

# BHARAT HEAVY ELECTRICALS LIMITED

## TRANSMISSION PROJECTS ENGINEERING MANAGEMENT



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TYPE OF DOC.	TECHNICAL SPECIFICATION			NAME	RJ	VK	RS			
TITLE 7/9 SWG(10.98mm OD) GI Shield Wire				SIGN						
				DATE				16/02/15	18/2	18/2/15
				GROUP				TBEM	W.O. No	840061
CUSTOMER	POWER GRID CORPORATION OF INDIA LTD.									
PROJECT	765kV/400kV Agra UPPTCL (New) Substation									

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## SECTION – I

### SCOPE, SPECIFIC TECHNICAL REQUIREMENT AND QUANTITIES

#### 1.0 SCOPE

This technical specification covers the requirements of design, manufacture, testing at works, packing and dispatch of 7/9SWG (10.98mm OD) GI shield wire.

The equipment is required for the following project.

Customer : Power Grid Corporation of India Ltd.

Project :765kV/400kV Agra UPPTCL (NEW) Substation

Owner : UP Power Transmission Corporation Ltd.

#### 1.1 BILL OF QUANTITY

Sl. No.	Item	Qty.
1.	7/9 SWG (10.98mm OD) GI wire	7.5 kM

Note:

- The Qty may vary upto  $\pm 30\%$  before placement of order.
- The Qty. May vary by  $\pm 20\%$  during contract stage.
- Manufacturing clearance shall be given in 2 lots (max.)

#### 1.2 TYPE TESTING

Bidder shall submit valid type test reports (as per relevant IEC/IS Standard) for approval. The type test reports submitted shall be of tests conducted within last 10 years prior to the date of bid opening i.e. 28.04.2014 The bidder should have conducted type test on identical or similar equipment/ components to those offered. In case type test reports are found to be technically unacceptable to BHEL/PGCIL, the type test shall be conducted without cost and delivery implication to BHEL.

#### 1.3 QUALITY PLAN

Bidder to follow valid PGCIL approved Quality Plan as per PGCIL procedure. In case the bidder don't have PGCIL approved QP, it will be the bidder's responsibility to get its QP approved directly from the ultimate customer.

#### 1.4 DRAWING/DOCUMENTS APPROVAL:

Standardized GTP of POWERGRID is enclsod in section-2, no approval on GTP is required and inspection shall be carried out as per standardized GTP. Further, type test approval is also not required , if the manufacturer of GI steel earth wire is mentioned in the Annexure-E (Page 77/82). For all other manufacturer , type test approval from Powergrid shall be required .

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## SECTION – II

### TECHNICAL SPECIFICATION

This section covers the technical requirements of the GI Shield wire.

#### **2.1 TECHNICAL REQUIREMENTS & CONSTRUCTIONAL DETAILS:**

Technical specification, Section:SE C/ENGG/SPEC/SE Rev-09 Page 15/59, 16/59 & 17/59 (enclosed)

#### **2.2 Guaranteed technical Particulars : of GI steel wire should be as per clause 1.2 Annexure -E, page 56/59 & 57/59(enclosed)**

#### **2.3 Testing Procedure for Galvenised Steel Earthwire: As per Annexure-B, page 43 of 59 & 44 of 59 of customer's technical specification, Section:SE C/ENGG/SPEC/SE Rev-09(enclosed)**

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**SECTION - (SE)**  
**SWITCHYARD ERECTION**

- f) Breaking load test on steel and aluminium strands ) ) ) )
- g) Wrap test on steel and aluminium strands ) As per IEC:888 & 889 ) )
- h) DC resistance test on aluminium strands ) As per IEC:889 ) )
- i) UTS test on welded joint of aluminium strands ) As per Annexure - A ) )

**NOTE:**

All the above tests except test mentioned at (a) shall be carried out on aluminium and steel strands after stranding only.

**3.8.1.3 Routine Tests**

- a) Check to ensure that the joints are as per specification.
- b) Check that there are no cuts, fins etc. on the strands.
- c) All acceptance tests as mentioned above to be carried out on each coil/drum (as applicable).

