

GUJARAT ENERGY TRANSMISSION CORPORATION LTD.

Sardar Patel Vidyut Bhavan, Race Course,

Vadodara: 390 007

TECHNICAL SPECIFICATION
FOR
CLAMPS & CONNECTORS
FOR
SUB-STATION

GETCO/E/TS-C&C 057/R2 June - 22

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TECHNICAL SPECIFICATIONS FOR CLAMPS & CONNECTORS

1.0 SCOPE:

This specification covers the design, manufacture, assembly, inspection, testing, packing and delivery of clamps & connectors, suitable for *"Panther" Conductor ,* "MOOSE" Conductor (54/7/3.53 mm) or "Zebra" Conductor (54/7/3.18) with Sub-Conductor spacing as 450 mm/350 mm with quadruple & Twin formations *as well as 4" IPS Aluminum tube*. The same are required for out door bus of 400/220 KV Sub-stations. The material offered shall be complete with all components that are necessary for efficient operation. Such parts shall be deemed to be within scope of the supply whether specifically mentioned or not. Fittings shall confirm in all respect to the highest standard of engineering, design, and workmanship and shall be capable of performing trouble free continuous operation.

2.0 QUANTITY:

The quantities of various clamps/connectors/fittings are to be considered as set.

3.0 CLIMATIC CONDITIONS:

The overall climate is moderate hot, humid, tropical, highly polluted and conductive to rust and fungus growth. The clamps/connector shall be given tropical and fungicidal treatment and shall be capable of satisfactory operation under the hot and humid climatic conditions that would prevail at sites. The climatic conditions are prone to wide range of variation in ambient conditions. The materials offered shall be suitable for installation at any of the switchyards in Gujarat State.

4.0 SYSTEM PARTICULARS:

4.1	Nominal System Voltage	:	*66 KV*	*132 KV*	220 KV	400 KV
4.2	Highest System Voltage.	:	72.5KV	145KV	245 KV	420 KV
4.3	Short circuit level for 3 sec	:	25 kA	40 kA	40 kA	40 kA
4.4	Frequency	:	50Hz	50Hz	50 Hz	50 Hz.
4.5	Basic insulation level, kVp (1.2/50 Micro second wave)	:	350	650	1050	1425
4.6	Switching surge withstand	:	---	---	---	1050 kVp
4.7	Number of phases	:	3	3	3	3
4.8	System earthing	:	---------- Effectively earthed ----------			
4.9	No. of sub-conductor bus	:	------	------	4 or 2	4 or 2
4.10	a) Size of sub-conductor bus	:	30/7/3.0	54/7/3.18	54/7/3.18	54/7/3.53
	b) Overall diameter of the conductor, mm	:	21	28.62	28.62	31.77.
	c) Approx. weight of conductor: Kg/km.		974	1619	1619	2004
4.11	Ultimate tensile strength of single conductor, in kG.	:	9050	13200	13200	16250
4.12	Spacing between sub- conductors of bus: 350 or 450 mm *(as specified in Schedule – A of respective tender)*					
	formation.	:	Quadruple or Twin			
4.13	Maximum working tension	:	1000-2000 Kg. per sub conductor of the bus.			

4.14	Span of the bus.	:	36 meters & 56 meters.
4.15	Conductor temperature range:		Minimum: 3.5ºC Maximum: 64.5ºC

5.0 STANDARD:

5.1 Design, manufacture, performance of the clamps/connectors shall comply with all currently applicable standards, regulations and safety codes in the locality where the same will be installed. Unless otherwise specified it should conform to the latest applicable Indian Standards and in particular to the following: (Latest Edition)

IS :2121	:	Fittings for aluminum and steel covered aluminum conductors for overhead power lines.
IS:5561	:	Electrical power connectors.
IS:731 – 1971 IEC:437 –1973	:	Method of high voltage testing.
IS – 2629 IS -2633	:	Methods of galvanizing.

5.2 Materials conforming to any other national standards which ensure equal or better services shall be acceptable. The salient point of this Specification and point of difference between these in the above specification shall be clearly brought in the offer.

