



Title: Southern States – LLS-I-2000, LLS-II-2000 and LLS-II-3000 Load and Line Switchers	Product Specification Guide
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## 1.0 SCOPE

This specification covers the design, manufacture, and testing of outdoor load and line switchers.

## 2.0 STANDARDS

All outdoor load and line switchers shall be designed, manufactured, assembled, and tested in accordance with the latest applicable ANSI, NEMA, IEEE, and ASTM standards and guidelines. If there are any conflicts between the ANSI, NEMA, IEEE, or ASTM standards and this specification the specification shall govern.

## 3.0 DESIGN REQUIREMENTS

### 3.01 Service Conditions

The load and line switcher shall be suitable for outdoor installation in electric power substations and on transmission line applications under the following conditions:

#### 3.01.01 Temperature

The load and line switcher shall perform in an ambient temperature range of -40°C through +50°C.

#### 3.01.02 Altitude

The load and line switcher shall perform at elevations up to 3,300 feet.

#### 3.01.03 Additional Requirements

If any site specific service conditions not covered in sections 3.01.01 and 3.01.02 exist (e.g. extreme cold temperature installation, high altitude installation, etc.) they will be defined in the quotation request.

### 3.02 Ratings

Design Characteristics	LLS-I-2000		LLS-II-2000		LLS-II-3000	
	Maximum Voltage	38 – 72.5 kV	123 – 245 kV <sup>1</sup>	72.5 -170 kV	245 kV	72.5 -170 kV
Load Breaking Capability	2000 A	N/A	2000 A	2000 A	3000 A	2000 A
Line Dropping Capability	300 A	N/A	300 A	200 A	300 A	200 A
Loop Splitting Capability	2000 A	2000 A <sup>2</sup>	2000 A	2000 A <sup>3</sup>	3000 A	3000 A <sup>3</sup>
Nominal Operating Pressure	65 psig at 20°C	65 psig at 20°C	55 psig at 20°C for 72.5 kV, 65 psig at 20°C for 123 kV-170 kV	65 psig at 20°C	55 psig at 20°C for 72.5 kV, 65 psig at 20°C for 123 kV-170 kV	65 psig at 20°C
Full Load Operations	2000	N/A	2000	2000	2000	2000

**Table Notes:**

- 1) For load break applications above 72.5 kV, see LLS-II catalog flyer or consult factory.
- 2) The The LLS<sup>®</sup>-I can be utilized for loop splitting applications to 245 kV as long as the transient recovery voltage does not exceed 30 kV.
- 3) The The LLS<sup>®</sup>-II can be utilized for loop splitting applications to 245 kV as long as the transient recovery voltage does not exceed 95 kV.

### 3.03 Interrupter

The load and line switcher shall use SF<sub>6</sub> single gap puffer interrupters. Vacuum interrupters or multigap SF<sub>6</sub> interrupters are unacceptable. Each interrupter shall be housed in an ANSI 70 gray composite or epoxy insulator that will not degrade when exposed to the sun's UV rays. Fiberglass housed interrupters without silicone outer coatings and porcelain housed interrupters are unacceptable.

### 3.04 SF<sub>6</sub> Gas System

The gas system shall include the insulator and a color-coded, temperature compensated density gauge that is visible from the ground.

A means for refilling the system in the field without disassembling the interrupter must be provided. The device shall have a leak rate of less than 0.5% per year.

### 3.05 Operating Mechanism

Each interrupter shall be provided with a spring open mechanism and shall reset itself when the switch is in the open position.

#### 4.0 DESIGN TESTS

The load and line switcher shall be design tested in accordance with IEEE Std. 1247-1998, Standard for Interrupter Switches for Alternating Current Rated Above 1,000 Volts. The testing shall include dielectric tests, power tests, an environmental test, and a mechanical endurance test. The dielectric tests shall include 60 Hz power frequency, lightning impulse withstand, and visual corona. The power tests shall demonstrate the capability to perform load breaking, line dropping, and loop splitting. The power tests and the dielectric tests shall be performed at full voltage on the complete interrupter assembly. Testing individual modules is not acceptable. The environmental test shall demonstrate the load and line switcher's capability to perform over a temperature range of -40°C to +50°C. The load and line switcher shall be endurance tested to 2000 operations.

#### 5.0 PRODUCTION TESTS

Each load and line switcher shall be fully assembled at the factory, adjusted, tested, and timed per IEEE Std. 1247-1998. The tests shall include:

##### 5.01 Mechanical Operations Test

There shall be at least 25 mechanical operations performed at the factory. Timing tests shall be recorded.

##### 5.02 Leak Test

An SF<sub>6</sub> leak test shall be performed to confirm the leak rate is less than 0.5% per year.

##### 5.03 Resistance Test

###### 5.03.01 Current Path Resistance Test

A micro-ohm resistance check shall be performed on each interrupter using a 100 A DC source and the values shall be recorded.

##### 5.04 Dielectric Test

###### 5.04.01 Interrupter Dielectric Test

Each complete interrupter assembly shall pass a 60 Hz power frequency withstand test for one minute.

#### 6.0 SPARE PARTS

No spare parts shall be required at the time of load and line switcher purchase. Stock shall be maintained at the manufacturer and available for rush shipment in the event of an emergency need.

## 7.0 DOCUMENTATION REQUIREMENTS

### 7.01 Approval Drawings

The manufacturer shall furnish approval drawings in AutoCAD .DWG format via e-mail. The purchase order will designate the name and e-mail address of the individual where the drawings should be forwarded. If there are no comments to the approval drawings purchaser will respond via e-mail that drawings are approved as submitted with no changes. If comments are required then one copy of the drawings will be returned to the manufacturer within 10 days from the date of transmittal marked “approved with comments as noted”.

### 7.02 Final Drawings

The manufacturer shall furnish final drawings in AutoCAD .DWG format via e-mail. Unless otherwise specified in the purchase order, the final drawings will be forwarded to the same individual that the approval drawings were sent to.

### 7.03 Instruction Books

The manufacturer shall furnish an electronic copy of each applicable instruction book in Adobe Acrobat .PDF format via e-mail. Unless otherwise specified in the purchase order, the instruction book(s) will be forwarded to the same individual that the approval drawings were sent to.

### 7.04 Additional Documentation

One complete set of final drawings and one copy of each applicable instruction book shall be shipped in a weatherproof envelope with each load and line switcher.

## 8.0 SHIPPING and DELIVERY

Each interrupter shall be shipped fully pressurized with SF<sub>6</sub>, eliminating the need to pull a vacuum on the interrupters in the field.

## 9.0 WARRANTY

All load and line switchers and their accessories furnished under this specification shall be covered by a five-year warranty from date of shipment against failure due to design or to defects in workmanship or material.

## 10.0 ACCEPTABLE LOAD and LINE SWITCHER

Load and Line switchers, Type LLS-I or LLS-II, as manufactured by Southern States are approved. Alternative products must meet or exceed this specification and be approved for use by the USER prior to the bid date.