

April 2011

SPECIFICATION SS-31/A

**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 with aluminum conductors ACSR.

II. KEYWORDS

Connectors, Aluminum connectors.

III. USE

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

IV. OPERATING CONDITIONS

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| 1. Installation | : Outdoors |
| 2. Limits of ambient temperature | : -15°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 silicium-aluminum alloy which the chemical composition is determined below.

VII. ALLOYS

1. ALUMINUM ALLOY

The Aluminum connectors shall be manufactured with first melting silicium-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 silicium-alouminum alloy are the following:

Tensile strength	: 235 MPα
Elongation	: 1,5%
Yield point at 0,2% elongation	: ≥165MPα
Hardness	: ≥65H
Receptivity	: 4,8 μΩ x cm

VIII. TESTS

1. Quality assurance 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

These tests shall be carried-out in one piece from each type of connector.

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, ACSR conductor shall be used with $550/70\text{mm}^2$ in cross-section. The test measurement of the electrical resistance will be made in conjunction with the temperature rise test.

The measurement of the electrical resistance shall be at a distance of 30cm on either side of the junction of the connector and the deviation of the measured resistance after the test should not exceed the $1.2R_u$.

R_u is the resistance of the conductor before the temperature rise test.

2.3 Mechanical strength test

Mechanical strength of connector shall be made with ACSR conductor with $550/70\text{mm}$ in cross-section with diameter $\Phi 32.5\text{mm}$.

The connector shall be fastened with the conductor and the bolts tightened with the range of 1.2 Nm of the nominal tightened torque..

The pull out value shall be considered as the minimum values is 4.500 Newtons.

IX. ASSEMBLING COMPONENTS

All the assembling components, Bolts, Nuts, and Lock 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 also symbolism of the roughness of the contact surface of the clamp.
2. Approximate weight of each assembled clamp connector
3. Chemical composition of the alloy which is to be used for the manufacturing of the conductors
4. Type of material made of Bolts, Nuts, Lockwashers 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.