans line.

The splice temperatures were slightly higher than the dead-end temperatures – this could be explained by the mass of the dead-ends acting as a heat sink. The maximum splice temperatures were about 100°C on average. No excessive temperature excursions were noted.

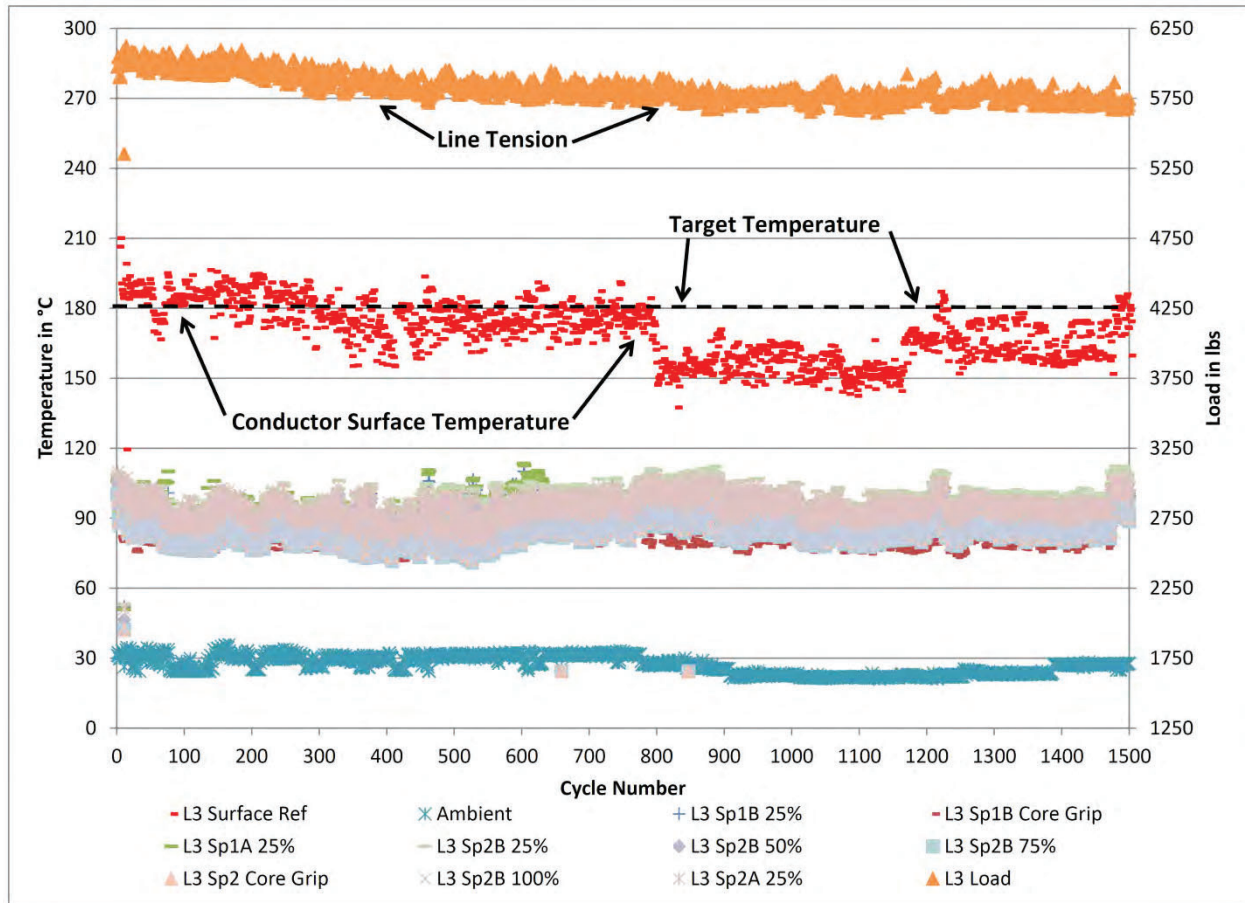


Figure 2-47. Nexans Lo-Sag Splice Thermal and Tension Profiles

Electrical Performance

Figure 2-48 shows the resistance measurements for the Nexans Lo-Sag conductor. The resistance of all the connectors was generally in the 10 – 25 $\mu\Omega$ range. There was no upward trend seen in the resistance measurements; the average resistance value decreased as the test progressed.

