6 ACSS CONNECTOR EVALUATION

Conductor-connector systems were tensile tested for each of the four ACSS conductors to ensure that the ultimate tensile strength measured for each system met or exceeded 95% of the rated breaking strength of their respective conductor.

Dead-end and splice compression connector assemblies were utilized for these tests. The compression connectors were all manufactured by AFL and were sized appropriately for their respective conductors.

The tests were based on procedures described in International Electrotechnical Commission (IEC) 61089-1991-05 “Round Wire Concentric Lay Overhead Electrical Stranded Conductors” and American National Standards Institute (ANSI) C119.4 “American National Standard for Electric Connectors – 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 Designed for Normal Operation at or Below 100°C” standards.

For each conductor type, two (2) conductor samples with a compression dead-end and two (2) conductor samples with a compression splice were prepared for the ultimate tensile (UTS) test. All bare conductor ends of the prepared samples were terminated using epoxy resin dead-ends.

One at a time, the samples were installed in a hydraulically activated horizontal test machine with a load cell installed at the hydraulic crosshead to measure tension.

The tension, as measured by the load cell, was monitored continuously using a digital data logging system. The data logging rate was each one (1) second during the test. The test was performed in a temperature-controlled laboratory where the ambient temperature did not vary by more than ± 2°C during the test. A calibrated thermocouple was used to monitor the ambient temperature during the test.

Each sample was placed in a hydraulically activated horizontal test machine and pre-tensioned to 2% of the conductor’s rated breaking strength (RBS), to straighten the sample and mark the entrance of the epoxy dead-ends to monitor for any slippage of the sample. The samples were then tensioned until failure to determine their UTS. The loading rate was based upon reaching 30% of the conductor’s RBS in two (2) minutes.

General Cable

Dead-end-connector and splice-connector systems were tensile tested for the General Cable ACSS conductor to ensure that the ultimate tensile strength measured for each system met or exceeded 95% of the rated breaking strength of the conductor (23,845 lb.).

Dead-end and splice compression connector assemblies were utilized for these tests. The compression connectors were all manufactured by AFL and were sized appropriately for their respective conductors (see

Table 6-1).

Table 6-1. General Cable Squab ACSS, MA5 connector specifications

Conductor Manufacturer	General Cable	
Conductor Geometry	605 kcmil, ACSS 26/7 MA5, Squab	
Nominal Outer Diameter	0.966 in (24.54 mm)	
Construction	Twenty-six (26), 3.87 mm round 1350-O Temper aluminum wires (2 layers) over seven (7) 3.01 mm round ultra-high strength steel wires	
Rated Breaking Strength	25,100 lb.	
Dead-end Part No.	Aluminum Body	8127.106 HT/UHS
	Steel Eye	9314.377
Splice Part No.	Aluminum Body	8027.106 HT/UHS
	Steel Sleeve	4014.377

The samples were individually loaded into the test frame and pre-loaded to 2% of the RBS of the General Cable ACSS conductor (502 lbs or 2.23 kN). A loading rate of 3,763 lbs/min was used for the General Cable ACSS connector-conductor tests.

The tension applied to the systems over the test time is plotted in Figure 6-1.

