PROJECT:	**PGCIL Neemuch, Chittorgarh and Mandsaur (Extension)**
ITEM:	**Supply & Supervision of ETC of CIRCUIT BREAKERS**
SUBJECT:	**BID SPECIFIC ATC**

1.	For any **Technical Clarification**, please contact Mr. Satyaki Chaudhary, Manager (TBEM). Contact No. 0120-06748592; e-mail: satyaki@bhel.in
2.	For any **commercial clarification**, please contact Mr. Sandeep, Dy. Manager (TBMM). Contact No. 0120-6748540; e-mail: kumar.sandeep@bhel.in
3.	**Terms of Payment:**

(Supply & Services)

As per GTC of GeM (Payment due date shall be within 90 Days as per GEM)

Supply Payment:

a) 95% of payment within 90 days from the date of receipt of complete invoice along with documents in 3 sets (original + 2 copies) as follows:
- LR / GR duly endorsed by BHEL Site Official.
- Material Receipt Certificate issued by BHEL Site Official.
- GST Compliant Tax Invoice
- Packing List (Case-wise)
- Copy of Transit Insurance Certificate from underwriters.
- Material Inspection Clearance Certificate (MICC) issued by BHEL Quality Management
- Guarantee Certificate
- Copy of Performance Bank Guarantee (PBG)
- Certificate of acceptance of Type Test Reports issued by BHEL Engineering Management wherever specifically mentioned in the Purchase Order

b) 5% of payment within 90 days from the date of receipt of complete invoice along with documents in 3 sets (original + 2 copies) as follows:
- Certificate of successful completion of Supervision of Erection, Testing & Commissioning at Site if it is in the scope of the supplier or Certificate of successful completion of Testing & Commissioning at Site if it is in the scope of the supplier.
- Certificate of completion of final documentation as per Purchase Order / Technical Specification issued by BHEL Engineering Management

Note: In-case commissioning is delayed beyond reason not attributable to supplier. Supplier may claim the balance 05% of supply portion after 18 months from the date of last delivery or 12 months from 22.12.2023 whichever is later upon submission of BG with equivalent amount and the certificate endorsed by BHEL Site In-Charge citing the details that the "delay in commissioning is not attributable to supplier".

Vendor has to submit the duly signed check-list along with Bill.

Payment terms for supervision of ETC: 100% payment within 90 days along with applicable GST from the date of receipt of complete GST compliant Tax invoice along with certificate of successful completion of Testing & Commissioning at Site issued by BHEL Site Official / Construction Management in 3 sets (Original + 2 copies).

However, Payments due shall be as below depending on the nature of enterprises

Type of Bidder	**Payment Terms (Number of Days)**
Micro & Small Enterprises (MSEs)	**45 Days**
Medium Enterprises	**60 Days**
Non - MSME	**90 Days**

Note: Service charges like Supervision should not exceed 2% of the total contract value.

PROJECT:	**PGCIL Neemuch, Chittorgarh and Mandsaur (Extension)**
ITEM:	**Supply & Supervision of ETC of CIRCUIT BREAKERS**
SUBJECT:	**BID SPECIFIC ATC**

4.	**Terms of Delivery:**
As per GeM. However, unloading at site is in the scope of BHEL. Bidders to quote price accordingly. LR / GR date or invoice date (whichever is later) shall be considered as delivery date.	
5.	**Delivery Time:**
26 Weeks (182 days) from the date of PO by BHEL as per Activity schedule (Annexure-A). Early Delivery is acceptable. Deputation of service engineer for supervision of ETC of CB shall be 02 months after completion of delivery. **Note:** In case, BHEL's delivery requirement is not met by vendor(s), then a chance may be given to all such vendors to review their quoted delivery schedule in line with BHEL's delivery requirement. However, if vendor fails to meet the requisite delivery plan, then BHEL reserves the right not to consider the offer of such vendor(s).	
6.	**Deputation of Supervision of ETC for CB**
	Vendor has to depute the service engineer at respective sites within 07 days upon confirmation of readiness of front from BHEL/Site
7.	**Prices:**
The quoted prices shall be on **Firm basis including packing and forwarding charges**. Price to be quoted as inclusive of GST. i.e. Ex-Works + F&I + GST.	
8.	**Liquidated Damage of delayed Delivery:**
As per GeM terms and conditions. LD calculation shall be done site wise if required.	
9.	**Item & BOQ:**
BOQ: As per Clause No. 1.2 of Section-1 of Technical specification.	
10.	**Technical Specification:**
Technical specification no**. TB-418-316-001 Rev-00.** No permissible Technical Deviation has been envisaged. Bidders to quote as per Technical Specification.	
11.	**Pre-Qualification Requirement:**
As specified in Technical Specifications	
12.	**MQP (Manufacturing Quality Plan):**
MQP format is indicative only, however inspection shall be carried out as per approved Quality Plan. Supplier has to submit Quality Plan to BHEL for Customer approval.	
13.	**Inspection:**
Inspection shall be carried out as per customer as per approved Quality Plan.	
14.	**Destination / Delivery Location**:

a. **400/220kV AIS Neemuch New S/S, Madhya Pradesh**
POWERGRID NEEMUCH TRANSMISSION SYSTEM LIMITED
400/220 Substation , Village- Badi, Tehsil-Singoli, District-Neemuch
(Madhya Pradesh), Pin code 458228

b. **Extension of 400kV Chittorgarh S/S, Rajasthan**
POWERGRID NEEMUCH TRANSMISSION SYSTEM LIMITED
765/400kV Chittorgarh Substation,
NH-76, Near Narayanpura Toll Plaza,
Chittorgarh - Udaipur Road, Village — Chhapri, Tehsil - Dungla
Chittorgarh, Rajasthan - 312024.
GSTIN: 08AAICN1852A1ZR

c. **Extension of 400kV Mandsaur S/S , Madhya Pradesh**
POWERGRID NEEMUCH TRANSMISSION SYSTEM LIMITED
400/220 kV MPPTCL substation, Village - Laduna, Tehsil- Sitamau,
District — Mandsaur, Pincode - 458990

PROJECT:	**PGCIL Neemuch, Chittorgarh and Mandsaur (Extension)**
ITEM:	**Supply & Supervision of ETC of CIRCUIT BREAKERS**
SUBJECT:	**BID SPECIFIC ATC**

15.	**Bill to Address:**
Bharat Heavy Electricals Limited-TBG, 10th Floor, Plot No.C-20/1A/1, Joy Tower, Sector-62, Noida-201301, U.P. **GSTN-**09AAACB4146P2ZC	

16.	**Guarantee Clause (Defect Liability Period):**
The equipment / material supplied and services rendered (if applicable) shall be guaranteed to be free from all defects and faults in design & engineering, material, workmanship & manufacture and in full conformity with the Purchase Order / Contract, Technical Specifications & approved drawings / data sheets, if any, "Sixty (60) months from the date of taking over/Completion of the Facilities (i.e. 22.12.2023) or Eighteen (18) months from the date of last delivery (or any part thereof), whichever is later". The defective equipment / material / component shall be replaced free of cost at site. Freight & Insurance during transit shall also be in the scope of the supplier / contractor. Any expenditure for dismantling and re-erection of the replaced equipment / material / component shall be to supplier's / contractor's account. All replacements during the guarantee period shall be delivered at site promptly and satisfactorily within a period not more than 45 days from the date of reporting the defect / rejection etc. In the event of the supplier / contractor failing to replace the defective equipment / material / component within the time period mentioned above, BHEL may proceed to undertake the replacement of such defective equipment / material / component at the risk and cost of the supplier / contractor without prejudice to any other rights under the contract and recover the same from PBG / other dues of this Purchase Order / Contract or any other Purchase Order / Contract executed by the supplier / contractor.	
17.	**Performance Bank Guarantee:**
Performance BG to be kept valid till the completion of guarantee period i.e. **Sixty (60) months from the date of taking over/completion of facilities (1.e. 22.12.2023) or Eighteen (18) months from the date of last delivery (or any part thereof), whichever is later with 03 months claim period extra over and above**.	
18.	Bidders to ensure that Third party / customer issued certificates being submitted as proof of PQR qualification should have verifiable details of document / certificate issuing authority such as name & designation of Issuing Authority and its organization contact number and e-mail Id etc. In case the same found not available, Purchaser has right to reject such document from evaluation.
19.	**Acceptance of Offer:**
Bidder's offer will be considered for evaluation based on PQR, Technical and other commercial documents submitted along with bid. Bidder's offer will be acceptable subject to final acceptance of vendor by ultimate customer as approved supplier. The bidders which are not PGCIL approved supplier or not including in POWERGRID compendium, bidder shall submit necessary credentials/documents as per Annexure-XIII for onward submission to customer for approval.	
20.	**Deviations:**
a) Technical Deviation: No Technical Deviation is envisaged. b) Commercial Deviation: No Commercial Deviation is envisaged.	
21.	All other terms & conditions shall be as per GTC of GeM

Signature & Seal of supplier

Date

PROJECT:	**PGCIL Neemuch, Chittorgarh and Mandsaur (Extension)**
ITEM:	**Supply & Supervision of ETC of CIRCUIT BREAKERS**
SUBJECT:	**BID SPECIFIC ATC**

Activity Schedule for PGCIL Neenuch, Chittorgarh and Mandsaur Ext sites for main and spares quantities: (Delay analysis for cases of delivery extension if required, shall be governed as per below schedule)-

SL.	ACTIVITY	ACTIVITY TIME IN WEEKS
1.	Input by BHEL from PO (In scope of BHEL)	01
2.	*Submission of documents necessary for getting manufacturing clearance like Drawings, data sheet etc**.** from input by BHEL (In scope of vendor)	02
3.	Review and Approval of documents and issue of manufacturing clearance (In scope of BHEL)	01
4.	Manufacturing Time and Inspection call (In scope of vendor)	19
5.	Inspection (In scope of BHEL)	01
6.	Issue of MICC (In scope of BHEL)	01
7.	Dispatch (In scope of vendor)	01

Note –

1 Supplier must ensure the completeness and correctness of the requisite documents before submission for approval. Delay in approval on account of incomplete / inadequate information shall be the responsibility of supplier.

2 *Supplier to ensure every revised drawing/ document submission incorporating comments within 1 weeks from the date of comments by BHEL, else vendor delay shall be deducted from manufacturing time.

3 Inspection call to be raised with 1 week in advance notice. Inspection call should be given in the prescribed format only. Inspection calls not in the prescribed format shall not be entertained.

Signature & Seal of Supplier
Date

Annexure-V

Item/Package Name :	**Supply & Supervision of ETC for Isolators**
Enquiry No.:	
Project:	**TSGENCO Kodyar**
Type of project	**Hydro**
Percentage of Local Content	***(Bidder to enter the applicable % of local content on Rs. 100 Non-Judicial Stamp Paper)***

Format of Self certification regarding Local Content in line with PPP-MII order, 2017 & its revision dated 04.06.2020.

Date:……

I _____S/o, D/o, W/o, _____Resident of _____ hereby solemnly affirm and declare as under:

That I will agree to abide by the terms and conditions of the Public Procurement (Preference to Make in India) Order, 2017 (*hereinafter PPP-MII order*) of Government of India issued vide Notification No: P-45021/2/2017-BE-II dated 15/06/2017, its revision dated 04/06/2020 and any subsequent modifications/Amendments**,** if any**.**

That the information furnished hereinafter is correct to the best of my knowledge and belief and I undertake to produce relevant records before the procuring entity/BHEL or any other Government authority for the purpose of assessing the local content of goods/services/works supplied by me for …… *(Enter the name of the Equipment/Item for Project)*.

That the local content for all inputs which constitute the said goods/services/works has been verified by me and I am responsible for the correctness of the claims made therein.

That the goods/services/works supplied by me for …… (Enter the name of the Equipment/Item for Project) contains…….% (mention the Local content in %age) Local Content.

That the value addition for the purpose of meeting the 'Minimum Local Content 'has been made by me at …… (*Enter the details of the location(s) at which value addition is made)*.

That in the event of the local content of the goods/services/works mentioned herein is found to be incorrect and not meeting the prescribed supplier class categorization criteria as per said order, based on the assessment of procuring agency (ies)/BHEL/Government Authorities for the purpose of assessing the local content, action shall be taken against me in line with the PPP-MII order and provisions of the Integrity pact/ Bidding Documents.

