# Annexure ‘B’

**Tubular Steel Poles for Overhead Lines**

1. **SCOPE:**

This specification covers the general requirements towards design, manufacture, testing at manufacturers works, supply and delivery for tubular steel poles of circular cross section ( swaged type ) for overhead lines.

1. **STANDARD:**

The tubular steel poles shall conform to the latest edition of Indian Standard specification IS: 2713 (Part – I, III): 1980 or any other authoritative standards (as amended up-to- date) except where specified otherwise in this specification.

1. **Topography and Climatic Condition:**

The materials offered, shall be suitable for operation in tropical climate and will be subjected to the sun and inclement weather and shall be able to withstand wide range of temperature variation. For the purpose of design, average atmospheric temperature may be considered to be 50ºC with humidity nearing saturation.

1. **Materials:**
   1. The materials used in construction of tubular steel poles shall be of the tested quality of steels of minimum tensile strength 540 MPa (: 55 Kgf/mm2).
   2. The materials, when analysed in accordance with IS: 228 (Part-III: 1972) and IS : 228 ( Part-IX) shall not show sulpher and phosphorous contents of more than 0.060 percent each.
2. **Types, Size and construction:**
   1. Tubular Steel Poles shall be swaged type.
   2. Swaged poles shall be made of seamless or welded tubes of suitable lengths swaged and jointed together. No circumferential joints shall be permitted in the individual tube lengths of the poles. If welded tubes are used they shall have one longitudinal weld seam only: and the longitudinal welds shall be staggered at each swaged joint.
   3. Swaging may be done by any mechanical process. The upper edge of each joint shall be chamfered if at an angle of about 45o. The upper edge need not be chamfered if a circumferential weld is to be deposited in accordance with clause No. 5.3 2 of IS: 2713 ( Part-I):1980.
   4. The length of joints on swaged poles shall be in accordance with clause No. 5.4 of IS: 2713 (Par-I): 1980.
   5. Poles shall be well-finished, clean and free from harmful surface defects. Ends of the poles shall be cut square. Poles shall be straight, smooth and culindrical. The weld joints, if any, shall be of good quality, free from scale, surface defects, cracks, etc.
   6. Tolerances for outside diameter, thickness, length, weight and straightness shall be in accordance with IS: 2713 (Part-I) : 1980.
   7. The poles shall be coated with black bituminous paint conforming to IS: 158-1968 throughout, internally and externally, upto the level which goes inside the earth. The remaining portion of the exterior shall be painted with one coat of red oxide primer as specified in IS: 2074-1979.
3. **Earthing Arrangements:**

For earthing arrangement a through hole of 14mm diameter shall be provided in each pole at a height of 300mm above the planting depth.

1. **Tests and Test Certificates:**
   1. The following tests shall be conducted on finished poles :
      1. Tensile test and chemical analysis for sulpher and phosphorous,
      2. Deflocation test,
      3. Permanent set test, and
      4. Drop test.
   2. In addition to above verification of dimensions as per IS: 2713 (Part-III) : 1980 shall be carried out during acceptance lots.
   3. Number of poles selected for conducting different tests shall be in accordance to clause No. 10.1.1 and No. 10.1.12: of IS: 2713 (Part-I) 1980.
   4. Tests shall be carried out before supply of each consignment at the manufacturers woks and test certificates should be submitted to the purchaser for approval prior to delivery.
   5. Re-tests, if any, shall be made in accordance with IS: 2713 (Part-I) 1980.
   6. Purchaser reserves the right to inspect during manufacturing and depute his representative to inspect/test at the works.
   7. If any extra cost is required for carrying out the above specified tests, the same shall be borne by the manufacturer.
2. **Marking:**
   1. The poles shall be marked with designation, manufacturer’s identification, year of manufacture and name of the purchaser: Employer Name; DDUGJY
   2. The poles may also be marked with the ISI certification mark.
3. Guaranteed technical particulars:
   1. The manufacturer shall furnish all necessary guaranteed technical particulars in the prescribed Performa enclosed hereinafter.
4. **Performance:-**
   1. The manufacturer shall furnish a list of the major supplies effected during the last 3 (three) years indicating the volume of supply and actual delivery dates.
   2. Manufacturer may not be considered if the past manufacturing experience is found to be less that 3 (three) years.
5. **Deviation:-**

Any deviation in technical specification shall be clearly indicated with sufficient reasons thereof. Purchaser shall however reserve the right to accept and/or reject the same without assigning any reasons what-so-ever.

**ANNEXURE –‘A’**

**SPECIFIC TECHNICAL REQUIREMENTS FOR TUBULAR STEEL POLES : SWAGED TYPE**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **9 meters long** | **11 meters long** | **13 meters long** | **12 meters long** |
| 1) Standard | IS: 2713 ( Pat-I and III): 1980 as amended upto date | | | |
| 2) Type of Pole |  | Swaged Type | |  |
| 3) Designation | 540 SP 28 | 540 SP 52 | 540 SP 72 | 410 SP 60 |
| 4) Overall Length | 9 meters | 11 meters | 13 meters | 12 meters |
| 5) Planting depth | 1.5 meters | 1.8 meters | 2.0 meters | 2.0 meters |
| 6) Height above ground | 7.5 meters | 9.2 meters | 11.0 meters | 10.0 meters |
| 7) Effective length of Each  section. |  |  |  |  |
| a) Bottom | 5.0 meters | 5.6 meters | 5.80 meters | 5.80 meters |
| b) Middle | 2.0 meters | 2.7 meters | 3.60 meters | 3.10 meters |
| c) Top | 2.0 meters | 2.7 meters | 3.60 meters | 3.10 meters |
| 8) Outside diameter and  Thickness of each Section. |  |  |  |  |
| a) Bottom | 139.7x 4.50 mm | 165.1x4.50 mm | 219.1x5.90 mm | 165.1x5.40mm |
| b) Middle | 114.3x3.65 mm | 139.7x4.50 mm | 193.7x4.85 mm | 139.7x4.50 mm |
| c) Top | 88.9x3.25 mm | 114.3x3.65 mm | 165.1x4.50 mm | 114.3x3.65 mm |
| 9) Joint Length ( in cm.): |  |  |  |  |
| a) Bottom (J2) | 30 cm. | 35 cm. | 45 cm. | 35 cm. |
| b) Top (J1) | 23 cm. | 30 cm. | 40 cm. | 30 cm. |
| 10) Approximate weight | 113 Kg. | 175 Kg. | 343 Kg. | 208 Kg. |

0.3 mtr. 478 191 339 232

|  |
| --- |
| of Pole |
| 11)Point of application of  load below/top (mtr.) |
| 12) Breaking load ( inKgf ) |
| 13) Working load with factor of  Safety : 2.5 ( in Kgf ) |
| 14) Crippling load ( inKgf ) |
| 15) Load for permanent set  Not exceeding 13mm (in Kgf) |
| 16) Load for Temporary  Deflection of 157.5 mm (in Kgf) |
| 17) Tolerance |
| 18) Finish |
| 19) Manufacturing clause |

|  |  |  |
| --- | --- | --- |
|  |  |  |
| 0.6 mtr. | 0.6 mtr | 0.6 mtr |
| 567 | 1084 | 469 |
| 227 | 435 | 188 |
| 403 | 770 | 333 |
| 276 | 527 | 228 |
| 74 | 121 | 61 |
| As per IS : 2713 ( Part-I & Part-III): 1980 | | |
| -do- |  |  |
| -do- |  |  |

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