**3.8.1.4 Tests During Manufacture**

- a) Chemical analysis of zinc used for galvanising ) ) ) )
- b) Chemical analysis of aluminium used for making aluminium strands ) As per Annexure - A ) )
- c) Chemical analysis of steel used for making steel strands ) ) ) )

**4.0 Galvanised Steel Earth wire**

**4.1 Details of Earth wire**

**4.1.1** The galvanised steel earth wire shall generally conform to the specification of ACSR core wire as mentioned in IEC:60888/IS: 398 (Part-II)-1976 except where otherwise specified herein.

The contractor shall supply the earthwire as per the standard guaranteed technical particulars enclosed in Annexure-E of the technical specification, Section – Switchyard Erection and separate approval for **guaranteed technical particulars** is not required during detailed engineering.

**4.2 Workmanship**

**SECTION - (SE)**  
**SWITCHGEAR AND SWITCHYARD ERECTION**

- 4.2.1 All steel strands shall be smooth, uniform and free from all imperfections, such as spills and splits, die marks, scratches, abrasions and kinks after drawing and also after stranding.
- 4.2.2 The finished material shall have minimum brittleness as it will be subjected to appreciable vibration while in use.
- 4.2.3 The steel strands shall be hot dip galvanized and shall have minimum Zinc coating after stranding, as stipulated in guaranteed technical particulars attached with. The zinc coating shall be smooth, continuous, of uniform thickness, free from imperfections. The steel wire rod shall be of such quality and purity that, when drawn to the size of the strands specified and coated with zinc, the finished strands shall be of uniform quality and have the same properties and characteristics as prescribed in ASTM designation B498-74.
- 4.2.4 The steel strands shall be preformed and post formed in order to prevent spreading of strands while cutting of composite earth wire. Care shall be taken to avoid damage to galvanisation during preforming and postforming operation.
- 4.2.5 To avoid susceptibility towards wet storage stains (white rust), the finished material shall be provided with a protective coating of boiled linseed oil.

**4.3 Joints in Wires**

There shall be no joints of any kind in the finished steel wire strand entering into the manufacture of the earth wire. There shall be no strand joints or strand splices in any length of the completed stranded earth wire.

**4.4 Tolerances**

The manufacturing tolerance to the extent of the limits as stipulated in guaranteed Technical Particulars attached with this specification shall only be permitted in the diameter of the individual steel strands and lay length of the earth wire.

**4.5 Materials**

**4.5.1 Steel**

The steel wire strands shall be drawn from high carbon steel rods and the chemical composition shall conform to the requirements as stipulated in Guaranteed Technical Particulars attached with.

**4.5.2 Zinc**

The zinc used for galvanising shall be electrolytic High Grade Zinc. It shall conform to and satisfy all the requirements of IS: 209 -1979.

**4.6 Standard Length**

- 4.6.1 The standard length of the earth wire shall be as stipulated in Guaranteed Technical Particulars attached with, with the specified tolerance on standard length.

**4.8 TESTS**

- 4.8.1 The following type, routine & acceptance tests and tests during manufacturing shall be carried out on the earthwire.

**4.8.2 TYPE TESTS**

~~SECTION - (SE)~~ SECTION - (SE)  
~~SWITCHGEAR SWITCHYARD SWITCHYARD ERECTION~~

In accordance with the stipulation of specification, the following type tests reports of the earthwire shall be submitted for approval as per clause 9.2 of Section - GTR.

- a) UTS test )
  - b) DC resistance test )
- As per Annexure - B

**4.8.3 ACCEPTANCE TESTS**

- a) Visual check for joints, scratches etc. and length of Earthwire )
  - b) Dimensional check )
  - c) Galvanising test )
  - d) Lay length check )
  - e) Torsion test )
  - f) Elongation test )
  - g) Wrap test )
  - h) DC resistance test )
  - i) Breaking load test )
  - j) Chemical Analysis of steel )
- As per Annexure - B  
IS:398 (Part-III) - 1976

**4.8.4 ROUTINE TESTS**

- a) Check that there are no cuts, fins etc. on the strands.
- b) Check for correctness of stranding.

**4.8.5 TESTS DURING MANUFACTURE**

- a) Chemical analysis of zinc used for galvanising )
  - b) Chemical analysis of steel )
- As per Annexure - B

~~5.0 ALUMINIUM TUBE~~

~~5.1 General~~

~~Aluminium used shall be grade 63401 WP (range 2) conforming to IS:5082.~~