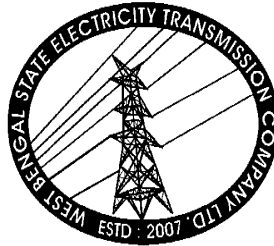


ALUMINIUM PIPE BUS



September 2017

Engineering Department

WEST BENGAL STATE ELECTRICITY TRANSMISSION COMPANY LIMITED

পশ্চিমবঙ্গ রাজ্য বিদ্যুৎ সংবহন কোম্পানি লিমিটেড
(পশ্চিমবঙ্গ সরকারের একটি উদ্যোগ)

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CIN: U40101WB2007SGC113474; Website: www.wbsetcl.in

TECHNICAL SPECIFICATION OF ALUMINIUM TUBULAR PIPE BUS

1. **SCOPE :**

The specification covers design, engineering, manufacture, testing at Manufacturer's works of IPS extruded standard Aluminium Tubular Busbar as required at new as well as existing Sub-station.

2. **STANDARD :**

The rigid aluminium tubular conductor shall conform to IS:5082 and IS:2673 in all respect as amended upto date.

3. **MATERIALS :**

The Aluminium tubular busbar shall be extruded from 63401 grade Aluminium alloy with W.P.range2 treatment.

The rigid tubular conductors shall be of aluminium of standard type and designed to operate within set temperature limits and to withstand thermal and electro mechanical forces developed due to short circuits and vibration by wind. The material shall be clean smooth and free from any harmful effect.

Standard Aluminium pipes of minimum size 4", 3", 2.5" and 1.5" will be used for busbar of 400KV, 220 KV, 132 KV and 33 KV switchyard respectively. During erection of new switchyard pipe to pipe joint is to be avoided as far as practicable. In case of Al tube jointing Argon welding process is to be adopted for 400KV, 220KV, 132KV & 33KV Switchyard. Uses of very small pieces of Al tube is to be avoided as far as practicable in order to minimize no of joints. Length of Al tube of each section between equipment and equipment & equipment to accessories are to be mentioned in Erection key diagram drawing.

4. **MECHANICAL CHARACTERISTICS :**

The surface of the Aluminium tubes shall have a bright smooth finish, free from seams, cracks and other imperfections. Special attention shall be given to avoid formation of corona as far as possible. The finished tubes shall be perfectly straight.

5. **DIMENSIONAL TOLERANCES :**

- i) Dimensional tolerances of the aluminium tube shall be as laid down in IS:2673 for the extruded tube.
- ii) All tubes shall be supplied straightened and reasonably free from twist.
- iii) The standard outside diameters and thickness of the tubes shall be guided by as per Table 1 of the IS:2673.

- iv) The tolerance on wall thickness shall be as per Table 3 and the tolerance on O/D or I/D of tubes shall be as given in Table 5 of the IS:2673.
- v) The straightness tolerance for tubes over any length of one meter shall not exceed 1.7 mm.

6. CHEMICAL COMPOSITION :

The ingot to be used for producing the Aluminium tubular busbars of grade 63401 W.P. shall comply with the requirements specified in Table 1 (Clause 6.1) of IS:5082 when analyzed in accordance with IS:504 or any other standard instrumental method of analysis.

7. TESTS AT MANUFACTURER'S WORKS AND TEST CERTIFICATES :

Al. tubular pipe bus are to be offered conforming to our technical specification, and relevant IS & IEC. All Acceptance tests shall be carried out at the manufacturer's works on every lot offered for inspection as per relevant IS in presence of Engineers of WBSETCL. In addition to above, all routine tests are also to be carried out on Aluminium pipe bus as per relevant IS & Routine Test report are to be submitted. Selection of samples for acceptance test as well as rejection and retesting shall be guided by relevant IS. The entire cost of acceptance and routine tests that are to be carried out as per relevant IS shall be treated as included in quoted price of Aluminium Tubular pipe bus. Three (3) copies of test reports shall be submitted for approval and afterwards distribution to site. The contractor shall give at least 15 (fifteen) days advance notice of the date when the test will be carried out.

8. PACKING :

The Aluminium tubes shall be properly packed to avoid damage in transit.