I agree to maintain the following information in the Company's record for a period of 8 years and shall make this available for verification to any statutory authority.

i. Name and details of the Local Supplier
(Registered Office, Manufacturing unit location, nature of legal entity)
ii. Date on which this certificate is issued

iii. Goods/services/works for which the certificate is produced

iv. Procuring entity to whom the certificate is furnished

v. Percentage of local content claimed and whether it meets the Minimum Local Content prescribed

vi. Name and contact details of the unit of the Local Supplier (s)

vii. Sale Price of the product

viii. Ex-Factory Price of the product

ix. Freight, insurance and handling

x. Total Bill of Material

xi List and total cost value of input used to manufacture the Goods/to provide services/in construction of works

xii. List and total cost of input which are domestically sourced. Value addition certificates from suppliers, if the input is not in-house to be attached

xiii. List and cost of inputs which are imported, directly or indirectly

For and on behalf of…… (Name of firm/entity)

Authorized signatory (To be duly authorized by the Board of Directors)
<Insert Name, Designation and Contact No.>

PROJECT:	**PGCIL Neemuch, Chittorgarh and Mandsaur (Extension)**
ITEM:	**Supply & Supervision of ETC of CIRCUIT BREAKERS**
SUBJECT:	**BID SPECIFIC ATC**

SCHEDULE OF COMMERCIAL DEVIATION

The following are the deviations/ variations exception from the General Terms and Conditions:

SL. NO.	CLAUSE NO. OF TERMS AND CONDITIONS	STATEMENT OF DEVIATION
	NIL DEVIATION	NIL DEVIATION

In case, this schedule is not submitted, it will be presumed that the equipment /material to be supplied under this contract is deemed to be in compliance with the General Terms and Conditions.

If there is NIL deviation, even then the format to be filled as NIL DEVIATION.

Note : 1. Continuation Sheets of like size and format may be used as per the Bidder's Requirement and shall be annexed to this schedule.

2. Deviation mentioned in this schedule shall only be considered.

This Format is to be submitted in original duly signed by bidder. Reproduction of the same in any sort is not acceptable.

Signature of the authorized representative of

Place: ……

Bidder's name

Date : …… :……

Designation:……..

Company Seal:……

PROJECT:	**PGCIL Neemuch, Chittorgarh and Mandsaur (Extension)**
ITEM:	**Supply & Supervision of ETC of CIRCUIT BREAKERS**
SUBJECT:	**BID SPECIFIC ATC**

SCHEDULE OF TECHNICAL DEVIATION

The following are the deviations/ variations exception from the Technical Specifications:

SL. NO.	CLAUSE NO. OF TERMS AND CONDITIONS	STATEMENT OF DEVIATION
	NIL DEVIATION	NIL DEVIATION

In case, this schedule is not submitted, it will be presumed that the equipment /material to be supplied under this contract is deemed to be in compliance with the Technical Specifications,

If there is NIL deviation, even then the format to be filled as NIL DEVIATION.

Note : 1. Continuation Sheets of like size and format may be used as per the Bidder's Requirement and shall be annexed to this schedule.

2. Deviation mentioned in this schedule shall only be considered.

This Format is to be submitted in original duly signed by bidder. Reproduction of the same in any sort is not acceptable.

Signature of the authorized representative of

Place: ……

Date : ……

Bidder's name :……

Designation:……..

PROJECT:	**PGCIL Neemuch, Chittorgarh and Mandsaur (Extension)**
ITEM:	**Supply & Supervision of ETC of CIRCUIT BREAKERS**
SUBJECT:	**BID SPECIFIC ATC**

UNPRICED BID **Annexure-I**

Item No.	Item Description (PGCIL - Neemuch)	Item Quantity	Unit of Measure	Unit Price (Inclusive of F&I & GST, Wherever applicable)	GST % Applicable
1	SUPPLY- CIRCUIT BREAKER : 420KV, 63KA FOR 1S, 25MM/KV CREEPAGE, 3150A 3PHASE CIRCUIT BREAKER WITHOUT PIR ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXESAND ALL ACCESSORIES COMPLETE IN ALL RESPECT	11	No.	Mention as "Quoted"	Mention GST %
2	SUPPLY- CIRCUIT BREAKER : 420KV, CONTROLLED SWITCHING DEVICE FOR 3-PH CIRCUIT BREAKER	02	No.	Mention as "Quoted"	Mention GST %
3	SUPPLY- CIRCUIT BREAKER : 245KV, 50KA FOR 1S, 25MM/KV CREEPAGE, 3150A 3PHASE CIRCUIT BREAKER WITHOUT PIR ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXESAND ALL ACCESSORIES COMPLETE IN ALL RESPECT	01	No.	Mention as "Quoted"	Mention GST %
4	SUPPLY- CIRCUIT BREAKER : 245KV, 50KA FOR 1S, 25MM/KV CREEPAGE, 1600A 3PHASE CIRCUIT BREAKER WITHOUT PIR ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXESAND ALL ACCESSORIES COMPLETE IN ALL RESPECT	05	No.	Mention as "Quoted"	Mention GST %
5	SUPPLY- CIRCUIT BREAKER : 72.5KV, 25KA FOR 1S, 25MM/KV CREEPAGE, 1250A 3PHASE CIRCUIT BREAKER WITHOUT PIR ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXESAND ALL ACCESSORIES COMPLETE IN ALL RESPECT	01	No.	Mention as "Quoted"	Mention GST %
6	SUPPLY- CIRCUIT BREAKER : 420KV, FOUNDATION BOLTS FOR CIRCUIT BREAKER, PLATFORM AND LADDER (IF APPLICABLE) AND MARSHALLING BOX (IF APPLICABLE)	01	LOT	Mention as "Quoted"	Mention GST %
7	SUPPLY- CIRCUIT BREAKER : 245KV, FOUNDATION BOLTS FOR CIRCUIT BREAKER, PLATFORM AND LADDER (IF APPLICABLE) AND MARSHALLING BOX (IF APPLICABLE)	01	LOT	Mention as “Quoted”	Mention GST %

8	SUPPLY- CIRCUIT BREAKER : 72.5KV, FOUNDATION BOLTS FOR CIRCUIT BREAKER, PLATFORM AND LADDER	01	LOT	Mention as "Quoted"	Mention GST %
9	SUPPLY- CIRCUIT BREAKER : TRANSDUCERS / FIXTURES REQUIRED FOR TRAVEL MEASUREMENT OF COMPLETE 3-PHASE CB	01	LOT	Mention as "Quoted"	Mention GST %
10	SUPPLY- CIRCUIT BREAKER : SF6 GAS FILLING ADOPTER, INCLUDING COUPLING, REGULATOR, CONNECTING HOSE PIPE UP TO GROUND LEVEL	01	LOT	Mention as "Quoted"	Mention GST %
11	SUPPLY- CIRCUIT BREAKER: SPECIAL CABLES FOR CB / CSD / RP INTERFACING. MODE OF MEASUREMENT SHALL BE CABLE-TRENCH RUNNING LENGTH FROM CIRCUIT BREAKER TO CSD/ RELAY PANEL	300	MTR	Mention as "Quoted"	Mention GST %
12	SERVICES- CIRCUIT BREAKER : SUPERVISION OF ERECTION, TESTING & COMMISSIONING OF SUPPLIED 420KV, 3-PHASE CIRCUIT BREAKERS AT SITE.TESTING & COMMISSIONING INSTRUMENTS (TIME INTERVAL METER (TIMING KIT), SF6 GAS LEAKAGE DETECTOR & ANY OTHER SPECIAL TOOLS LIKE GAS FILLING ADAPTER ETC) SHALL BE BROUGHT BY SUPPLIER AND SHALL BE TAKEN BACK AFTER SUCCESSFUL COMPLETION OF TESTING AND COMMISSIONING.	11	No	Mention as "Quoted"	Mention GST %
13	SERVICES- CIRCUIT BREAKER : 400KV, SUPERVISION OF ERECTION TESTING AND COMMISSIONING OF CONTROLLED SWITCHING DEVICE	02	No	Mention as "Quoted"	Mention GST %
14	SERVICES- CIRCUIT BREAKER : SUPERVISION OF ERECTION, TESTING & COMMISSIONING OF SUPPLIED 245KV, 3-PHASE CIRCUIT BREAKERS AT SITE.TESTING & COMMISSIONING INSTRUMENTS (TIME INTERVAL METER (TIMING KIT), SF6 GAS LEAKAGE DETECTOR & ANY OTHER SPECIAL TOOLS LIKE GAS FILLING ADAPTER ETC) SHALL BE BROUGHT BY SUPPLIER AND SHALL BE TAKEN BACK AFTER SUCCESSFUL COMPLETION OF TESTING AND COMMISSIONING.	06	No	Mention as "Quoted"	Mention GST %

15	SERVICES- CIRCUIT BREAKER : 72.5KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF CIRCUIT BREAKER	01	No	Mention as "Quoted"	Mention GST %
16	SPARES- CIRCUIT BREAKER : 420KV, 63KA FOR 1S, 25MM/KV CREEPAGE, ONE COMPLETE POLE OF 3150A CB WITHOUT PIR, WITH POLE COLUMN INTERRUPTER, DRIVING MECHANISM AND MARSHALING BOX EXCLUDING SUPPORT STRUCTURE	01	No	Mention as "Quoted"	Mention GST %
17	SPARES- CIRCUIT BREAKER : 400KV, GRADING CAPACITORS	02	No	Mention as "Quoted"	Mention GST %
18	SPARES- CIRCUIT BREAKER : 400KV, O" RINGS, GASKETS & SEALS FOR OPERATING MECHANISM	01	SET	Mention as "Quoted"	Mention GST %
19	SPARES- CIRCUIT BREAKER : 400KV, TRIP COILS WITH RESISTOR	02	SET	Mention as "Quoted"	Mention GST %
20	SPARES- CIRCUIT BREAKER : 400KV, CLOSING COILS WITH RESISTOR	02	SET	Mention as "Quoted"	Mention GST %
21	SPARES- CIRCUIT BREAKER : 400KV, TERMINAL PAD	02	SET	Mention as "Quoted"	Mention GST %
22	SPARES- CIRCUIT BREAKER : 400KV, MOLECULAR FILTER	02	No	Mention as "Quoted"	Mention GST %
23	SPARES- CIRCUIT BREAKER : 400KV, CORONA RINGS	01	No	Mention as "Quoted"	Mention GST %

24	SPARES- CIRCUIT BREAKER : 400KV, RELAY POWER CONTACTORS, SWITCH FUSE UNITS, LIMIT SWITCHES, PUSH BUTTON, TIMERS & MCB ETC	01	SET	Mention as "Quoted"	Mention GST %
25	SPARES- CIRCUIT BREAKER : 400KV, PRESSURE SWITCH OF EACH TYPE/DENSITY MONITOR	**01**	SET	Mention as "Quoted"	Mention GST %
26	SPARES- CIRCUIT BREAKER : 400KV, AUXILIARY SWITCH ASSEMBLY	**01**	SET	Mention as "Quoted"	Mention GST %
27	SPARES- CIRCUIT BREAKER : 400KV, OPERATION COUNTER	**01**	No	Mention as "Quoted"	Mention GST %
28	SPARES- CIRCUIT BREAKER : 400KV, COMPLETE DRIVE MECHANISM	**01**	SET	Mention as "Quoted"	Mention GST %
29	SPARES- CIRCUIT BREAKER : 400KV, SF6 GAS (EQUIVALENT TO 2 POLES)	**01**	LOT	Mention as "Quoted"	Mention GST %
30	SPARES- CIRCUIT BREAKER : 220KV, 50KA FOR 1S, 25MM/KV CREEPAGE, ONE COMPLETE POLE OF 3150A CB WITHOUT PIR, WITH POLE COLUMN INTERRUPTER, DRIVING MECHANISM AND MARSHALING BOX EXCLUDING SUPPORT STRUCTURE	**01**	No	Mention as "Quoted"	Mention GST %
31	SPARES- CIRCUIT BREAKER : 220KV, GRADING CAPACITORS	**02**	No	Mention as "Quoted"	Mention GST %
32	SPARES- CIRCUIT BREAKER : 220KV, O" RINGS, GASKETS & SEALS FOR OPERATING MECHANISM	**01**	SET	Mention as "Quoted"	Mention GST %

