



TECHNICAL SPECIFICATION
FOR
ALUMINIUM TUBULAR BUS BAR

GUJARAT ENERGY TRANSMISSION CORPORATION
LTD

SARDAR PATEL VIDYUT BHAVAN, RACE COURSE
BARODA: 390 007

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TECHNICAL SPECIFICATION FOR ALUMINIUM TUBULAR BUS BAR

1.0 SCOPE:

The specification covers the design, manufacture, assembly, inspection, testing and delivery of Aluminium Tubular bus bar(4inch and 2inch IPS Aluminium tube) **BALCO/NALCO/HINDALCO/BANCO MAKE** for outdoor bus of 400/220 KV Sub – stations in the Gujarat State.

2.0 CLIMATIC CONDITIONS

- i) Location : Anywhere in the State of Gujarat.
- ii) Maximum Ambient Air Temperature. ° C. : 50
- iii) Minimum Ambient Air Temperature. ° C. : 0
- iv) Average daily ambient Air Temperature ° C. : 35
- v) Maximum relative humidity. - % : 95
- vi) Average rainfall per annum. (mm) : 1150
- vii) Maximum altitude above mean sea level – Mtrs : 1000
- viii) isokeraunic level i.e. Average number of Thunder storm - Days/annum : 15
- ix) Maximum wind pressure. (Kg/Sq. meters) : 200
- ix) Seismic level i.e. Earthquake Acceleration
 - a) Horizontal Seismic Co-efficient (Acceleration) – G (Zone – 5) : 0.08
 - b) Vertical Seismic Co-efficient (Acceleration) – G (Zone – 5) : 0.84

3.0 STANDARDS:

- 3.1 Design, manufacture, performance of the tubular bus bar, shall comply with all currently applicable standards regulations and safety codes in the locality where the same is to be installed. Unless otherwise, specified, bus bar should conform to the latest applicable Indian standards and in particular to the following:

IS: 5082 -1998 : Specification for wrought – Aluminium & Aluminium alloy, bars, rods, tubes and sections for electrical purpose. Acceptance tests / chemical composition And latest amendments.

IS: 731-1971 : Method of high voltage testing / Corona / RIV

IS – 2121-1982 : Specification for conductors and earth wire accessories for overhead power lines.

IS:2673 : Dimensions for wrought Aluminium and Aluminium alloys, extruded round tube

- 3.2 Materials conforming to any other national standards which ensure equal or better services shall be acceptable.
- 3.3 If required, modifications shall have to be incorporated, as directed by the GETCO for items ordered without any extra cost.

4.0 **ALUMINIUM TUBULAR BUS BAR (BALCO/NALCO/HINDALCO/BANCO MAKE)**

- 4.1 Aluminium tubular bus bar pipe shall be Alloy 63401 Temper Designation WP (range 2) as per IS 5082: 1998 and its latest amendments.
Material of Aluminium Tubular bus pipe shall be cold drawn aluminium tube with minimum 55% IACS conductivity at 20° C temperature. (International Annealed Copper standards).
- 4.2 The tube sizes shall be in accordance with the standards.
- 4.3 The minimum Tensile Strength should be 200 Mpa
- 4.4 The Maximum Electrical Resistivity at 20° C should be 0.03135 ohm-mm/mm²

- 4.5 The tubular bus shall have adequate strength to withstand mechanical forces due to short circuit current of 40 KA for 3 seconds respectively for 4" & 2" IPS pipe.
- 4.6 The temperature of tubular bus bar when carrying full load current shall not exceed 45° C above the site ambient temperature.
- 4.7 The aluminium tubular bus bar offered shall not have any sharp edges, cuts, abrasions, etc and shall be free from visible corona.
- 4.8 The radio interference voltage level of the tubular bus bar shall be below 500 micro volts, at a voltage 20% above the highest line to earth value of the Megahertz.
- 4.9 Preference shall be given to the firms having ISO.

5.0 **SPECIFIC TECHNICAL REQUIREMENT**

- 5.1
 - a) Standard pipe size : 4" IPS
OD -114.3 ID - 97.18
2" IPS
OD – 60.33 ID – 49.25
 - b) Material : Aluminium grade 91E
Confirming to IS: 5082 - 1998
& latest amendment
 - c) Atmosphere : Corrosive and fungicidal
 - d) Type of corrosive atmosphere : Saline & industrial pollution
 - e) Rated voltage : 420 KV
 - f) Impulse withstand voltage : 1425 KV
 - g) Switching surge withstand : 1050 KV
- 5.2 The maximum length of tube that can be supplied with and without stationing limitations on transport stipulation shall be indicated in the Bid. Standard length should be 7 meters for 4" IPS and 7.5 Meters for 2" IPS.

6.0 **TEST**

6.1 Individual tubular bus bar shall be subjected to following tests:

- a) Three second short circuit test
- b) Resistivity Test.
- c) Yield strength Test.
- d) Chemical composition.
- e) Tensile Test.
- f) Critical disruptive voltage test for **4" IPS pipe only**.

