

## **TECHNICAL SPECIFICATION FOR ACSR RABBIT CONDUCTOR**

### **1. SCOPE :**

This specification provides for the manufacturing, testing and supply of ACSR conductors as per details given below:

### **2. STANDARDS :**

The conductor shall conform to the following Indian Standard specifications which shall mean latest revisions with amendments / changes adopted and published unless specifically stated otherwise in the specification.

1. IS: 398 (Part-II) 1976 /1990 : Specification for Aluminium Conductors.
2. IS: 2629-1985/1990 : Hot dip Galvanizing of Iron & Steel
3. IS: 4826-1979 : Specification for Hot Dipped Galvanized coating on Round Steel Wires.
4. IS: 209-1966/1992 : Electrolytic High Grade Zinc.
5. IS: 1778:1980 : Specification for Reels and Drums for Bare Conductors
6. IS: 2633-1992 : Method of Testing uniformity of coating of Zinc coated Articles.

### **3. MATERIAL AND WORKMANSHIP**

Materials used in manufacture of the conductor shall be of the highest quality of its kinds obtainable and except where modified by the specification, shall comply in all respect with the standards laid down by Indian Standard Institution.

The Aluminium Wire (Strands) shall be hard drawn from electrolytic Aluminium rods having purity not less than 99.5% Test certificates of Aluminium Manufacturer, respect of impurity content of Aluminium conductivity etc. shall have to be furnished in order to assess its quality.

The Steel Wire (Strands) shall be drawn from High Carbon Steel Wire Rods produced by either the acid or the basic open-hearth process, or by the electric Furnace process. Steel produced by Basemer process shall not be used for drawing of wires. The steel wires shall be hot dip Galvanized conforming to IS: 2629:1985 and shall have weight to zinc coating as per IS: 4826/1979. The quality of zinc used for coating on steel wire strands shall be as per ZN98 of IS: 209:1966/1992 i.e. Electrolytic High Grade Zinc of 99.95% purity.

Zinc coating shall be reasonably smooth, continuing of reasonable uniform thickness and free from all defects not consistent with good commercial practice. The steel wire shall be of such quality and purity that when drawn to the size of wire specified and coated with zinc, the finished strands and the individual wire shall be of uniform quality and have the same properties and characteristics as prescribed in the relevant Indian Standard.

All the Aluminium as well as Steel wires strands shall be reasonably smooth, uniform and shall be free from all defects such as die marks, scratches, abrasions and kinks etc. after drawing and also after stranding.

The finished conductor shall have a smooth surface without any surface dents, abrasions, scuff marks and shall be free from dirt grit etc. Also the conductor shall be free from loose strands. The ends of the conductor shall be properly sealed to avoid unwinding of the strands.

Particular care has therefore, to be taken during the manufacture, handling, packing and transportation of the conductor, to see that the surface is not dented, cut or damaged in any way.

#### **4.0 MODULUS OF ELASTICITY AND COEFFICIENT OF LINEAR EXPANSION**

The value of the find modulus of elasticity and coefficient of linear expansion for ACSR conductors shall be as below:

Sl.No.	Conductor	Find Modulus of Elasticity GN/m <sup>2</sup> (Practical)	Co-efficient of linear expansion per degree C.
1.	ACSR Rabbit	79	$19.1 \times 10^{-6}$

#### **5. JOINTS :**

5.1 There shall be no joint of any kind in the steel core of the conductor, Joints in the Aluminium strands, if any shall be as per IS: 398 (Part-II) 1976/1990. Joints shall be made by cold pressure butt-welding and shall withstand a stress of not less than the breaking strength of individual strand guaranteed.

5.2 A certificate shall be recorded by the supplier on each and every invoice / bill and challan as follows.

“Certified that there is no joints of any kind in steel core of the conductor and kind in Steel core of the conductor and joints in the Aluminium strands, if any, are as per IS: 398 (Part-II) 1976/1990.

#### **6.0 STRANDING :**

The wires used in manufacture of standard conductor shall meet to all the relevant requirements of IS: 398 (Part-II) 1976/1990.

#### **7.0 LAY RATIO OF CONDUCTOR:**

(a) For ACSR Rabbit Conductor

		Maximum	Minimum
Aluminium	6 Wire Layer	14	10

#### **8. GUARANTEED TECHNICAL PARTICULAR:**

The guaranteed technical particular of the ACSR Rabbit conductor shall be as per details given in enclosed Schedule of technical particulars.