33	SPARES- CIRCUIT BREAKER : 220KV, TRIP COILS WITH RESISTOR	**02**	**SET**	Mention as "Quoted"	Mention GST %
34	SPARES- CIRCUIT BREAKER : 220KV, CLOSING COILS WITH RESISTOR	**02**	**SET**	Mention as "Quoted"	Mention GST %
35	SPARES- CIRCUIT BREAKER : 220KV, TERMINAL PAD	**02**	**SET**	Mention as "Quoted"	Mention GST %
36	SPARES- CIRCUIT BREAKER : 220KV, MOLECULAR FILTER	02	No	Mention as "Quoted"	Mention GST %
37	SPARES- CIRCUIT BREAKER : 220KV, CORONA RINGS	01	No	Mention as "Quoted"	Mention GST %
38	SPARES- CIRCUIT BREAKER : 220KV, RELAY POWER CONTACTORS, SWITCH FUSE UNITS, LIMIT SWITCHES, PUSH BUTTON, TIMERS & MCB ETC	01	SET	Mention as "Quoted"	Mention GST %
39	SPARES- CIRCUIT BREAKER : 220KV, PRESSURE SWITCH OF EACH TYPE/DENSITY MONITOR	01	SET	Mention as "Quoted"	Mention GST %
40	SPARES- CIRCUIT BREAKER : 220KV, AUXILIARY SWITCH ASSEMBLY	01	SET	Mention as "Quoted"	Mention GST %
41	SPARES- CIRCUIT BREAKER : 220KV, OPERATION COUNTER	01	No	Mention as "Quoted"	Mention GST %

42	SPARES- CIRCUIT BREAKER : 220KV, COMPLETE DRIVE MECHANISM	01	SET	Mention as "Quoted"	Mention GST %
43	SPARES- CIRCUIT BREAKER : 220KV, SF6 GAS (EQUIVALENT TO 2 POLES)	**01**	LOT	Mention as "Quoted"	Mention GST %
Item No.	**Item Description (PGCIL- Chittorgarh)**	**Item Quantity**	**Unit of Measure**	**Unit Price (Inclusive of F&I & GST, Wherever applicable)**	**GST % Applicable**
44	SUPPLY- CIRCUIT BREAKER : 420KV, 63KA FOR 1S, 25MM/KV CREEPAGE, 3150A 3PHASE CIRCUIT BREAKER WITHOUT PIR ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXESAND ALL ACCESSORIES COMPLETE IN ALL RESPECT	03	No	Mention as "Quoted"	Mention GST %
45	SUPPLY- CIRCUIT BREAKER : 420KV, FOUNDATION BOLTS FOR CIRCUIT BREAKER, PLATFORM AND LADDER (IF APPLICABLE) AND MARSHALLING BOX (IF APPLICABLE)	**01**	LOT	Mention as "Quoted"	Mention GST %
46	SUPPLY- CIRCUIT BREAKER : TRANSDUCERS / FIXTURES REQUIRED FOR TRAVEL MEASUREMENT OF COMPLETE 3-PHASE CB	**01**	LOT	Mention as "Quoted"	Mention GST %
47	SUPPLY- CIRCUIT BREAKER : SF6 GAS FILLING ADOPTER, INCLUDING COUPLING, REGULATOR, CONNECTING HOSE PIPE UP TO GROUND LEVEL	**01**	LOT	Mention as "Quoted"	Mention GST %
48	SERVICES- CIRCUIT BREAKER : SUPERVISION OF ERECTION, TESTING & COMMISSIONING OF SUPPLIED 420KV, 3-PHASE CIRCUIT BREAKERS AT SITE.TESTING & COMMISSIONING INSTRUMENTS (TIME INTERVAL METER (TIMING KIT), SF6 GAS LEAKAGE DETECTOR & ANY OTHER SPECIAL TOOLS LIKE GAS FILLING ADAPTER ETC) SHALL BE BROUGHT BY SUPPLIER AND SHALL BE TAKEN BACK AFTER SUCCESSFUL COMPLETION OF TESTING AND COMMISSIONING.	03	No	Mention as "Quoted"	Mention GST %

49	SPARES- CIRCUIT BREAKER : 420KV, 63KA FOR 1S, 25MM/KV CREEPAGE, ONE COMPLETE POLE OF 3150A CB WITHOUT PIR, WITH POLE COLUMN INTERRUPTER, DRIVING MECHANISM AND MARSHALING BOX EXCLUDING SUPPORT STRUCTURE	01	No	Mention as "Quoted"	Mention GST %
50	SPARES- CIRCUIT BREAKER : 400KV, GRADING CAPACITORS	02	No	Mention as "Quoted"	Mention GST %
51	SPARES- CIRCUIT BREAKER : 400KV, O" RINGS, GASKETS & SEALS FOR OPERATING MECHANISM	01	SET	Mention as "Quoted"	Mention GST %
52	SPARES- CIRCUIT BREAKER : 400KV, TRIP COILS WITH RESISTOR	02	SET	Mention as "Quoted"	Mention GST %
53	SPARES- CIRCUIT BREAKER : 400KV, CLOSING COILS WITH RESISTOR	02	SET	Mention as "Quoted"	Mention GST %
54	SPARES- CIRCUIT BREAKER : 400KV, TERMINAL PAD	02	SET	Mention as "Quoted"	Mention GST %
55	SPARES- CIRCUIT BREAKER : 400KV, MOLECULAR FILTER	02	No	Mention as "Quoted"	Mention GST %
56	SPARES- CIRCUIT BREAKER : 400KV, CORONA RINGS	01	No	Mention as "Quoted"	Mention GST %
57	SPARES- CIRCUIT BREAKER : 400KV, RELAY POWER CONTACTORS, SWITCH FUSE UNITS, LIMIT SWITCHES, PUSH BUTTON, TIMERS & MCB ETC	01	SET	Mention as "Quoted"	Mention GST %

58	SPARES- CIRCUIT BREAKER : 400KV, PRESSURE SWITCH OF EACH TYPE/DENSITY MONITOR	01	SET	Mention as "Quoted"	Mention GST %
59	SPARES- CIRCUIT BREAKER : 400KV, AUXILIARY SWITCH ASSEMBLY	01	SET	Mention as "Quoted"	Mention GST %
60	SPARES- CIRCUIT BREAKER : 400KV, OPERATION COUNTER	01	No	Mention as "Quoted"	Mention GST %
61	SPARES- CIRCUIT BREAKER : 400KV, COMPLETE DRIVE MECHANISM	01	SET	Mention as "Quoted"	Mention GST %
62	SPARES- CIRCUIT BREAKER : 400KV, SF6 GAS (EQUIVALENT TO 2 POLES)	**01**	LOT	Mention as "Quoted"	Mention GST %
Item No.	**Item Description (PGCIL – Mandsaur Extension)**	**Item Quantity**	**Unit of Measure**	**Unit Price (Inclusive of F&I & GST, Wherever applicable)**	**GST % Applicable**
63	SUPPLY- CIRCUIT BREAKER : 420KV, 63KA FOR 1S, 25MM/KV CREEPAGE, 3150A 3PHASE CIRCUIT BREAKER WITHOUT PIR ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXESAND ALL ACCESSORIES COMPLETE IN ALL RESPECT	02	No	Mention as "Quoted"	Mention GST %
64	SUPPLY- CIRCUIT BREAKER : 420KV, FOUNDATION BOLTS FOR CIRCUIT BREAKER, PLATFORM AND LADDER (IF APPLICABLE) AND MARSHALLING BOX (IF APPLICABLE)	**01**	LOT	Mention as "Quoted"	Mention GST %
65	SUPPLY- CIRCUIT BREAKER : TRANSDUCERS / FIXTURES REQUIRED FOR TRAVEL MEASUREMENT OF COMPLETE 3-PHASE CB	**01**	LOT	Mention as "Quoted"	Mention GST %

PROJECT:	**PGCIL Neemuch, Chittorgarh and Mandsaur (Extension)**
ITEM:	**Supply & Supervision of ETC of CIRCUIT BREAKERS**
SUBJECT:	**BID SPECIFIC ATC**

66	SUPPLY- CIRCUIT BREAKER : SF6 GAS FILLING ADOPTER, INCLUDING COUPLING, REGULATOR, CONNECTING HOSE PIPE UP TO GROUND LEVEL	**01**	LOT	Mention as "Quoted"	Mention GST %
67	SERVICES- CIRCUIT BREAKER : SUPERVISION OF ERECTION, TESTING & COMMISSIONING OF SUPPLIED 420KV, 3-PHASE CIRCUIT BREAKERS AT SITE.TESTING & COMMISSIONING INSTRUMENTS (TIME INTERVAL METER (TIMING KIT), SF6 GAS LEAKAGE DETECTOR & ANY OTHER SPECIAL TOOLS LIKE GAS FILLING ADAPTER ETC) SHALL BE BROUGHT BY SUPPLIER AND SHALL BE TAKEN BACK AFTER SUCCESSFUL COMPLETION OF TESTING AND COMMISSIONING.	02	No	Mention as "Quoted"	Mention GST %
68	SPARES- CIRCUIT BREAKER : 420KV, 63KA FOR 1S, 25MM/KV CREEPAGE, ONE COMPLETE POLE OF 3150A CB WITHOUT PIR, WITH POLE COLUMN INTERRUPTER, DRIVING MECHANISM AND MARSHALING BOX EXCLUDING SUPPORT STRUCTURE	01	No	Mention as "Quoted"	Mention GST %
69	SPARES- CIRCUIT BREAKER : 400KV, GRADING CAPACITORS	02	No	Mention as "Quoted"	Mention GST %
70	SPARES- CIRCUIT BREAKER : 400KV, O" RINGS, GASKETS & SEALS FOR OPERATING MECHANISM	01	SET	Mention as "Quoted"	Mention GST %
71	SPARES- CIRCUIT BREAKER : 400KV, TRIP COILS WITH RESISTOR	02	SET	Mention as "Quoted"	Mention GST %
72	SPARES- CIRCUIT BREAKER : 400KV, CLOSING COILS WITH RESISTOR	02	SET	Mention as "Quoted"	Mention GST %
73	SPARES- CIRCUIT BREAKER : 400KV, TERMINAL PAD	02	SET	Mention as "Quoted"	Mention GST %

74	SPARES- CIRCUIT BREAKER : 400KV, MOLECULAR FILTER	02	No	Mention as "Quoted"	Mention GST %
75	SPARES- CIRCUIT BREAKER : 400KV, CORONA RINGS	01	No	Mention as "Quoted"	Mention GST %
76	SPARES- CIRCUIT BREAKER : 400KV, RELAY POWER CONTACTORS, SWITCH FUSE UNITS, LIMIT SWITCHES, PUSH BUTTON, TIMERS & MCB ETC	01	SET	Mention as "Quoted"	Mention GST %
77	SPARES- CIRCUIT BREAKER : 400KV, PRESSURE SWITCH OF EACH TYPE/DENSITY MONITOR	01	SET	Mention as "Quoted"	Mention GST %
78	SPARES- CIRCUIT BREAKER : 400KV, AUXILIARY SWITCH ASSEMBLY	01	SET	Mention as "Quoted"	Mention GST %
79	SPARES- CIRCUIT BREAKER : 400KV, OPERATION COUNTER	01	No	Mention as "Quoted"	Mention GST %
80	SPARES- CIRCUIT BREAKER : 400KV, COMPLETE DRIVE MECHANISM	01	SET	Mention as "Quoted"	Mention GST %
81	SPARES- CIRCUIT BREAKER : 400KV, SF6 GAS (EQUIVALENT TO 2 POLES)	**01**	LOT	Mention as "Quoted"	Mention GST %

Signature & Seal of Supplier
Date:

General terms and conditions on GeM 3.0 (Version 1.21)

1. Introduction

This document is an electronic record published by GeM under the provisions of the Information Technology Act, 2000 and the rules made there under (as applicable) and shall act as valid agreement between Seller / Service Provider and Buyer. Further the use of GeM Portal for Sale / Purchase of Goods / Services and the **resulting Contracts shall be governed by the following General Terms and Conditions (GTC) (unless otherwise superseded by Product / Service specific Special Terms and Conditions (STC), Product / Track / Domain Specific STC of Particular Service including its SLA (Service Level Agreement) and BID/Reverse Auction Specific Additional Terms and Conditions (ATC) as applicable).**

Government e-Marketplace (GeM) is the National Public Procurement Portal; an end-to-end online Marketplace for Central and State Government Ministries / Departments, Central & State Public Sector Undertakings (CPSUs & SPSUs), Autonomous institutions and Local bodies, for procurement of common use goods & services. The portal is owned and managed by GeM SPV which is a Section 8 (Non- Profit) Company registered under the Companies Act, 2013. GeM SPV operates, monitors and supervises all the business transactions on the portal through the Managed Service Provider as per defined roles and responsibilities.