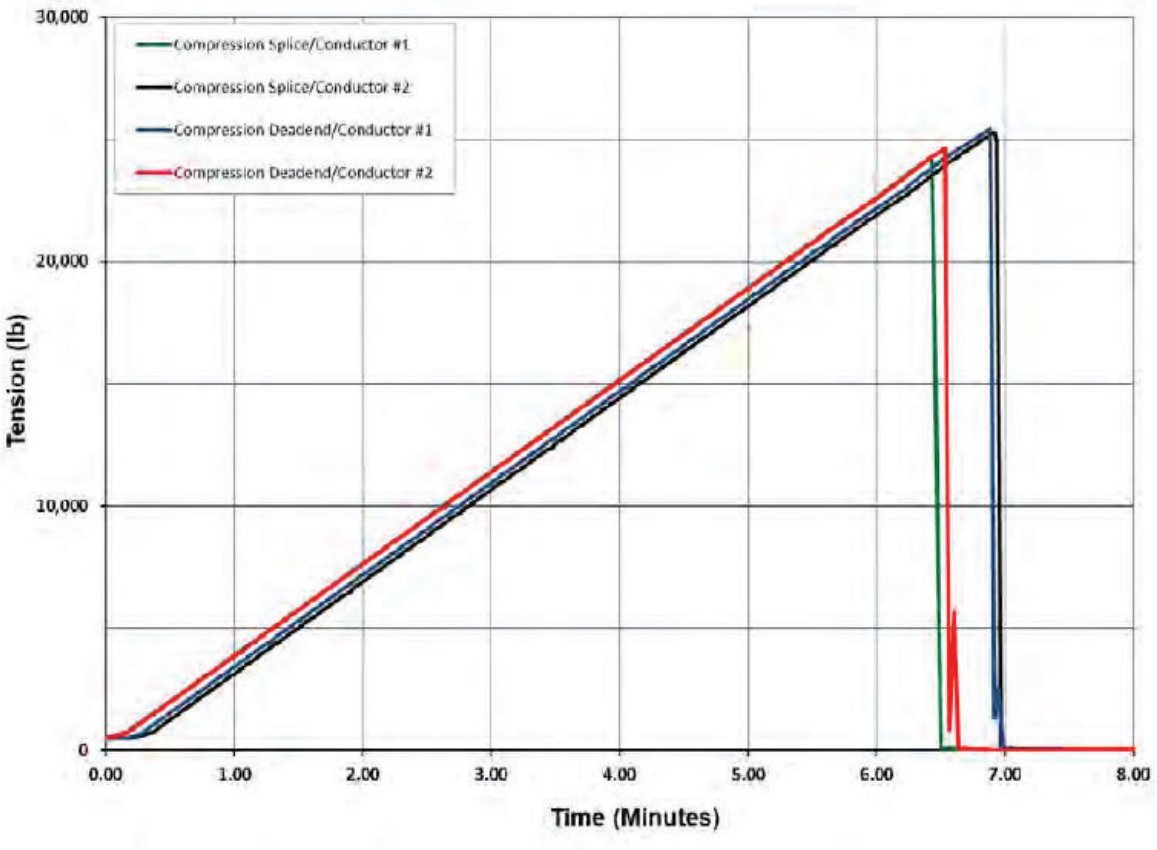

Figure 6-1. General Cable ACSS connector-conductor system UTS test: tension vs. time

The results from the UTS test of the General Cable ACSS connector-conductor samples are presented in Table 6-2. The compression dead-end and compression splice samples installed on ACSS MA5 Squab conductor, as evaluated, met the specified acceptance criteria in ANSI C119.4 for tensile strength.

Table 6-2. General Cable ACSS connector-conductor system UTS test results

No.	Sample Description	Test Results		
		UTS (lbs)	UTS (% Conductor RBS)	Failure Location
1	Dead-end 1	25,426	101.3	16 in from mouth of DE
2	Dead end 2	24,627	96.9	10 in from epoxy
3	Splice 1	24,299	98.2	6 ft from epoxy
4	Splice 2	25,293	100.8	10 in from splice

LS Cable

Dead-end connector and splice-connector systems were tensile tested for the LS Cable ACSS conductor to ensure that the ultimate tensile strength measured for each system met or exceeded 95% of the rated breaking strength of the LS Cable ACSS conductor (31,682 lbs).

dead-end and splice compression connector assemblies were utilized for these tests. The compression connectors were all manufactured by AFL and were sized appropriately for their respective conductors (see Table 6-3).

Table 6-3. LS Cable ACSS connector specifications

Conductor Manufacturer	LS Cable & System Ltd.	
Conductor Geometry	ACSS/TW 834.4 kcmil	
Nominal Outer Diameter	1.031 in (26.20 mm)	
Construction	Twenty-five (25),1350-O Temper trapezoidal aluminum wires (2 layers) over seven (7) 3.50 mm round high strength steel wires	
Rated Breaking Strength	33,350 lb.	
dead-end Part No.	Aluminum Body	8130.109CHT/UHS
	Steel Eye	9414.432
Splice Part No.	Aluminum Body	8030.109HT/UHS
	Steel Sleeve	4014.432

The samples were individually loaded into the test frame and pre-loaded to 2% of the RBS of the LS Cable ACSS conductor (667 lbs or 2.97 kN). A loading rate of 5,003 lbs/min was used for the LS Cable ACSS connector-conductor tests.