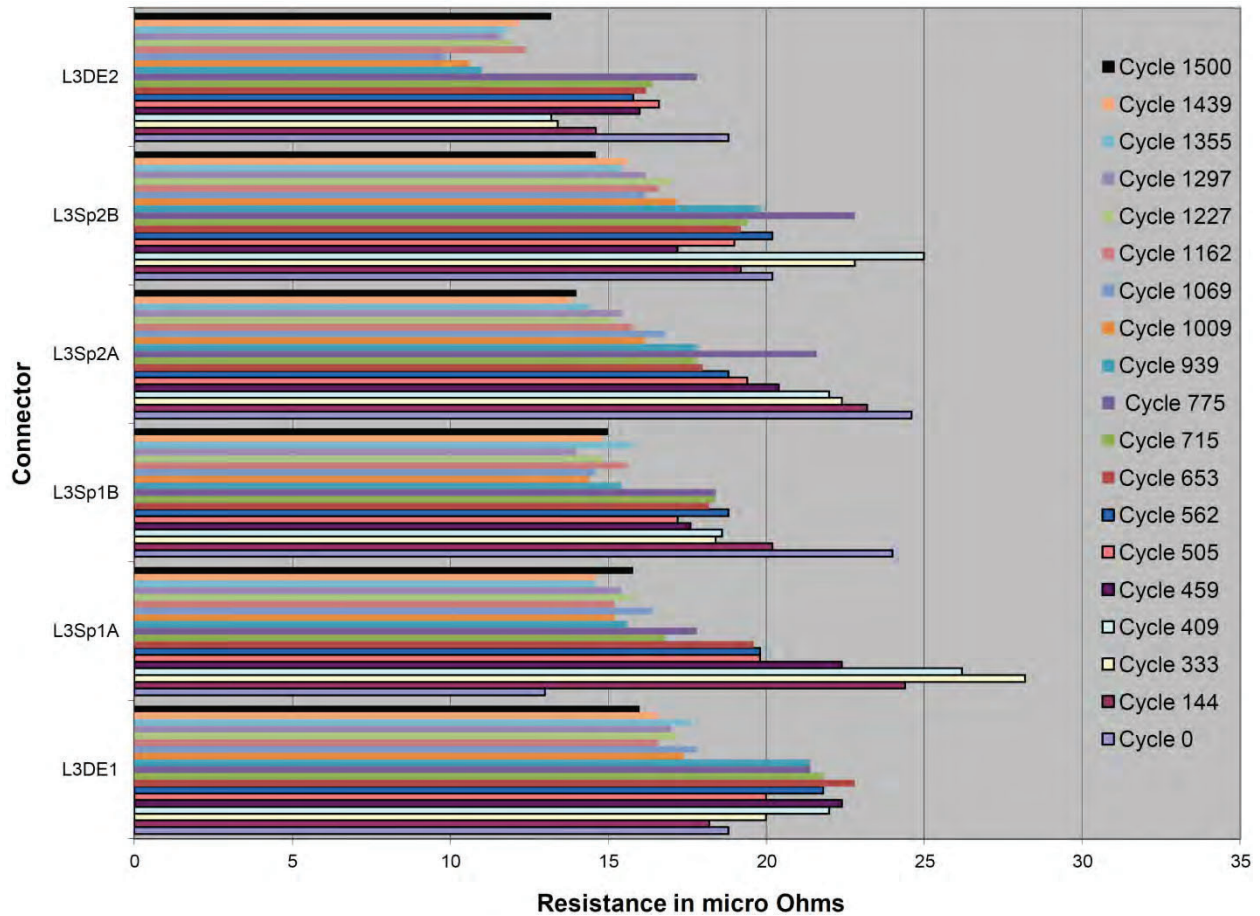


Figure 2-48. Lo-Sag Line 3 Resistance Measurements

Mechanical Performance

The Lo-Sag conductors rated breaking strength is 22,930 lb. Kinectrics staff installed the epoxy dead-ends used to mechanically evaluate the samples. The results of these tests are shown in Table 2-4.

The test results indicate that none of the samples had a residual strength below 95% of the Lo-Sag conductors rated breaking strength. The aged Lo-Sag conductor evaluated had a residual strength exceeding 150% of the rated breaking strength as specified by the manufacturer.

Table 2-4. Nexans Lo-Sag Conductor Mechanical Test Results

Sample Tested	Breaking Load (lbs)	%RBS	Maximum Test Temperature in °C	Comments
Aged Dead-end 1	30,417	132.6	102	Conductor pulled out from dead-end connector
Aged Dead-end 2	22,843	99.6	120	Conductor pulled out from dead-end connector
New Dead-end 1	23,727	103.5	-	The conductor broke 108 mm inside of connector
New Dead-end 2	28,015	122.2	-	The conductor broke 0.3m from the dead-end connector.
Aged Splice 1	29,075	126.7	113	The conductor pulled out from south splice mouth.
Aged Splice 2	23,245	101.4	112	The conductor pulled out from south splice mouth.
New Splice 1	25,290	110.3	-	The conductor pulled out from south splice mouth.
New Splice 2	26,455	115.4	-	The conductor pulled out from south splice mouth.
Aged Conductor	34,450	150.2	195	The conductor broke in the center of the span.
New Conductor	-	-	-	No sample available for testing.