2. General Terms and Definitions:

a. **"APPLICABLE LAWS"** shall mean any statute, law, ordinance, notification, rule, regulation, judgment, order, decree, bye-law, approval, directive, guideline, policy or other governmental restriction as may be in effect.

b. **"GOODS"** shall mean an Article / product or an intangible product like software, technology transfer, licenses, patents or other intellectual properties being offered for sale on the GeM portal by Seller(s) on GeM. The term 'Goods' shall also include works and services which are incidental or consequential to the supply of such goods, such as, transportation, insurance, installation, commissioning, training and guarantee / warrantee obligations as defined in the scope of supply given in the contract.

c. **"SERVICES"** shall mean the services offered or provided by the Seller such as IT Professional Services, Manpower Services, Security Services, Transport Services, etc. listed as Services on GeM. The term 'Service' shall also include supply of goods / articles which are incidental or consequential to the provisioning of such Services as defined in the scope of supply given in the contract.

d. **"SERVICE LEVEL AGREEMENT (SLA)"** shall mean the Contractual Commitment that prevails between the Buyer and the Service Provider with regard to type of service to be provided, deliverables, desired performance level, reliability and responsiveness, monitoring process and service level reporting, response and issue resolution time-frame, repercussions / penalties / remedies for service provider not meeting its commitment. The SLA of a particular contract may carry the matrix regarding the delivery of the goods and/or services and the corresponding penalties or remedies and liquidated damages as applicable.

e. **"CATEGORY SPECIFICATION"** shall mean the framework of technical features, functional capabilities, technical properties, certifications of the items etc. in a particular category. The Specifications shall identify the key parameters defining the products with all necessary validations related to configuration, type of data, restrictions, range / allowed values, allowed units etc. Sellers as well as Buyers while offering / buying the Goods / services shall have to comply with the validation rules / restrictions provided for in the Category Specification. Buyers / Sellers can not add parameters and / or drop down values not provided for in category Specification. If any Buyer / Seller desire to add new parameter, value, validation etc. against any category specification, they have to raise request for the same to GeM for incorporation in Category Specification.

f. **"BUYER"** is the Contract placing authority, which includes Central/State Government Ministries/Departments including its attached/subordinate offices, Central/State Public Sector Units (PSUs) and Autonomous Bodies acting through its authorized officer(s) for and on behalf of President of India/Governor of the State /PSU/Autonomous Bodies, as the case may be, for purchase of Goods/Services offered by Sellers on GeM.

g. **"SELLER / SERVICE PROVIDER"** on GeM shall mean any legal entity such as firm(s)of Proprietorship / Partnership Firm / Limited Liability Partnership / Private Limited / Limited company / Society registered under Society's Act / Statutory Bodies etc., registered on GeM to sell its Good(s) / Service(s) to the Buyers registered on GeM.

   The "Seller on GeM" will be either OEM (Original Equipment Manufacturer*) or Seller having authorization to sell products manufactured by the OEM in open market.

   * OEM is the owner of the Brand / Trademark of the product being offered or in case of un-registered brand's products / products with own brand, the actual manufacturer of the final product. To be recognized as an OEM on GeM, seller has to get Vendor Assessment Report from designated agency (unless exempted as per GeM VA policy) as per due process of vendor assessment notified on GeM portal

(which would include production of documentary evidences and demonstration of manufacturing facilities and / or capabilities as required).

In case of Services related to Goods, Service Provider on GeM will be either OEM or Service Provider having authorization to Service products manufactured by that OEM in open market. In respect of other Services, Service Provider on GeM will be any legal entity offering its services.

By registering on GeM portal , Seller / Service Provider hereby agrees to be bound by these General Terms and Conditions for Sale / Purchase of Goods and / or Services (GTC); Product / Service Specific Special Terms and Conditions (STC) and Service Level Agreements (SLAs) for various Services; and Additional (Bid Specific) Terms and Conditions (ATC) as applicable.

For the purpose of this document and transactions on GeM, Seller as well as Service Provider will be referred to as "Seller"

h. **"USER ID and PASSWORD"** All users including Buyers and Sellers (primary as well as secondary) will get User ID and Password created on GeM following due registration process defined on GeM. It is the responsibility of the user to keep their User ID and Password secure and confidential. Individual user shall be solely and completely responsible for all transactions taking place on GeM portal using his / her User Id and Password and GeM shall not be responsible in any manner.

i. **"LICENSE"** shall mean by registering the Seller and by offering Product / Service details on GeM, the Seller grants GeM a non-exclusive, royalty-free, irrevocable, perpetual and fully sub-licensable right to use, reproduce, modify, adapt, publish, translate, distribute, and/or display the content/materials which has been submitted to GeM excluding Aadhaar No. In case of registration of Primary user and creation of secondary user(s) by the Buyer/Seller, their Aadhaar (UID) details collected by GeM are solely for user verification and to apply e-signing on the documents. The e-sign is at par with digital signatures as per InformationTechnology Act Amendment 2008 and it works based on details available in Aadhaar database of UIDAI and there is no interference / intrusion in their personal details.

j. **"CONTRACT"** shall mean the purchase order created / issued by the Buyer on GeM for supply of Goods / Services in electronic form which includes scope of supply, delivery instructions and specifications etc. as ordered by Buyer against such Contract besides the subject GTC, STC/ATC as the case may be.

3. Role, Responsibilities and Obligations of Seller/ Buyer:

A. Role and Responsibilities of Sellers on GeM are as under:

i. Only Director (s) / Partner (s) / Proprietor (as applicable) are authorized to become Primary User and register any legal entity on GeM as Seller.

ii. Once Seller/Service Provider is registered and account is created on GeM, the Primary user of the Seller/Service Provider can create Secondary User Accounts within Seller/Service Provider Organization with different Roles and Responsibilities. However, the Primary User creating Secondary User accounts shall continue to be fully responsible and accountable for all actions / transactions done by Secondary Users on GeM Portal.

iii. Since GeM is a trust based Portal, the complete accuracy and integrity ofdata submitted in respect of the Seller and also in respect of the Goods / Services offered on GeM will be the sole responsibility of the Seller/Service Provider. Seller will be liable for administrative action as per GeM terms and conditions in case of any discrepancy / infirmity in any data / information submitted on GeM.

iv. The Primary / Secondary Users of Sellers, offering Goods/Services and/or participating in e-Bidding / Reverse Auction on GeM, must ensure that they have the requisite authorization to enter into contract with Buyer(s) in GeM for and on behalf of the Seller, failing which such Seller as well as the individual(s) shall be vicariously liable for its actions and also for any liability arising out of such actions.

v. Seller can offer any number of products. However, it will be the sole responsibility of the seller to satisfy themselves regarding possessing the requisites for doing business for the offered product(s). The Sellers are solely responsible for ensuring that there is no violation of any Intellectual Property Rights in their offer for sell / providing service on GeM.

vi. The Seller should not exercise any corrupt influence on any aspect of contract and commit to take all measures necessary to prevent corruption maintaining complete transparency, integrity and fairness in all activities related to GeM.

vii. The seller would represent its business on the GeM portal and is mandatedto comply with all the terms and conditions of the platform. Sellers would be solely and absolutely responsible for the information provided about their organization, business, products and services on the portal and would be required to produce proof of such information, if requested at any point in time by the Buyer and / or GeM.

viii. GeM would not allow creation of any fresh data related to Seller identity on GeM portal. All details provided by the Seller at the time of registration would be counter checked / verified through other data bases of Government such as PAN, MCA 21, Udyam Registration etc. For Financial details, PAN / Income tax Database shall be primary validating database and will override any conflicting data in any other database. If the data / details entered by the seller while registering on GeM is not verified with validating databases, registration will not be allowed. Further, in case of any conflict in details after registration, Seller's registration would be automatically suspended. It is the Seller's responsibility to keep all their information on GeM updated with the latest change(s). Non-updating of details on GeM within 7 days of such occurrence would make Seller liable for administrative actions.

ix. Eligibility of Sellers in terms of Turn Over / Past Performance / Profitability etc. and also their eligibility for availing various benefits / advantages in terms of various Govt. Policies / Guidelines / Acts / Laws etc. shall be determined solely on the basis of data fetched / validated or verified through external agency / owner of that set of database such as Income Tax / PAN Data Base, MCA 21, Udyam Registration, GSTN, Certifying Agencies such as BIS, BEE etc. In case of any discrepancy in data available in these databases, Seller has to get the same updated in the corresponding validating database before updating the same on GeM. Till such time only the existing validated information shall be used to decide seller's eligibility on GeM. Any default in sellers updating their data on partner sites / validating databases and any fall out of the same impacting adversely any transaction on GeM, shall entirely and exclusively be Seller's responsibility. GeM shall not be responsible for any consequential impact on any GeM transaction due to data discrepancy and / or suspension of seller account due to data discrepancy. Seller will be solely responsible for the same.

x. The Seller shall be solely responsible for the Goods / Services including, without limitation, the applicable guarantee / warranty, shelf-life, quantity, quality and the title and for giving the correct and accurate details of the offer their Goods and / or /Services indicating product specifications, quantity which can be supplied over the specified time period, etc. as per catalogue or catalogue based template prescribed in GeM. Seller would ensure that the Goods or /Services offered are latest, new and complete in all respects. Where Seller is selling any Goods which needs spare parts, Seller should ensure and make available such spare parts for a minimum period of three years from the date of expiry of warrantee period (unless otherwise specified). The individual Sellers shall ensure that the products offered in e-Bidding and/or ordered shall remain available on GeM during the bid / contract validity period.

xi. Sellers shall offer minimum discount of 10% on the Maximum Retail Price (MRP) mandatorily (unless otherwise specified for offering their products on GeM). Sellers are free to offer higher discounts. The Seller must offer its best possible lowest price on GeM and undertake that it would not sell or offer to sell the same product outside GeM in comparable quantity on similar terms and conditions at a price equal to or lower than Offer Price on GeM. In case any such infringement by Seller is noticed, the Seller shall be liable to be removed / debarred from the GeM.

xii. By offering their product on GeM, the Seller agrees for sharing price details of the offered Goods / Service by GeM authorities with other Government agencies including Department of Excise & Customs, Income tax, GST etc.

xiii. Listing of Goods / Services in irrelevant / inappropriate categories is strictly prohibited. If any such infringement made by Seller leads to placement of a contract by any Buyer for such inappropriately offered product(s)/service(s)by the Seller, such contract shall be treated as null and void. No claim whatsoever against such contract shall be admissible and entertained.

xiv. The Seller(s) shall pass on all the benefits associated with any scheme / offer / freebies provided by the OEM on any product from time to time onan "as-is basis" to the Buyer. This obligation will also apply to OEM's directly supplying the goods. Holding back any such offer or accounting such freebies in quantity supplied shall make such consignments liable to be rejected by the consignee and shall also be considered as inappropriate and against the GeM policies for which GeM reserves all rights to take necessary action against such Seller/OEM as deemed fit.

xv. By registering on GeM and by participating in any bid on GeM, Seller undertakes that presently it is not "Debarred from Bidding" on the grounds mentioned in Rule 151 of GFR 2017.

B. Role and Responsibilities of Buyer on GeM:

Buyer Registration on GeM is divided in two categories:

a. **Primary User:** In GeM , the Primary User is as under:

i. Any officer of Central / State Government / PSU / Autonomous Bodies / Local Bodies / Constitutional Bodies / Statuary Bodies at the level of Deputy Secretary of the Government of India or equivalent

ii. Head of the Office at Sub Centre / Unit / Branch, can Register his / her organization / unit on GeM portal as Primary User.

Primary User shall be responsible for registering the organization on GeM, for creating User accounts for Secondary Users, assigning them roles and responsibilities on GeM and for supervision of all transactions performed by Secondary Users under him / her.