5.3 If required, modifications shall have to be incorporated for the items ordered with you without any extra cost to the Board.

6.0 GENERAL TECHNICAL REQUIREMENT OF CLAMP/CONNECTOR:

All casting shall be free from shrinking, blow holes, surface blisters,cavities,cracks, other defects and quality of product shall be uniform throughout. All sharp edges and corners shall be blurred and rounded off.

6.1 Assembly shall be designed and manufactured in such a way so as to have minimum contact resistance.

6.2 The fittings offered shall be inherently resistive to atmospheric corrosion or be suitable to protect against corrosion both during storage as well as in service.

6.3 The clamps/connector shall not cause any damage to the conductor in any way.

6.4 All bolts, clamps, etc. shall have suitable locking arrangements to safe guard against vibration and loosening.

6.5 Minimum thickness of any part shall be 12 mm or as per TTR which is more.

6.6 All ferrous parts shall be hot dip galvanized confirming to IS: 2633.

6.7 For bimetallic connectors, copper alloy liner of minimum thickness of 2 mm shall be cast integral with aluminium body.

6.8 Flexible connectors shall be made from tinned/copper/aluminium sheets.

6.9 Connectors shall be designed to be corona free in accordance with the requirements stipulated in IS: 5561

6.10 The terminal connectors suitable for conductor shall be compression type, unless otherwise indicted in schedule –A of respective tender.

6.11 The required bolts and nuts for terminal connector must be stainless steel/MS HDG in line with submitted TTR with suitable check nut.

6.12 *No Nuts & bolts shall be less than 12 mm size.*

7.0 SPECIFIC REQUIREMENTS:

7.1 Clamps and fittings shall be so designed that the *equipment* shall not subject to any abnormal stress due to thermal changes in conductor. All the clamps and fittings shall be enable the connection to be as short as possible. Wherever possible they shall be in two separate halves. No 'U' bolts shall be used.

7, 2 The data in respect of bus bars and equipment for which clamps and connectors are required shall be given to the successful bidder.

7.3 MATERIAL:

The clamps and connectors shall be made of materials listed below:

i) For connecting ACSR conductor aluminum alloy casting conforming to designation A6 of IS: 617.
ii) Bolts, nuts, plain washers and spring washers for all items:
Hot dip galvanized mild steel/stainless steel as per GETCO approved make.
iii) Split pin shall be made of stainless steel.

7.4 The clamps shall be designed to withstand the flow of continuous current as follows:

i)	400 kV	-	***3150/***2000 Amp.
ii)	220 kV	-	2000 Amp.
iii)	132kV	-	1600 Amp.
iv)	66 kV	-	800/1250 Amp.

The temperature rise when carrying full load current shall not exceed 45ºC above site ambient temperature of 45ºC.

8.0 DESIGNS:

8.1 Responsibility of satisfactory design of the clamps/connectors to safely withstand the specified mechanical stresses and carry the rated current without exceeding the temperature rise specified, shall solely rest with the bidder. For this purpose, a minimum factor of safety 2 (two) shall be taken into account.

9. TEST:

Individual fittings, clamps, connectors shall be subjected to following Type, Acceptance and Routine Tests.

9.1 CLAMPS & CONNECTORS IS:5561: (Latest Edition)

9.1.1 Type Test:

All the clamp & connectors offered shall be fully tested for following tests from NABL accredited laboratory in accordance with latest / amended / up to date IS/IEC. The bidder has to submit the all type test reports as stated hereunder for the offered item along with the technical bid. The type test reports from NABL approved laboratory shall not be older than TEN years. Type Test shall be valid as on the last date of submission of bid.