The bidder shall submit copies of above Type test certificate of any Government recognized NABL approved Laboratory for consideration along with the technical bid. The date of type test conducted should not be later than 7 years as on the date of opening of technical bid and should be valid till expiry of offer. Tests mentioned (b) to (e) above shall be part of Acceptance Test.

7.0 **INSPECTION & TESTING:**

- a) The GETCO reserves the rights to inspect the materials at any stage of manufacturing. All acceptance tests as per relevant specification shall be performed in the presence of the GETCO's inspecting authority. The Bidder will have to give intimation of place, Date and Time of such testing to the GETCO sufficiently in advance to enable the GETCO to depute its representative to be present at the testing. No material shall be dispatched without having been passed by GETCO's representative. Routine/Acceptance tests shall have to be arranged by the Bidder, in accordance with the relevant standards free of cost for each lot of supply.
- b) Inspection by the GETCO's representative shall not relieve the Bidder from his obligation of furnishing material in accordance with the relevant specification.

8.0 PERFORMANCE:

The Bidder has to clearly state their experience, resources, engineering organization to undertake this work of supply. The Bidder shall have minimum experience of 3 years in the manufacture of similar items. However, the GETCO reserves the right to waive stipulation in respect of experience for new firms.

9.0 DRAWINGS:

Immediately, on receipt of the order, the Bidder should submit the necessary drawings for approval in line with Technical Specifications.

- 10.0 a) The technical Bid should be comprising of all the information as per the format given with this specification.
- b) True copies of all Type test certificates of Govt. recognised Laboratory in respect of offered items only shall be furnished.
- c) Descriptive literature, dimensional drawings, catalogues, etc. shall be Submitted for the offered items.

Bids which does not give complete details, or which are vague and technically not in line with the GETCO's requirements shall be liable for rejection.

8.0 QUALITY ASSURANCE PLAN

8.1 The bidder shall invariably furnish following information along with his offer, failing in which offer shall be rejected.

- i) Statement giving list of important raw materials names of sub suppliers for the raw materials, list of standards according to

which the raw materials are tested, list of tests normally carried out on raw materials in presence of supplier's representative and as routine and / or acceptance during production and on finished goods, copies of test certificates.

ii) Information and copies of test certificates as in (i) above in respect of bought out accessories.

iii) List of manufacturing facilities available.

iv) Level of automation achieved and list of areas where manual processing exists.

List of areas in manufacturing process, where stage inspections are normally carried out for quality control and details of such tests and inspections.

List of testing equipment available with the Supplier for final testing of IPS pipe. In the case if the suppliers does not possess all the Routine and Acceptance testing facilities the tender will be rejected.

The GETCO reserves the right for factory inspection to verify the facts quoted in the offer. If any of the facts are found to be misleading or incorrect the offer of that Bidder will be out rightly rejected and he may be black listed.

v) Special features provided to make it maintenance free.

8.2 The bidder shall also submit following information to the purchaser along with the technical Bid. .

i) List of raw materials as well as bought out accessories, and the name of suppliers of raw materials as well as bought out accessories.

- ii) Type test certificates of the raw material and bought out accessories.
- iii) Quality assurance plan (QAP) with hold points for purchaser's inspection.

8.3 The Supplier shall submit the routine test certificates of all the bought out items, accessories etc.

(TO BE FILLED IN COMPLETELY AND SHALL BE SUBMITTED WITH TECHNICAL BID)

GUARANTEED TECHNICAL PARTICULARS

4/2 INCH IPS ALUMINIUM PIPE

SR.NO.	Description	REQUIREMENTS	
1.	Manufacturer's Name and Country		
2.	Standards to which confirming		
3.	63401 WP(range2) - IS 5082-1998 55% IACS at 20 °C		
4. a)	Size of tubular bus bar- OD 114.3mm (4" size) 60.33mm (2" size)	(4" size)	(2" size)
b)	ID 97.18 mm (4" size) 49.25 mm (2" size)		
c)	Wall thickness 8.56 mm (4" size) 5.54 mm (2" size)		
d)	Tolerance on wall Thickness	-0.0 +shall be acceptable	-0.0 +shall be acceptable
5.	Area 2844mm ² (4" size) 954mm ² (2" size)		
6.	Conductivity to IACS 55% (Minimum)		
7.	DC Resistance(Max) at		

	20°C-microhms/m		
8.	Weight 7.678 Kgs/Mtr. (4" size) 2.575Kgs/mtr. (2" size)		
9.	Short circuit current rating for 3 seconds duration		
10.	Yield strength at tensile strength of min. 200 Mpa		
11.	Minimum breaking strength at tensile strength of 210 Mpa		
12.	Deflection of tubular bus conductor for 10 Mtr. Span.		
13.	Standard piece length of tubular bus conductor 7 mtrs. (4" size) 7.5 mtrs. (2" size)		
14.	Chemical composition (max. values)	Copper-0.05%, Si-0.3-0.7%, Mg-0.4-0.9% Fe-0.5% Mn-0.03% Zn-0.10% Titanium-0.10% Cr-0.03% Al-Balance	

Signature of the Bidder: _____

Name: _____

Designation: _____

Date: _____

Authorized common rubber

Stamp / seal of the bidder: _____