Primary User shall also be vicariously responsible for ensuring compliance of

General Financial Rules and / or Rules Governing Public Procurement in respect of their organization, all GeM terms and conditions and other Procurement Policies / Guidelines notified by the government from time to time, by all the secondary users including timely payments and for dispute resolutions as per GeM terms and conditions.

Primary user cannot perform any Procurement related transactions on GeM portal.

b. **Secondary Users:** Secondary Users are officials responsible for procurement transactions on GeM including Placement of Contracts, Receipt of Stores, and Payments to the Sellers etc. The access rights permissible to registered Secondary users would be decided by the Primary User of the Department. Secondary Users may be given the roles of Buyer / Consignee / Drawing and Disbursement Office (DDO) / Paying Authority etc. For transaction on GeM portal, Buyer is the official who is responsible for processing procurement transaction up to Order Placement stage. Consignee is the Secondary User in Buyer Organization responsible for certifying receipt and acceptance of the goods procured.

   Buyer's responsibilities on GeM portal are as under:

   i. The Buyers are responsible to ensure that the procurement done by them are in compliance of General Financial Rules and / or Rules Governing Public Procurement in respect of their organization, all GeM terms and conditions and other procurement Policies / Guidelines notified by the government from time to time, including timely payments as per GeM terms and conditions.

   ii. The Buyers (in all capacities i.e. as Buyer, Consignee, DDO, Paying Authority etc) are responsible to ensure that the procurement done by them are in compliance with GeM Terms and Conditions / Guidelines and all contract related transactions are completed within time lines prescribed in GeM Contract.

   iii. The Buyers must ensure that they have the requisite authorization to enter into contract with Seller(s) on GeM for and on behalf of the organization, failing which such individual(s) shall be individually liable for its actions and also for any liability arising out of such actions.

   iv. While making procurement on GeM, the Buyers shall judiciously search and shortlist items using filters such as quantity, technical parameters, delivery period, warranty period, consignee location(s), Seller's eligibility etc. as per their approved requirements. Placement of contract for a product / service uploaded by the Seller in any wrong/inappropriate product category is strictly prohibited and such contracts shall be treated as null and void and such Buying shall adversely affect Buyer Rating on GeM.

   v. The Buyers shall satisfy themselves that the price of the selected offer is reasonable. Buyer is at liberty to utilize all the data / information and Business Analytics made available in GeM including e-bidding and reverse auction.

vi. The Buyers, before placing the order on GeM, should have the required mandatory approval with prior sanction and approval of the competent authorities and shall be in compliance with and as per procedures outlined in GFR and other procurement guidelines issued by the Government from time to time.

vii. On award of the Contract(s), it would be construed that the Buyer has obtained all necessary Administrative & Financial sanctions of the competent authority and adequate funds are available indicating the relevant Head of accounts in the awarded Contract(s).

viii. The Buyers should not exercise any corrupt influence on any aspect of contract and commit to take all measures necessary to prevent corruption maintaining complete transparency and fairness in all activities related to GeM.

ix. Buyers are not allowed to place any order at GeM prices outside GeM. The prices on GeM are only applicable if the procurement is made through GeM portal. Using GeM prices for procurement outside GeM portal is strictly prohibited. Further, Buyers are not allowed to place any off-line contract to the Seller directly based on the outcome of e-Bidding / RA conducted on GeM. All such contracts shall be treated as null and void and GeM reserves the right to delete all data related to such transactions from GeM database besides taking suitable actions against such Buyers including suspension from GeM and / or reduction of Buyer rating etc.

4. Enabling provisions of Rule 149 of General Financial Rules- 2017

Enabling provisions of Rule 149 of General Financial Rules- 2017 as amended vide Ministry of Finance OM dated 02.04.2019 regarding procurement through GeM and necessary guidelines and terms and conditions thereon:

GeM portal may be utilized by the Government buyers for on-line purchases as under:-

i. Up to Rs.25,000/- through any of the available suppliers on the GeM, meeting the requisite quality, specification and delivery period.

ii. Above Rs.25,000/- and up to Rs.5,00,000/- through the GeM Seller having lowest price amongst the available sellers (excluding Automobiles where limit of Rs.30,00,000/- will be applicable), of at least three different manufacturers, on GeM, meeting the requisite quality, specification and delivery period. The tools for online bidding and online reverse auction available on GeM can be used by the Buyer if decided by the competent authority.

iii. Above Rs.5,00,000/- through the supplier having lowest price meeting the requisite quality, specification and delivery period after mandatorily obtaining bids, using online bidding or reverse auction tool provided on GeM (excluding Automobiles where limit of Rs.30,00,000/- will be applicable).

iv. The Government Buyers may ascertain the reasonableness of prices before placement of order using the Business Analytics (BA) tools available on GeM including the Last Purchase Price on GeM, Department's own Last Purchase Price etc.

v. GFR rule 149 allows direct on-line purchases on GeM up to Rs. 25,000/- through any of the available suppliers on the GeM, meeting the requisite quality, specification and delivery period. However this is subject to procuring authorities certifying the reasonability of rates. While making such direct on-line purchase below Rs. 25,000/-, the buyer should have approval of competent authority and should also record reasons for selecting the specific product in case lowest priced products are not being accepted / ordered.

vi. Tools have been deployed on GeM portal to show the price of compared products on other e-commerce sites (wherever available) and also the rates at which orders have been placed on GeM for such items in recent past. While taking decision on reasonableness of price, the buyers may also take into account the discount over MRP; Last Purchase Price on GeM, Department's own Last Purchase Price; rates on other e-commercewebsites etc. The prices on e-commerce site give a broad idea and its terms and conditions may be different. If it is found that the price available on GeM marketplace is not reasonable or is substantially higher than e-commerce sites or LPP, the GeM Portal provides tools for online bidding or reverse auction which can be used by the Buyers to get better competitive rates and then satisfy themselves about reasonableness of the price as per GFR -2017 before placement of contract. Bidding should be considered asthe preferred mode of procurement above Rs. 25,000/-.

vii. In case of Direct Purchase, during carting period, rates for carted quantity, for that buyer, are frozen for carting period as notified from time to time on GeM against any upward revision by seller. However, advantage of any downward revision in the offer price of carted item shall be automatically provided to the buyer.

viii. According to the provisions of Rule 149 (ii) of GFR, 2017, GeM shall be utilized by Government buyers for direct on-line purchases above Rs. 25,000/- and up to Rs. 5,00,000/- however such purchase has to be through the Seller having the lowest price (L-1) amongst the available Sellers on the GeM. In order to ensure that buyers select only L-1 available offer, the GeM portal enables buyer to first compare all the product options available on GeM to ensure that it meets its requirements/ specifications. While comparing, care should be taken by the Buyer that comparison has to be done between products of at least three different Manufacturers / OEMs. For L-1 buying, comparison has to be made between products of at least three different OEMs, as per GFR. If Buyer wants to buy any specific OEM's product then he has to go for Proprietary Article Certificate (PAC) buying after obtaining necessary approvals of competent

authorities for PAC buying as per GFR-2017, as amended from time to time or the Procurement Guidelines of the respective Organisation as the case may be.

ix. **Proprietary Article Certificate (PAC) Buying:** While making procurement under PAC Buying on GeM, it is the responsibility of the Buyer to ensure that compliances with the conditions / rules as laid down under GFR, 2017, as amended from time to time or the Procurement Guidelines of the respective Organisation as the case may be is met before initiating procurement under PAC:

(a) In case a Govt. Buyer on GeM wants to make procurement on proprietary basis on the GeM Portal after obtaining the requisite approvals / PAC certificate from their competent authority as per Rule 166 of GFR-2017 or the Procurement Guidelines of the respective Organisation as the case may be, the Buyer can use PAC filter provided on GeM for selecting a specific model/ make available from a particular GeM Seller. The Buyer should ensure before procuring the goods under PAC Buying that the Proprietary Article Certificate as per the conditions laid down in GFR or the Procurement Guidelines of the respective Organisation as the case may be is available with the Buyer. It is the responsibility of the Buyer to ensure compliance with GFR or the Procurement Guidelines of the respective Organisation while procuring goods on proprietary basis through the GeM Portal including ensuring the certificate to be in proper format as per GFR or the Procurement Guidelines of the respective Organisation as the case may be.

(b) The Buyer should note that the Seller's price on the Portal is just their offer prices and the proper discovery of price generally happens through bidding/RA. Moreover, in PAC procurement irrespective of multiple listing by authorised sellers, the important issue of price control remaining with the OEM should not be overlooked. Therefore, in case of all the PAC procurements, the Buyers are advised to carry out extra due diligence in establishing the reasonableness of prices before placement of contract as per Para (vii) of Rule -149 of GFR-2017 or the Procurement Guidelines of the respective Organisation as the case may be.

(c) Except for direct buying up to Rs. 25,000/- subject to establishing the reasonableness of price, the bidding is mandatory for procurements above Rs. 25,000/- as per GFR. As result of bidding, the response could be as under:

i. Only OEM is available or only single authorised seller is available.

ii. OEM as well as multiple authorised Sellers are available.

iii. Multiple authorised Sellers of the OEM are available.

(d) After bidding, under PAC buying, the Buyer may take decision with the approval of the competent authority to process the procurement subject to establishing the reasonableness of prices before placement of contract as per Para (vii) of Rule - 149 of GFR-2017 or the Procurement Guidelines of the respective Organisation as the case may be.

x. In order to give flexibility to the buyers in sourcing their requirements through GeM, provision has been made in e-bid and RA modules for indicating delivery period in terms of "number of days from date of placement of contract". While stipulating delivery period in their bid documents, Buyers are advised to be careful since un-realistic delivery period stipulations may result in elimination of some genuine sellers, lack of competition and may ultimately have impact on cost of procurement. While fixing delivery period in e-bid/ RA bid, buyers should not only take into consideration the quantity required and the essentiality of requirement of that quantity within stipulated time period but also the possible impact of shorter delivery period on competition in e-bidding / RA.

xi. Splitting of demands by creating multiple Bids / RAs of same goods / services or making repeated procurements of same Goods / Services through L-1 buying as per rule 149(i) and 149(ii) of GFR-2017 are strictly prohibited on GeM. Splitting of demand deprives the organizations from achieving the best competitive prices leveraging economies of scale. It also implies avoiding the necessity of obtaining the sanction of higher authority required with reference to the estimated value of the total demand. It is a violation of Para Rule 149 (viii) of GFR -2017 and terms and conditions of GeM Portal and Buyer including the Primary Buyer shall be entirely responsible for the same. If any such splitting of demand is noticed, GeM shall have the right to take necessary action such as blocking of such Bids/RAs and / or cancelling such contracts.

xii. GeM is a dynamic online marketplace. The product/service listings across the existing categories are dynamic. Moreover, new categories ofproducts/services are continuously being added on GeM. In situations where there is only one offer available in a product/ service category and/or there is offer from only one Seller after filter based search, the buyer should not select such offer for buying. Efforts should be made by Buyer to get their past suppliers and prospective Sellers on-boarded on GeM so as to ensure availability of sufficient Sellers on GeM. This however will not apply for PAC procurement.

xiii. e-Bidding and Reverse Auction (RA) on GeM

(a) The e-Bidding / RA module of GeM is a tool provided to the Buyer(s) for organizing bidding / RA from GeM Sellers of the particular product category for a pre-defined requirement i.e. quantity, technical parameters for Goods/ Services of the particular product category required for one or more Buyers / Consignees.

(b) Prior to initiating e-Bidding / RA, the Buyer shall judiciously search and shortlist item among the items offered on GeM using filters such as quantity, technical parameters, warranty period, consignee location(s) etc. as per the requirement. In case the search made using actual quantity required, fails to identify sufficient offers, the Buyer may use an indicative quantity for initial search and selection of product and quantity may be

amended to match the actual requirement at the timeof finalizing e-Bidding / RA.

(c) The technical parameters and warranty of the item identified by the Buyer shall be base parameters of the item for conducting e-Bidding / RA for the required Goods/Services.

(d) The e-Bidding / RA document will be finalized by the Buyer(s) by stipulating requirements such as Quantity, Consignee Details, Terms of Delivery, Delivery Period, EMD, Performance Bank Guarantee, Time & Date for Start and End of Bid Submission and for Opening of Bids and required Bid Validity period etc. GeM system shall decide Start / Reference Price and Step Value of Decrement in case of RA based on product selection and / or outcome of bidding process.