IMPORTANT NOTE: *In case of non-submission/partial submission or type test reports of which validity is over, bidder shall submit pending type test report/s from NABL accredited laboratory, in the event of an order, before commencement of supply without affecting delivery schedule, free of cost to GETCO. Confirmation for above shall be invariably submitted along with technical bid.*

a) Tensile test :
b) Resistance test :
c) Temperature rise test. :
d) Short time current test :
e) Dimensional check :
f) Galvanizing test :
g) Corona test : Only for 400 Kv class
h) Radio interference test. : Only for 400 Kv class

9.1.2 Acceptance Test:

a) Visual inspection
b) Dimensional check
c) Tensile test :
d) Resistance test :
e) Dimensional check :
f) Galvanizing test :

9.1.3 Routine Test:

a) Visual inspection :
b) Dimensional check :

10.0 EXPERIENCE:

The Bidders have to clearly state their experience, resources, engineering organization to undertake this work of supply of clamps/connectors. The Bidder shall have minimum experience of 3 years in the manufacture of similar item for 220KV and above.

11.0 DRAWINGS:

Successful bidder shall submit all the required drawings and get approval within stipulated commencement period. Inspection call can be raised only after drawing approval.

12.0 INTERCHANGEABILITY:

All fittings shall be of standard design and made to guage or jig and shall be interchangeable in all respects with similar items.

13.0 INSPECTION & TESTING:

13.1 The GETCO reserves the right to inspect the material at the time of manufacture at various stages. All acceptance tests shall be performed in the presence of the GETCO's inspecting authority and the manufacturer/supplier shall have to give intimation of place, date and time of each test to the inspecting authority sufficiently in advance to enable the later to be present at the test. *Material shall not be dispatched without dispatch clearance from GETCO.*

13.2 Inspection by the GETCO's Representative shall not relieve the Bidder of this obligation of furnishing material in accordance with the relevant specifications.

14.0 (a) *The Technical Bid shall comprise all the information as per GTP attached.*

(b) True copies of all the Type Test Certificates of Govt. recognized */NABL* Laboratory in respect of the offered items only shall be furnished.

(c) Descriptive literature, dimensional drawings catalogues, etc. shall be submitted for the offered items.

(d) Bids which do not give complete details, or which are vague and Technically not in line with the GETCO's requirements shall be liable for rejection.

15.0 **QUALITY ASSURANCE PLAN**

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

i) Statement giving list of important raw materials, proposed to be used in the manufacture of the accessories against this specification, names of sub suppliers for the raw materials, list of standards according to which the raw materials are tested,
ii) List of tests normally carried out on raw materials in presence of supplier's representative as routine and/or acceptance during production and on finished goods, copies of test certificates.
iii) Information and copies of test certificates as in (i) above in respect of bought out accessories.
iv) List of manufacturing facilities available.
v) Level of automation achieved and list of areas where manual processing exists.
vi) List of areas in manufacturing process, where stage inspections are normally carried out for quality control and details of such tests and inspections.
vii) List of testing equipment available with the supplier for final testing of conductor specified. In the case if the supplier does not possess all the routine and acceptance testing facilities the tender will be rejected.
viii) Special features provided to make it maintenance free.
ix) 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 supplier will be out rightly rejected and they may be black listed.

GUARANTEED TECHNICAL PARTICUALRS FOR CLAMPS & CONNECTORS

(Completely filled in & submitted in the Technical Bid)

1	Manufacturer's Name *Address of works from where the material is offered.*	
2	Applicable Standard	
3	Application	
4	Type of connector	
5	For connection to:	
	1) Conductor size and arrangement.	
	2) Equipment terminal size.	
6	Material (State percentage composition of constituents and impurities present)	
	1) Clamp body	
	2) Bolt and Nuts	
	3) Spring washers	
	4) Liners if any	
7	Rated current (Ampere)	
8	Maximum temperature rise over ambient temperature when carrying rated current. (ºC)	
9	Rated terminal load	
10	Factor of safety	
11	Minimum thickness of any part, in mm	
12	Weight of clamp complete with hardware.	
13	Machining accuracy for matching surface.	
14	Service Indoor/Outdoor.	
15	Manufacturers Drg. No.	

Signature of the Bidder: _____
Name: _____
Designation: _____
Date: _____
Authorised common rubber
Stamp / seal of the bidder: _____