



## **SPECIFICATION SS-31/A-1**

# **ALUMINUM POWER CONNECTORS FOR** **EHV400/150/30kV**

### **I. SCOPE**

The hereby specification covers the technical characteristics, manufacturing and testing of Aluminum power clamp connectors, suitable for connection with aluminum conductors ACSR.

### **II. KEYWORDS**

Connectors, Aluminum connectors.

### **III. USE**

The Aluminum connectors shall be used to connect with Aluminum studs with diameters  $\Phi 32.4\text{mm}$ ,  $\Phi 30\text{mm}$  and  $\Phi 52\text{mm}$ .

### **IV. OPERATING CONDITIONS**

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|--|--|
| 1. Installation                          | : Outdoors   |
| 2. Limits of ambient temperature         | : $-15^{\circ}\text{C}$ to $+40^{\circ}\text{C}$ -25 minimum |
| 3. Altitude                              | : Up to 1000m above sea level                                |
| 4. Weather conditions                    | : Snow, ice, rain  |
| 5. Conditions of environmental pollution | : Dust, salt and industrial contamination                    |

## V. STANDARDS

The Aluminum connectors shall be in accordance with the following ASTM standards

- ASTM B 26-88 and A356.0

## VI. DESCRIPTION

The Aluminum connectors are intended to hold mechanically and connect electrically two (2) or more parts of the network.

The Aluminum connectors shall be manufactured with cast silicon aluminum alloy, the chemical composition of which is determined below.

## VII. ALLOYS

### 1. ALUMINUM ALLOY

The Aluminum connectors shall be manufactured with first melting silicon aluminum alloy according to ASTM B 26-88 and A356.0 type Al-Si7Mg with the following chemical composition:

Al: 91-92%

Si: 6,5-7,5%

Mg: 0,25-0,45%

Also the impurities of the following metals shall not exceed the below referred values:

Fe:<0,7%

Mn:<0,1%

Zn:< 0,1%

Ti: <0.2%

Mechanical properties of the silicum-alouminum alloy are the following:

Tensile strength	: 235 MPα
Elongation	: 1,5%
Yield point at 0.2% elongation	: ≥165Mpa
Hardness	: ≥65H
Receptivity	: 4,8 μΩ x cm

## VIII. TESTS

### 1. Quality assurance tests (special tests)

The following tests shall be made in one piece from each casting lot.

#### 1.1 Chemical analysis

1.2 Mechanical tests (simulate forces that result from short-circuit conditions)

1.3 Porosity test with non destructive testing

## **2. Type tests**

### 2.1 Temperature rise test

- a. The tests shall be carried-out indoors.
- b. The conductors of anticipated type and size shall be extended at least 1m from each side of the connector, up to the point of the connection is made to the electrical circuit.
- c. The values of current which the temperature rise test shall be carried-out for the various types of connectors be 2000A:

The temperature rise of the connectors shall not exceed the temperature rise of the conductors which they are intended to be used. The specified current shall be applied to the connectors until its temperature is stabilized at all points. The hot-spot temperature rise shall not exceed the average temperature rise by more than 10 °C.

### 2.2 Electrical resistance test

For this test, an ACSR conductor 550/70mm<sup>2</sup> cross-section shall be used. The test measurement of the electrical resistance shall be made in conjunction with the temperature rise test. The electrical resistance shall be measured at a distance of 30cm on either side of the connector's junction and the deviation of the measured resistance after the test, should not exceed the 1.2Ru. Ru is the resistance of the conductor before the temperature rise test.

### 2.3 Mechanical strength test

The mechanical strength test of the connector shall be performed with ACSR conductor of 550/70mm cross-section and diameter Φ32.5mm. The connector shall be fastened to the conductor and the bolts shall be tightened with a torque in the range of 1.2 Nm of the nominal tightened torque. The minimum pull out value to be considered in order that no slide of the conductor is observed, is 4.500 Newtons.

## **IX. ASSEMBLING COMPONENTS**

All the assembling components, bolts, nuts and lock washers shall be made of stainless steel. The connectors shall be delivered with all the assembling components.

## **X. PACKING**

The connectors shall be packed in robust wooden case of maximum gross weight 200kg.

Each case shall be indelibly marked with the total weight, item number of connector, number of connectors, contract number and year of manufacturing. Each case shall contain only one type of connectors and the required amount of grease if deemed necessary.

#### **XI. DATA TO BE SUBMITTED BY ALL BIDDERS**

1. Outline and section drawings of assembled clamp connectors with their dimensions and indication of the roughness of the contact surface of the clamp.
2. Approximate weight of each assembled clamp connector.
3. Chemical composition of the alloy that shall be used for the manufacturing of the conductors.
4. Type of material of bolts, nuts, washers and lock-washers and their strength.
5. On the drawings shall be stated the type and the quality of special grease to cover the contact surface of the clamp with the conductor, if this deemed necessary by the manufacturer.  
Also on the drawing shall be stated the rated torque of the bolts of the clamp.