9. GUARANTEE :

Electrical and Mechanical Characteristics shall be guaranteed by the bidder. In case of failure of the materials to meet the guarantee, WBSETCL shall have right to reject the materials. Guaranteed Technical Particulars are to be submitted by successful bidder during detail engineering alongwith submitted drawings/documents. However format for submission of GTP shall be handed over to intending bidders at the time of sale of tender documents.

10. I) DEVIATION :

Normally the offer should be as per Technical Specification without any deviation.

II) MODIFICATION :

If any modification felt necessary to improve performance, efficiency and utility of equipment, the same must be mentioned in the 'Modification schedule' with reasons duly supported by documentary evidences and advantages. Such modifications suggested may or may not be

accepted, but the same must be submitted along with Pre-Bid Queries. The modifications not mentioned in Schedule will not be considered.

11. CONTRACT DRAWING AND CATALOGUE :

Six (6) copies of GTP of Aluminium tubular pipes of different sizes with marking and technical information shall be submitted for our approval.

Four (4) copies of approved drawing, GTP and catalogue both in hard & soft format for each sub-station shall be submitted for our record and distribution to site.

SPECIFIC TECHNICAL PARAMETERS

Pipe Normal Size (")	Diameter (mm)		Wall Thickness (mm)	Area (mm ²)	Weight Kg/m.	DC Resistance (Max) at 20°C micro-ohm/m	Current Rating (Amps)
	Outside	Inside					
Standard Indian Pipe Size							
Schedule 40							
1.5	48.26	40.894	3.690	516.13	1.396	60.73	1160
2.0	60.33	52.51	3.91	693	1.871	45.1	1440
2.5	73.03	62.713	5.160	1099.35	2.980	28.44	1950
3.0	88.90	77.930	5.485	1437.42	3.890	21.75	2350
3.5	101.6	90.12	5.74	1729	4.667	17.4	2750
4.0	114.30	102.26	6.02	2048.00	5.529	15.30	3050
Schedule 80							
1.5	48.26	38.10	5.08	699.03	1.87	45.44	1335
2.0	60.33	49.25	5.54	954	2.575	32.9	1680
2.5	73.03	59.00	7.015	1454.19	3.94	21.52	2230
3.0	88.90	73.66	7.62	1945.80	5.27	16.11	2700
3.5	101.6	85.44	8.08	2374	6.41	13.2	3160
4.0	114.30	97.18	8.56	2844.00	7.678	11.00	3590

NOTE : Outdoor ratings for tubular bus-bar are for 50°C rise over 50°C ambient Temperature with a cross wind of 2 ft./sec.

GUARANTEED TECHNICAL PARTICULARS FOR ALUMINIUM TUBULAR PIPE BUS

(To be filled in and signed by the Bidder)

SL	DESCRIPTION	Pipe nominal size IPS (inch)
1.00	BUS PIPES : GENERAL	
1.01	Name of Manufacturer	
1.02	Name of the Supplier	
1.03	Conforming Standard	
1.04	Type of tube	
1.05	Material & grade	
1.06	Manufacturing length in (mm)	
1.07	0.2% proof stress (yield strength)kg/mm ² :	
1.08	% min. Elongation on 50 mm gauge length	
2	Chemical composition of material	
2.1	Cu (%)	
2.2	Mg (%)	
2.3	Si (%)	
2.4	Fe (%)	
2.5	Al (%)	

3	Area for tubes (mm ²)	
4	Weight for the above items separately (Kg/m)	
5	Minimum Ultimate tensile strength (Kg/mm ²)	
6	Modulus of Elasticity (Kg/mm ²)	
7	Thermal conductivity (calories/sec./Cm ² / oC at 100oC)	
8	Linear temperature co-efficient of expansion (20oC – 200oC) (/oC)	
9	Temperature Co-efficient of resistance (/oC)	
10	Rated normal current (Amps.)	
11	Temp. rise above ambient temperature of 50°C at rated normal current (oC)	
12	Short time Current rating in KA(1 sec. for 400 KV & 3 second for 220,132 & 33 KV)	
13	Electrical resistivity (Maxm) at 20°C (ohm-cm)	
14	D.C. resistance(Max.) at 20oC (Micro-Ohm)	
15	Minimum Electrical Conductivity (% I.A.C.S.)	