#### **9.0 PACKING & MARKING**

9.1 The conductor shall be supplied on strong non-returnable wooden drum so that it is not damaged during transit and can withstand all the transit and weather hazards. The supplier/manufacturer shall be responsible for any damage to the material during transit due to improper / inadequate packing. The drum shall be painted on the inside and outside with Aluminum paints and fitted with strong cast iron bushings. All drums shall have layer of a waterproof paper under the lagging. The conductor drums shall conform to IS: 1778/1980. The drums shall be strapped with steel wire. Each drum shall have the following information marked on it with indelible ink along with other essential data.

1. Paschimanchal Vidyut Vitran Nigam Ltd.

2. Designation of Consignee and Designation of Railway Station.
  3. Drum No. of the conductor.
  4. Contract/Specification number.
  5. Size and type of conductor.
  6. Number and length of each conductor in the drum.
  7. Gross weight of the drum.
  8. Weight of the empty drum.
  9. Net weight of conductor.
  10. Position of conductor end.
  11. ISI mark.
- 9.2 The Drums shall be constructed in such a way to ensure delivery of conductor in the Stores free from displacement and damage and should be able to withstand all stresses due to handling and the stringing operation so that conductor surface is not dented, scratched or damaged in any way during transport and erection.
- 9.3 All wooden components shall be manufactured out of seasoned wood, preferably soft wood free from defects that may materially weaken the component parts of the drum. Wood preservative of treatment shall be supplied to the entire drum with preservative of such quality, which is not harmful to the conductor.
- 9.4 The gross weight of each packing shall not exceed 1250 kg.

#### **10. CHECKING OF CONDUCTOR LENGTH**

Sufficient facilities should exist at contractor's premises to measure the conductor length by the inspecting officers. For this purpose motorized system to facilitate quick measurement should be installed at the works.

#### **11. TOLERANCE OF QUANTITIES**

The total permissible variation for the entire quantity ordered shall subject to limit of  $\pm 1\%$  for orders upto 500 kms and  $\pm 1/2\%$  for orders above 500 kms. However, the permissible variation in case of individual consignee may be  $\pm 5\%$ .

#### **12. LENGTH AND VARIATIONS IN LENGTHS**

The standard length of each type of ACSR conductor shall be as given below. Non-standard length, less than, as mentioned below shall not be acceptable. Also, non-standard lengths shall be acceptable subject to max. of 10% of the ordered quantity, subject to the condition that non standard length shall not exceed 10% of the ordered quantity.

Item	Standard Length	Non Standard Length
ACSR Rabbit	$\geq 1.5$ KM	1.0 KM

**13. TESTING:**

The conductor shall be subjected to the following tests in accordance with IS: 398 (Part-II) 1976: -

- 13.1 Check for diameter of individual Aluminium and Steel strands.
- 13.2 Check for lay ratio of various layers of Aluminium and Steel.
- 13.3 Breaking load tests on Aluminium and galvanized steel wires.
- 13.4 Wrapping test on Aluminium and galvanized steel wires.
- 13.5 Electrical resistance test on Aluminium wires only.
- 13.6 Ductility test on galvanized steel wire only.
- 13.7 Galvanizing test on galvanized steel wires only.
  - (i) Weight of zinc coating.
  - (ii) Uniformity of zinc coating.
- 13.8 Checking of conductors surface declared length and weight.
- 13.9 Visual Examination test on conductor drums as per IS: 1778/1980.
- 13.10 The rejection & retest procedure shall be followed as stipulated in IS: 398 (Part-II) 1976.

**14. TESTING AND TEST CERTIFICATE**

The conductor shall be subject to all tests laid down in the relevant ISS at contractor's work or at approved test laboratory at contractor's cost. Certified copies of test certificate in respect of tensile test of both Aluminium and Steel strand, electrolytic quality of Aluminium and galvanized coating test of steel strand and all other tests as prescribed in the relevant ISS shall be furnished by contractor in triplicate, one copy to respective consignee officer second copy to CE (MM), PVVNL Victoria Park, Meerut.

The inspection of the conductor offered will be arranged by the SE (DQC), PVVNL Victoria Park, Meerut.

**15. CALIBRATION OF TESTING EQUIPMENTS :**

The tensile testing machine and Kelvin's Bridge machine etc. shall be got checked from the competent authority for calibration once in a year. Calibration certificates, when demanded by the Inspecting Officer, shall be produced for verification purposes. In case of dispute regarding calibration, the instruments shall be jointly sealed and sent to institutions, lab or deputed for calibration at the cost of supplier. The result of such checking shall be binding on the supplier.

**16. CHECKING OF CONDUCTOR SURFACE/DECLARED LENGTH AND WEIGHT**

The supplier / manufacturer shall arrange for the inspection of conductors by the representative of the purchaser specially authorized for this purpose. At least 5% of the total number of drum of conductor taken at random shall be checked to ascertain the surface, declared length and weight of conductor.