(e) The e-Bidding / RA invitation / Notice shall be published on GEM, stipulating the last date for bid submission / opening of bids giving at least clear 10 days time after the publication. Any change in last date for bid submission will be intimated to eligible bidders through e-mail / GeM. The e-Bidding invitation shall be extended to all the registered Sellers on GeM who have Goods / Services for that particular category listed on GeM, at least 2 hours prior to closing time of e-Bidding / RA. The GeM normally requires 48 hrs for approval / rejection of the product / service offered by Sellers before it is listed on the portal. Considering these time lines, the Sellers are required to offer their Goods / Services on GeM well in advance before bid closure. The decision of the Buyer/GeM regarding technical/commercial eligibility of the individual Seller to be invited for e-Bidding / RA shall be final.

(f) The Seller participating in the e-bidding / RA may offer any one of their product(s) already listed on GeM. The bid submitted under e-Bidding / RA shall remain valid for 15 days (or as stipulated by the Buyer in the bid document) from the Bid Opening Date (till 24.00 Hrs IST). Bid Validity can be further extended with mutual consent between Buyer and Seller. The products offered in e-Bidding / RA can not be withdrawn by the Sellers from GeM during the bid validity period. The Buyer reserves the right to postpone/cancel the e-bidding and intimation thereof will be sent by e-mail / GeM to the Bidders. Any amendment / corrigendum to the e-bid invitation issued by the Buyer will be made online and shall be uploaded on the GeM. The participation by the Seller in e-bidding shall be construed as his / her acceptance for all the Terms and Conditions as outlined in the e-bidding including GTC, STC and ATC. However, the Buyer

shall have right to decide the technical and commercial acceptability of the individual bids based on eligibility criteria and compliances as stipulated in the bid document. The technical parameters shown in the bid are from a particular catalogue as selected by the buyer while applying initial filters in selection of the product. The sellers are free to bid for same, equivalent or superior specifications catalogue / products. In the public interest, buyers will evaluate such bids based on their requirements / end use and bid parameters and will accordingly technically accept or reject the bids on merits.

(g) In bid documents, Buyers can incorporate suitable eligibility criteria and additional terms and conditions only using various filters and ATC module available in e-bidding / RA modules of GeM. Buyers are not allowed to incorporate eligibility criteria and / or additional / special terms and conditions exterior tothe GeM portal by making reference to any other website / documents etc.

(h) In case, two or more acceptable bidders are found to have quoted identical lowest bid price, Buyer has to conduct Reverse Auction for the required Goods among all technically qualified bidders in case of bids for Goods. In case of Services bids, if the multiple L-1 bidders have quoted the lowest allowed price for that service, Buyer shall have two options for placement of Contract:

a) Placement of contract by selection of an agency from amongst the L-1 bidders through a Random Algorithm run by GeM system.
b) Placement of contract on any one of the L-1 bidders based on any criteria as deemed fit by the Buyer with appropriate internal approvals

(i) The Buyer reserves the right to accept/reject any bid including the lowest bid received through e-bid and/or annul the e- bidding process.

(j) The participating bidders shall not disclose details of their bids or other details of their e-bids to other bidders or indulge in any anti-competitive behaviour including price manipulation in violation of Competition Act, 2002.

(k) The Buyer/GeM will not be held responsible for consequential damages such as no internet connection, no power supply, system problems, loss of electronic information, power interruption etc.

(l) Against any bidding or RA conducted on GeM, if a bidder quotes Nil Charges/consideration, the bid shall be treated as non-responsive and will not be considered.

(m) There shall be no EMD for Bids / RA having estimated value less than Rs. 5 lakh. For bids / RA having estimated value more than Rs 5 Lakh, while finalizing e-Bid / RA, Buyer shall indicate the exact amount of EMD required to be submitted by bidders inthe form of Bank Guarantee on GeM portal in the prescribed format. Scanned copy of the same shall be uploaded by Seller in the online bid and hard copy of the same will have to be submitted directly to the Buyer within 5 days of bid opening. GeM recommends quantum of EMD @ 1% of estimated value of procurement. The Buyer also has the option to select EMD between 0.5% to 5%. The same should be valid for 45 days beyond the bid validity. Following categories of Sellers shall however, be exempted from furnishing EMD:

i. Micro and Small Enterprises who are manufacturer of the Primary Product Category or Service Provider of the Primary Service Category and give specific confirmation to this effect at the time of bid submission and whose credentials are validated online through Udyam Registration and through uploaded supporting documents.
ii. Start-ups as recognized by Department of Industrial Policy and Promotion (DIPP).
iii. KVIC, ACASH , WDO, Coir Board, TRIFED and Kendriya Bhandar.
iv. Sellers who have got their credentials verified through the process of Vendor Assessment by Vendor Assessment Agencies for the Primary Product / Primary Service for which Bid / RA has been invited.
v. Sellers/ Service Provider having annual turnover of Rs 500 Crore or more.
vi. Micro and Small Enterprises registered with NSIC for the Primary Product Category whose credentials are validated through NSIC database and through uploaded supporting documents.
vii. Micro and Small Enterprises registered with DIC for the Primary Product Category whose credentials are validated through DIC database and through uploaded supporting documents.

viii. Sellers / Service Providers holding BIS License for the Primary Product Category whose credentials are validated through BIS database and through uploaded supporting documents.

ix. Central / State PSUs.

x. Seller / Service Provider registered with designated Agency / Authority as specified in the bid document by the Buyer – such bidder shall have to upload scanned copy of relevant registration document in place of EMD document while bidding.

(n) EMD submitted by the bidder shall be forfeited, if the bidder:

i. Withdraws or modify or impairs or derogates from the bid in any respect within the period of validity of its bid; or

ii. If it comes to notice that the information / documents furnished in its bid is false, misleading or forged; or

iii. Fails to furnish requisite performance security / PBG within stipulated time required as per e-bid / RA conditions.

(o) Notwithstanding above, GeM SPV / GeM Admin also reserve the right to debar such seller from GeM portal. Such debarment shall be for minimum 3 months initially on first such offence and on repeat offence, the debarment period can be increased suitably by GeM SPV / GeM Admin. By submitting a bid on GeM, the Bidder explicitly undertakes to abide by the above clause.

(p) Earnest money of unsuccessful bidders shall be returned within 15 days after the award of contract or expiry of bid validity whichever is earlier. Earnest money of successful bidder shall be returned within 15 days after receipt of Performance Security / e-PBG.

(q) In case of RA, Start / Reference Price and Step Value of Decrement shall be indicated to the Bidders at the start of the auction. Any participating bidder can bid one or multiple Step Decrement lower than the prevailing Lowest Bid at that time.

(r) The Bidder shall be able to view Bid Start Price, Bid Decrement Value, Prevailing Lowest Bid value and last Bid Placed by him. Whenever a lower price bid is received in the closing moment i.e. within 15 minutes of existing end time of Reverse Auction, the end time of reverse auction shall be extended automatically by another 15 minutes. All participant sellers of that RA shall be notified by the GeM system about extension of time through email and/or SMS and they shall be allowed to submit revised bid under the RA. The same process shall be repeated, if there is

another lower bid received in the RA during last 15 minutes of RA.

(s) GeM / Buyer shall not have any liability to bidders for any interruption or delay in access to the GeM site / Reverse Auction link etc, irrespective of the cause.

(t) By creating a bid on GeM, the Buyer undertakes as under:

"I confirm that this tender document complies with the "Public Procurement (Preference to Make in India) Order, 2017, as amended from time to time" issued by DIPP and "Public Procurement Policy for Micro and Small Enterprises (MSEs) Order, 2012, as amended from time to time " issued by MoSME".

(u) **Bid to RA:** While creating bid on GeM, Buyer shall have the provision to select Bid to RA option. If this option is selected by the Buyer at the time of bid creation, Sellers would be required to submit their Technical and Commercial bids before bidclosure. After completion of technical evaluation by the Buyer, Reverse Auction would be conducted amongst first 50% of the technically qualified bidders arranged in the order of prices from lowest to highest. Number of sellers eligible for participating in RA would be rounded off to next higher integer value if number of technically qualified bidders is odd (e.g. if 7 bids are technically qualified, then RA will be conductedamongst L-1 to L-4). In case number of technically qualified bidders are 2, RA will be between both without any elimination.

In case Primary products of only one OEM are left in contention for participation in RA based on lowest 50% bidders qualifying for RA, the number of sellers qualifying for RA would be increased to get at least products of one more OEM (directly participated or through its reseller) if available. Further, if bid(s) of any seller(s) eligible for SME preference is / are coming within price band of 15% of L-1 or if bid of any seller(s) eligible for Make in India preference is / are coming within price band of 20% of L-1, then such SME / Make in India seller shall also be allowed to participate in the RA process. After the RA process, the award of contract(s) shall be made by the buyer keeping in view the Public Procurement Policy for Micro and Small Enterprises (MSEs) Order, 2012 and Public Procurement (Preference to Make-in-India) Order, 2017 last revised on 29.5.2019 as amended from time to time.

(v) In case any Seller / Service provider has been debarred in any particular Department / Organization, Buyers of that particular Department / Organization only shall have the right todisqualify

such Sellers / Service providers at the time of technical evaluation of Bids during the period of debarment, subject to the condition that orders of such debarment has been taken with approval of Competent Authority of thatDepartment / Organization and has been communicated to the concerned Seller / Service Provider before bid opening date.

(w) GeM is an end to end on-line procurement portal and not a tender publishing portal. GeM has detailed GTC, product / service specific STC and a rich ATC library in-built in the portal which can be used to create a comprehensive bid document. Based on the available terms and conditions, there is hardly any need to add any additional conditions to be attached with any GeM bid. However, for inclusion of some clause which is considered absolutely necessary for that particular bid for reasons to be explained in detail, a provision for inclusion of additional conditions in the bid through corrigendum is available in Request Management System. Only indispensable conditions that are not covered in and are not in conflict with GeM GTC, Product / Service STC and the standard ATC library, and which are in compliance with the Govt. orders on Public Procurement and are not restrictive and not against the core principals of transparency, fairness and efficiency enshrined in GeM, can be requested through RMS ATC request for making part of GeM bid through corrigendum. Each such request has to be made only after due approval of the Competent Authority in Buyer Organization confirming that the request has been made with the approval of the Competent Authority. Buyer organization shall be solely responsible for the impact of the requested clauses on the bidding process and its outcome. The clauses which are already covered in standard ATC library available on GeM Portal, will not be allowed through RMS.

(x) Determination of eligibility in case of products requiring BIS License: In case the bid requires availability of BIS License, bidder has to upload currently valid and operative BIS License copy (Valid on the date of bid opening) to be considered eligible. Submitted BIS License may be in the name of Bidder / OEM or in the name of the Manufacturer to whom the OEM has outsourced manufacturing of his brand of product. The name of the Brand of the offered product should be mentioned in the BIS License. BIS certificate issued under Compulsory registration Scheme for electronic products to OEM/Brand owners for the products marketed under their brand name wherein their products are manufactured at third-party manufacturing unit is valid and is

allowed for participation in the bids floated on GeM. The Manufacturer's Authorization in all such cases wherein the manufacturing is done by a third party shall be issued by the Brand owner / OEM and not by the third-party manufacturing unit mentioned in the BIS certificate.

(y) **Bid Splitting:** In case of critical / vital / safety / security nature of the item, and / or large quantity under procurement and / or urgent delivery requirements and / or inadequate vendor capacity, Buyer may decide to have more than one source of supply. In such cases Buyer may opt for Bid Splitting while creating the bid on GeM, clearly indicating the Bid Splitting ratio in which order will be split among L-1, L-2, L-3 etc as per ratio of splitting pre-disclosed in the bid . After technical and financial evaluation, before splitting the quantity, it should be ensured by the Buyer that the L1 price is reasonable. After deciding the acceptable reasonable price, L1 would be awarded contract for at least the first / highest percentage indicated in the bid splitting ratio. For the rest of the bid quantity, the L-1rates / lowest accepted rate will be counter offered to the next higher quoting bidder(s) for price matching. On acceptance of the counter offer, the order will be placed on next higher quoting bidder(s) for the respective percentage. In case of non- acceptance of the counter offer by the next higher quoting bidder(s), a similar offer shall be made to L3 and L4, and so on. In case counter offered rates are not accepted for ratio of splitting quantity as per bid document by any of the subsequent bidders, the left over quantity will be divided between bidders who have accepted the rates in the ratio of their originally allocated quantities subject to their confirmation and after getting consent on mutually agreed delivery schedule for the additional quantity.

