

TECHNICAL SPECIFICATION

1.0 Foundation

1.1 **Scope:** Design of foundation and anchor blocks, for traction structures carrying overhead equipment, and other concrete work.

1.2 For design of foundations for traction structures and gantries at switching stations, the contractor shall determine the type and allowable bearing pressure of soil at the locations of such stations and shall prepare designs for the foundations suitable for each location to suit the bearing pressure of the soil in consultation with the Purchaser. The designs would generally be in line with Drg. No. ETI/C/0058 Sh-I or Sh-II or latest version.

1.2.1 In the case of hard rock, a hole should be blasted in the rock or by means of any other drilling and pneumatic method and the mast sealed into in with concrete.

1.3 Concrete:

Concrete for foundations shall be nominal mix of grade M.10 obtained by mixing cement, coarse aggregated, fine aggregate and water in accordance with proportions as given vide Table 3 IS 456/1978. For grouting, muffing, embedding of structures in foundations and for cable trenches at switching stations, normal mix M.15 obtained by mixing materials in proportions as indicated in Table 3 of IS 456/1978 shall be used.

1.3.1 In judging the acceptability of the material quality of concrete and method of work, the purchaser will generally observe the provisions of the Indian Standard Code of practice for Plain Reinforced IS 456/1978. The crushing strength of concrete shall not be less than the limits given below:

Crushing strength of 15cm cubes by works test

	<u>Concrete</u>	<u>At 7 days age</u>	<u>At 28 days age</u>
a)	M.10	70Kg/Sq.cm	100Kg/Sq. cm
b)	M.15	100Kg/Sq.cm	150Kg/Sq.cm

NOTE: a) Test specimen of works tests shall be taken at the site of work from mixture of concrete ready for pouring into the foundation hole. All tests shall be carried out in accordance with IS 516/1959 or its latest version. The sample of concrete from which test specimens are made shall be representative of the entire batch.

b) Age is reckoned from the day of casting.

1.4.2 Size And Grading Of Aggregates

The grade coarse aggregate 40 mm nominal size (Table – 2 of IS 383/1970) shall be used for foundation. A coarse aggregate for grouting muffs and embedding shall be of 20mm graded nominal size as per table 2 of IS 383/1970 (specification for coarse and fine aggregate from natural sources for concrete).

1.5 Sand Cored Foundations

After erection of masts in sand cored foundations, the core hole of the foundation blocks shall be filled with dried sand and covered with a layer of bitumen of 80 mm thickness below 30mm from top level of the block. A hemispherical shaped muff shall be provided on such foundations.

2.0 **Structures**

2.1 **General**

Designs for steel structures shall, except where otherwise provided, comply with the Indian Standard Code of practice for use of structural steel in General Building Construction – IS 800/1984. The thickness of smallest steel sections used shall be 5 mm for galvanized members. All the steel structures and small part steel for carrying Power supply/Over Head equipment are to be fully galvanized after drilling and fabrication and no painted structures are to be used. Finished steel work shall be galvanized after riveting/welding/drilling to RDSO's specification No. ETI/OHE/13(4/84) or latest, which stipulates deposition of galvanized materials i.e. thickness of galvanization.

The mast and other special structure shall be supplied by the contractor and shall be of fabricated steel of standard type and design.

2.2 **Setting of Structures**

The setting is the distance from the central line of the track, on straight or curve, to the face of the masts/structures of fitting, located on the mast.

2.2.1 Minimum setting of structure shall be 2.8 mtrs. plus curve allowance as required. Whenever this distance cannot be provided, specific approval of purchaser shall be obtained before erection. Setting of portal upright, overlap/turnout structures, anchoring structures and other masts carrying more than one OHE will be 3.0 m. wherever possible.

2.2.2 Setting of structure on platform shall not be less than 4.75 mtrs. In vicinity of signals, structures shall be located in a manner which shall ensure good visibility.

The value of setting of masts/structures shall be painted on each mast/structure. The figure shall be 25 mm in size in white on yellow background. In addition, the track level shall also be marked on the mast/structure by a horizontal red painted stroke.

All structures shall be numbered as per the numbering scheme of the purchaser.

2.3 **Steel Work**

Horizontal member of main as well as auxiliary gantry carrying Isolators switches, Insulators, Potential Transformers etc. shall be made from steel sections viz. channels, angles and small joists, single or fabricated. They shall preferably be attached to masts by means of clamps to avoid drilling of masts sections. For purpose of design, all possible loads which may occur in the worst conditions shall be considered.

2.4 Chair, brackets and supporting steel works carrying potential transformer, Lightning Arrestors, Insulators etc. shall be made of fabricated steel and be mounted on the main auxiliary gantry preferably by means of clamps to avoid drilling of mast sections.

2.5 Uprights carrying operating handles of Isolators and fencing posts shall be fabricated from steel sections viz. channels, angles or small joists, either single or fabricated.

3.0 **Over Head Equipment**

3.1 Brief description:

Essentially the traction overhead equipment shall consist of standard catenary wire from which grooved contact wire is suitably suspended by means of droppers. In order to cater for a speed of 160 kmph the contact wire is given a pre-sag of about 50 mm for 67.50 m span and reduced suitably for other spans. As a general rule, the nominal encumbrance i.e. the centre distance between the Catenary and the Contact wire at the support shall be 1.40m.

- 3.1.1 The overhead equipment used shall normally be of the regulated type where the tension of both the catenary and contact wires shall be maintained at a constant value at all temperatures by means of automatic tensioning devices desired to take up the variation in the length of overhead equipment due to temperature variation.
- 3.1.2 An anticreep shall be provided at a point approximately midway between two tensioning devices and more than 750 meters from any of them.
- 3.1.3 In regulated equipment the tension in the catenary and in the contact wire shall be 1,000 kg. in each conductor.
- 3.1.4 Normally, the minimum height of contact wire above rail level shall be 5.50 mm, at mid span under the worst temperature conditions.
- 3.1.5 Any change in the height of the contact wire shall be made gradually and relative gradient to 2mm/m and 1mm/m respectively. The relative gradient in two adjacent spans of any section with a gradient of contact wire shall have a slope not greater than half the main slope.
- 3.1.6 To ensure uniform wear of contact strips of pantographs, the contact wire shall normally be staggered in a manner +/- 150 mm in tangent track at alternate support and +/- 250mm in curved tracks in worst conditions.
- 4.0 Minimum Horizontal Distance from centre line of the track to face of foundation of OHE mast/Portal – For facilitating working of track machines, following dimensions may also be ensured in the new electrification works either connected with new line/work of laying multiple lines/RE/gauge conversion:
 - (a) Below the rail level upto the formation level of the track on straight and curves of radius more than 875m – will be 2575mm.
 - (b) Below the rail level upto the formation level of the track on curves with radius less than 875m – will be 2725mm.
- 5.0 Provision of Forged OHE fitting should be ensured as per RDSO/CORE's approved.

ADEE/TRD/Sub/SRC