5. Contract(s):

Following documents shall be construed to be part of the contract generatedthrough GeM:

i. Scope of supply including price as enumerated in the Contract Document.

ii. General Terms and Conditions (GTC).

iii. Product / Service specific Special Terms and Conditions (STC).

iv. Product / Track / Domain Specific STC of Particular Service includingits SLA (Service Level Agreement)

v. Bid / RA specific Additional Terms and Conditions (ATC).

The Terms and Conditions stipulated in STC & SLA will supersede those in GTC and Terms and Conditions stipulated in ATC will supersede those in GTC and STC in case of any conflicting provisions.

6. Prices:

i. **Offer price on GeM portal:** The prices of the offered Goods or Services shall be firm and fixed at any point of time and shall be indicated in INR for each accounting unit. The Seller can choose to offer Goods or Services with uniform all inclusive unit price for deliveries at locations across India on All India basis or for specified locations selected at the time of product listing. As such, for supply of Goods contract, no additional charges such as local levies / transportation / loading unloading charges etc., shall be payable over and above the contract price. For selected freight intensive products, as notified on GeM, the Seller may quote unit price inclusive of GST with delivery charge(s) (including transportation, loading unloading and local levies) payable extra as defined in the relevant categories. In respect of items requiring installation and / or commissioning and other services (as indicated in technical details of the item), the charges for the same shall also be included in the offered price on GeM.

Once a Buyer carts a particular quantity of offered Goods / Service, during carting period as notified from time to time on GeM, rates for carted quantity, for that buyer, are frozen for the period as specified on the portal against any upward revision by seller. However, advantage of any downward revision in the offer price of carted item shall be automatically provided to the buyer.

ii. **Offer price in e-bidding:** Bidder is required to indicate offer price in the price schedule as provided in the bidding document. Complete breakup of price as required must be indicated. However evaluation of the bid shall be on the basis of total all inclusive, landed price at consignee destination (unless otherwise specified in the ATC).

iii. **Offer price in RA:** Bidder is required to indicate total offer price. Evaluation of the bid shall be on the basis of total all inclusive, landed price at consignee destination (unless otherwise specified in the ATC). Successful bidder shall have to provide complete breakup of the quoted price in the required price bid format before award of contract.

7. Performance Security and Performance:

i. There shall be no Performance security / PBG requirement for contracts:

a) Placed under Direct Purchase / L-1 Purchase Option under Para (i) and (ii) of GFR rule 149;

b) Placed through Bids / RA with estimated bid value up to Rs 5 Lakh (in case of Goods contracts); and

c) Placed through Bids / RA with estimated bid value up to Rs 5 Lakh (in

case of Services contracts)

ii. In case of contracts placed following e-Bidding / RA, Performance Security / Performance Bank Guarantee (PBG) (in format provided on GeM) valid for 2 months beyond the date of completion of all contractual obligations including warrantee obligations, will be obtained from the successful Bidder, for ensuring due performance of the contract. GeM recommends quantum of Performance Security @ 2% of the value of contract. The Buyer also has the option to select Performance Security between 2% to 10%. While finalizing e-Bid / RA, Buyer shall indicate the % of Performance Security required to be submitted by successful bidders. In case of any extension of contract obligation period, the seller shall be liable to suitably extend the validity of the Performance Security.

Such Performance Bank Guarantee, in prescribed format, from a scheduled commercial bank must be submitted by Seller to the Buyer within 15 days of award of contract on GeM. The payments to the seller shall become due only after receipt of Performance Bank Guarantee by the Buyer and verification of its genuineness.

If the Seller fails or neglects to observe or perform any of his obligations under the contract it shall be lawful for the Buyer to forfeit either in whole or in part,the Performance Security furnished by the Seller.

If the Seller duly performs and completes the contract in all respects the Buyershall, refund the Performance Security to the Seller within 30 days of completionof all contractual obligations by the Seller.

8. Duties & Taxes:

i. Offer Prices on GeM shall be on all inclusive basis i.e. including all taxes, duties, local levies / transportation / loading-unloading charges etc. In the case of Bid / RA, complete break-up of the quoted price in the required price bid format shall furnished by the Bidder, before award of contract.

ii. Statutory variation in the rate of GST, taking place between the date of awardof contract and the original / refixed delivery period, shall be to the Buyer's account. For claiming any change in price due to such Statutory variation, the seller shall have to lodge claim before the Buyer providing documentary evidence of change in rate of GST taking place after the date of award of contract and the date of supply within the original / refixed delivery period. Buyer shall issue necessary amendment in the contract to enable generation of supplementary invoice or revised invoice as the case may be.

iii. No increase in price on account of statutory increase in the rate of GST taking place during the period of delivery period extension with liquidated Damages shall be admissible. Nevertheless the Buyer shall be entitled to the benefit of any decrease in price on account of reduction in GST taking place during extended delivery period.

iv. The Bill Form / On-line invoice shall be generated by the Seller which may inter-alia include the following confirmations from the Seller:

a. Certified that the Goods and Services Tax (GST) charged on this Bill is not more than what is payable under the provision of the relevant Act or the Rules made there under.

b. Certified that the goods on which GST has been charged have not been exempted under the GST Act or the rules made there under and the charges on account of GST on these goods are correct under the provisions of that Act or the Rules made there under.

c. Certified that the Seller is registered with above indicated GSTIN as dealer in the State where in their Billing address is located for the purpose of GST.

d. The on-line bill form / invoice generated on GeM is not a replacement for the GST invoice. The proper GST invoice as per requirements of GSTrules shall be sent by the seller to the buyer / consignee directly along with the Goods / Services as and when deliveries are made to the consignee.

v. Seller shall comply with all the necessary statutory compliances including but not limited to providing GST invoices or other documentation as per GST Law relating to the supply of Goods or Services, uploading the details of the invoices, payment of taxes, timely filing of valid statutory returns for the tax period in the GST portal. In case the Input Tax Credit of GST is denied or demand is recovered from Buyer on account of any act/ omission of the Seller in this regard, the Seller shall be liable in respect of all claims of tax, penalty and / or interest, loss, damages, costs, expenses and liability that may arise due to such non-compliance. Buyer shall have the right to recover such amount from any payments due to the Seller or from Performance Security, or any other legal recourse from the said Seller. If any tax is required to be paid by the Seller in pursuance of any demand from tax authorities, on account of Seller's suppression of facts, fraud or wilful misstatement of facts while offeringthe products or submitting the bids, then the same shall not be passed on to Buyer through debit notes or Invoices or Supplementary Invoices and the seller shall be solely liable for payment of the same.

9. Integrity Pact:

All the Users in GeM i.e. Seller as well as Buyer agree not to indulge in any corrupt practices including without limitation any activity or action to influence the transaction on any aspect of contract and commit to take all measures necessary to prevent corruption maintaining complete transparency and fairness in all activities related to GeM. Users agree to follow and adhere with the Integrity Pactguidelines provided on GeM Portal.

10. Guarantee And Warrantee:

i. The Goods/Services supplied under the Contract(s) shall be in accordance with the contract specifications & quality and the Goods shall be brand new and have standard Guarantee/Warrantee for one year period from the date of final acceptance by the consignee unless otherwise specified in category specifications, specific Bid/RA . Seller, at the time of listing their product on GeM portal or offering their products against any Bid / RA, may accordingly provide longer Guarantee/Warrantee period (i.e. more than 1 year) and in such case, Guarantee/Warrantee period stipulation made in category specifications / Bid / RA document, shall prevail over standard Guarantee / Warrantee period of 1 year stipulated in these General Terms and Conditions.

ii. Notwithstanding the fact that the Buyer or its Quality Assurance Officer may have inspected and/or approved / accepted the said Goods, it is further guaranteed that if during the said guarantee / warrantee period, the Goods be discovered not to conform to the requisite description and quality and/or not giving satisfactory performance or have deteriorated, and the decision of the Buyer in that behalf shall be final and binding on the Seller and the Buyer shall be entitled to call upon the Seller to rectify and/or replace the Goods or such portion thereof as is found to be defective by the Buyer within 7 days. Otherwise, the Seller shall pay to the Buyer such compensations that may arise by reasons of the warranty therein contained. In cases requiring Spares, the Seller guarantees that they will supply Spare Parts, if and when required on agreed basis for an agreed price for a minimum period of three years from the date of expiry of warrantee period (unless otherwise specified in STC / ATC). The agreed basis could be, including but without any limitation, an agreed discount on the published catalogue or an agreed percentage of profit on the landed cost. The aforesaid provisions made specifically for Goods, shall also be applicable for Services to the extent the same are practically possible.

11. Buyer / Consignee's Right Of Rejection (Return Policy):

i. The Goods delivered shall bear the self certified Manufacturer's/Seller's Warranty/Guaranty. Buyer / Consignee shall have the right to inspect the supplied Goods themselves and/or through their appointed agency at consignee's own cost, at Consignee's site(s) after receipt and accept or reject on proper justification any consignment of the Goods received within a period of 10 days (unless otherwise specified in STC or ATC) of receipt of consignment of goods. The date of receipt shall be reckoned from the date of receipt of the Goods as notified in the Provisional Receipt Certificate (PRC) which will be issued online by consignee immediately after receipt of Goods.

ii. In case of Service contract, the Buyer reserves right to reject the same in conformance with the terms and conditions of the agreed Service Level Agreement

(SLA). However, such right to reject services offered by the Seller under the contract shall be exercised by the Buyer within 10 days (unless otherwise specified in STC or ATC) of the date of receipt of the Service. The date & time of start and completion of the Service, shall be indicated by the Seller while raising on-line invoice for a specified period of Service as per Service Level Agreement (SLA). The date of such invoice or the date of completion of the service, whichever is later shall be reckoned as date of receipt of the Service.

iii. On Acceptance / Part Acceptance or Rejection of Goods / Services, Consignee will issue an on line 'Consignee's Receipt cum Acceptance Certificate' (CRAC), which will form the basis of Payments to the Seller.

iv. No payment shall be made for rejected goods or services. After intimation of the rejection / part rejection by the Buyer/ Consignee, the Seller shall be liable to remove / lift back such rejected Goods within 10 days without any extra charge/cost to the Buyer / Consignee failing which suitable ground rent / warehousing charges would be payable by the Seller to the Buyer /Consignee.If the Seller fails to remove / lift back such rejected Goods within reasonable time period, the Buyer / Consignee shall have the right to dispose off such rejected goods at the risk and cost of the seller.

12. Payment Authority and Payment Terms:

Payments shall be made to the Seller in the manner below:

i. For Goods :

In case of goods, 100% payment will be released within ten (10) days of issue of consignee receipt-cum-acceptance certificate (CRAC) and on-line submission of bills unless otherwise specified in STC / ATC.

ii. For Services:

In case of services, 100% payments on the basis of monthly (unless otherwise specified) bills will be paid within ten (10) days of issue of consignee receipt- cum-acceptance certificate (CRAC) and on-line submission of bills unless otherwise specified in STC / ATC.

13. Terms of Delivery:

All the Goods or Services in the GeM shall be offered on Free Delivery at Site basis including loading/unloading. In respect of items requiring installation, commissioning and other services in the scope of supply (as indicated in respective product category specification / STC / ATC), the cost of the same shall also be included in the offer price.

14. Delivery Period

Seller shall indicate the quantity which can be supplied over the specified time period(s). The Seller would offer these details, which would constitute the part of the awarded Contract(s) in the GeM and would make a binding Contract between the Seller & the Buyer. Any modification thereto shall be mutually agreed and incorporated in the Contract. This Delivery Period/Time shall be deemed to be essence of the Contract and delivery must be completed not later than such date(s).

15. Extension of Delivery Period and Liquidated Damages:

Buyer may, on the request of the Seller or otherwise, extend the delivery date suitably subject to the following conditions:

i. The original Delivery Period may be re-fixed by the Buyer without any Liquidated damages subject to Force Majeure conditions mentioned below and also on the ground/reasons of delay attributable to the Buyer / Consignee.

ii. For other cases, provided the price trend is not lower, the Delivery Period may be suitably extended for which an amount equal to the Liquidated Damages for the extended period(s) for delay in the supply of the Goods/Services after the expiry of contract delivery period /re-fixed delivery period, shall be recovered from the Seller as mentioned hereinafter for the extended period.No increase in price on any ground after the original/re-fixed delivery date shall be admissible during such extended period(s). Nevertheless the Buyer shall be entitled to the benefit of any decrease in price on account of reduction in GST taking place during extended delivery period.

iii. **Liquidated Damages:** If the Seller/Service Provider fails to deliver any or all ofthe Goods/Services within the original/re-fixed delivery period(s) specified in the contract, the Buyer will be entitled to deduct/recover the Liquidated Damages for the delay, unless covered under Force Majeure conditions aforesaid, @ 0.5% of the contract value of delayed quantity per week or part of the week of delayed period as pre-estimated damages not exceeding 10% of the contract value of delayed quantity without any controversy/dispute of any sort whatsoever.

iv. Force Majeure Conditions :

If at any time during the continuance of the Contract, the performance in whole or in part by either party of any obligation under this Contract shall be prevented or delayed by the reasons of any war, hostility, acts of the public enemy, epidemics, civil commotion, sabotage, fires, floods, explosion, quarantine restrictions, strikes, lockouts or act of God provided notice of happening of such event duly evidenced with documents is given by one party to the other within 10 days from the date of occurrence thereof, neither party shall be by reasons of such event, be entitled to terminate the Contract nor shall either party have any claim for damages against the otherin respect of such non-performance or the delay in performance, and deliveries under the contract shall be resumed as

soon as practicable after such event has come to an end or ceased to exist, and the decision of the Buyer as to whether the deliveries have been so resumed or not, shall be final and conclusive, Provided further that if the performance in whole or part of any obligation under this contract is prevented or delayed by reason of any such event for a period exceeding **10 days**, either party may at its option terminate the contract provided also that the Buyer shall be at libertyto take over from the Seller at a price to be fixed by Buyer, which shall be final, all unused, undamaged and accepted material, bought out components and Goods in course of manufacture in the possession of the Seller at the time of such termination or such portion thereof as the Buyer may deem fit excepting such materials, bought out components and Goods as the Seller may with the concurrence of the Buyer elect to retain.

16. DISPUTE RESOLUTION BETWEEN THE BUYER AND THE SELLER / SERVICE PROVIDER

16.1 AMICABLE SETTLEMENT:

i. The Parties (i.e., the Buyer and the Seller/ Service Provider) undertake that any conflict or dispute that may arise between them shall first be dealt with in the manner stated below, irrespective of any other recourse, which any Party may have in law or in equity.

ii. In the event of any conflict or dispute arising out of or in connection with the Contract placed through GeM, the Parties shall endeavor to settle such disputes amicably. If a dispute is not resolved within 30 (thirty) days after a written notice of any dispute by one Party to the other, the same shall then be resolved through the mechanism of a Dispute Resolution Committee. This Dispute Resolution Committee shall comprise of representatives of both the Buyer and the Seller / Service Provider and shall be chaired by the Primary User of the Buyer organization/department or any other person as authorized by the Primary User. If the Dispute Resolution Committee is not able to resolve the matter within 30(thirty) days of its formation, the dispute shall then be referred to Arbitration.

16.2 ARBITRATION:

In the event of any conflict / dispute arising out of or in connection with the Contract placed through GeM, which has not been resolved in accordance with the procedure laid down in Clause 16.1 above, the aggrieved Party may invoke Arbitration by sending a written notice to the other Party. The procedure for appointment of the Arbitral Tribunal shall be as follows.

i. In cases where the total value of the Contract is less than INR 1,00,00,000/- (Indian Rupees One Crore only) the same shall be referred to a sole arbitrator mutually appointed by both the Parties.

ii. Where the total value of the Contract exceeds INR 1,00,00,000/- (Indian Rupees One Crore only), the arbitration shall be conducted by a quorum of three arbitrators. Each party shall be entitled to appoint an arbitrator and the two party-appointed arbitrators shall within 30 (thirty) days from their nomination, appoint a third arbitrator i.e., the Presiding Arbitrator.

iii. In case of failure to appoint the Presiding Arbitrator within a period of 30 (thirty) days from the date of nomination of the two arbitrators by the respective parties, the aggrieved party shall approach the High Court (under whose jurisdiction the principal place of business of the Buyer department/ organization is located) to appoint the Presiding Arbitrator as per the provisions of the Arbitration and Conciliation Act, 1996 (as amended up to date).

iv. The arbitration shall be conducted in the English language. Arbitration proceedings can also be conducted online, as per the discretion of the Arbitral Tribunal.

v. The cost of the Arbitration shall be equally borne by both the Parties.

vi. The award of the arbitrator shall be final and binding on the Parties to the Contract. The arbitration shall be governed by the Arbitration and Conciliation Act, 1996, as amended up to date. The seat of arbitration shall be at the place where the principal place of business of the Buyer department / organization is located.

vii. The Contract shall be interpreted and governed in all respects in accordance with the laws of India. All disputes in connection with or arising out of the Contract, shall be subject to the exclusive jurisdiction of the Court within the local limits of whose jurisdiction principal place of business of the Buyer department / organization is located.

16.3 Both the Parties understand and agree that GeM being an Intermediary cannot be made a party to any dispute in connection with or arising out of the Contract and/or the arbitration proceedings between the Parties

17. Laws Governing the Contract:

i. The contract shall be governed by the laws of India for the time being in force.

ii. Irrespective of the place of delivery, the place of performance or the place of payment under the contract, the contract shall be deemed to have been made at the registered address of the Buyer and / or Primary Buyer.

iii. Jurisdiction of Courts: The courts of the place from where the contract has been made shall alone have jurisdiction to decide any dispute arising out of or in respectof the contract.

iv. GeM SPV would not be a party to any such litigation.

v. In case any Seller / Service provider makes GeM a party / respondent in any case involving any dispute between Buyer and Seller arising out of a concluded contract or arising out of bidding process initiated / concluded by the Buyer on GeM, it would be obligatory on the part of the Buyer to represent GeM also through their Counsel / Lawyer in the proceedings before the legal authority and ensure timely filing of replies / affidavits etc provided by GeM also through their Counsel / Lawyer before the concerned legal authority during the course of litigation. A standard reply on behalf of GeM, covering following aspects shall be incorporated in all replies / affidavits filed by the Buyer in such cases:

"Government e-Marketplace is a National Public Procurement Portal; an end-to-end online Marketplace for Central and State Government Ministries / Departments, Central & State Public Sector Undertakings (CPSUs & SPSUs), Autonomous institutions and Local bodies, for procurement of common use goods & services. Prima facie, the dispute in the present case appears to be between the Buyer and Seller arising out a contract placed / bid created by the Buyer on Government e-Marketplace. As per Clause 16, Clause 17 and Clause 22 of the General Terms and Conditions of Government e-Marketplace (duly accepted by the Buyer and Seller), GeM is not to be made a party to any dispute between the Buyer and the Seller. As such Government e-Marketplace is liable to be deleted from the array of parties.

In light of the above, we request your goodself to kindly delete Government e-Marketplace from the array of parties."

18. Limitation of Liability:

Notwithstanding anything contained in this agreement, no party will be liable for any special, incidental or consequential damages arising out of or in connection with this agreement or any breach hereof (including for loss of data or profits, or cost of cover), whether or not such party has been advised of the possibility of such damages, and whether under a theory of contract, tort (including negligence) or otherwise; except for liabilities arising out of any violation, misappropriation or infringement of a party's intellectual property rights, or from a breach by either party of its obligation. In no event will either party's aggregate liability arising out of or in connection with this agreement or any breach hereof (whether under a theory of contract, tort (including negligence), warranty or otherwise) exceed the Contract Price entered into the Contract between Buyer and Seller.

19. Termination for Default:

If the Seller does not perform its obligations within the Delivery Period/Date mentioned in the Contract, the same would constitute the breach of the Contract and the Buyer shall have the right to Cancel or withdraw the Contract for the unsupplied portion after the expiry of the original or re-fixed delivery date or period stipulated in the Contract. Such cancellation of contract on account of non - performance by the Seller would entitle the Buyer to forfeit the performance security besides other actions such as downgrading the Seller's rating or debarment from the GeM for specified period as decided by GeM on merits.

20. Closure of Transaction:

After satisfactory completion of all the obligations under the Contract and releaseof payments for the goods / services, the transaction shall be treated as closed.

21. Grounds for Administrative Action

(i) Administrative actions may be taken by GeM against the Buyer or the Seller either suo-moto on the basis of the platform mechanisms identified through analytics or on the basis of a complaint or report made to GeM by any stakeholders or any third party information or upon Court order, inter –alia, for non-adherence to the GeM Website Policies including Terms and Conditions and the Incident Management Policy published on the GeM Website.

(ii) The Seller would be liable for administrative actions such as suspension / debarment / removal from GeM, if they fail to abide by any of the Website Policies including the terms & conditions stipulated in this document and/or on anyone or more of the following grounds:

(a) Listing the products/services not in the relevant categories and/or listing the same with vague/conflicting product specifications/details and irrelevant product photographs.

(b) Offering Goods / Services without having proper authorization

(c) Supplies goods of inferior/ substandard quality

(d) Supplies or offers to supply refurbished or counterfeit or fake products

(e) Withdraws or modify or impairs or derogates from the bid in any respect within the period of validity of its bid;

(f) Seller furnishes inaccurate, false, misleading or forged or fails to furnish any information / documents, within the prescribed time limits, to GeM or to a Buyer, including during e-Bidding/ RA process;

(g) Fails to furnish requisite performance security / PBG within stipulated time required as per e-bid / RA conditions;

(h) Fails to update GeM about any change in information furnished within the prescribed time limits;

(i) Executes services without conforming to requirement given in Service Level Agreement (SLA);

(j) Fails to execute an order/ contract or fail to execute it satisfactorily

(k) Is declared bankrupt or insolvent;

(l) Fails to produce the requisite documents/ information during the course of inspection / assessment at any stage;

(m) Performs any activity which is listed as prohibited activities on GeM.

(n) On any other ground for which, in the opinion of GeM, the retention of the seller or any of its offered product in GeM is not in Public Interest.

(o) The grounds mentioned above are illustrative only. Users are also advised to read the list of prohibited activities published on the website.

(iii) Notwithstanding anything contained in the GTC, GeM reserves the right to cancel or annul the registration of any Seller or remove any of the Good/Services listed by a Seller on the GeM Website to comply with

any provision of the Applicable Laws and / or Court Orders.

(iv) GeM may take an administrative action in terms of the GeM Website Policies against a Buyer which may include reporting of any breach or misconduct to the Buyer Primary User and/or to the competent authority and GeM reserves the right to review the rating of such Buyer, and / or block Buyer's account for such time as considered appropriate by GeM.

(v) The Seller and the Buyer understands that the grounds foradministrative action as provided under the Contract are only indicative and additional grounds may be provided under the GeM Website Policies including the Incident Management policy. The Seller / Buyer warrants to abide by all additional grounds as may be specified by GeM in the GeM Website Policies from time to time.

22. Role of Government E- Marketplace - Gem SPV

Government e-Marketplace – GeM SPV is the owner of the GeM portal which monitors and supervises all the business transactions on the portal. The role and responsibilities of the company are as under:

22.1 To develop, operate and maintain technology driven e-marketplace, through a Managed Service Provider (MSP), to be used by government agencies for procurement of various goods and services in a transparent and efficient manner.

22.2 Overall supervision and monitoring of GeM portal operations, policy management, finalization and implementation of various business processes and work flows in adherence with the applicable law and executive orders issued from time to time . To provide tools for on-line Bidding, on-line Reverse Auction and Business Analytics Tools on GeM.

22.3 To work continuously for improvements in the Business Processes and Work Flows for various activities / functions on GeM based on feedback from various stakeholders to enhance transparency, efficiency, competitiveness, equality, economy in procurement of goods and services by government agencies.

22.4 To finalize General Terms and Conditions for sale and purchase of Goods and Services on GeM, Product / Service Specific Special Terms and Conditions, Special Terms and Conditions for Bunching of Goods / Services, Bid Specific Special Conditions, Project Specific Special Conditions etc.

22.5 To finalize, upload and approve Technical Specification Frameworks for various item / service categories on GeM and to monitor conformity of offered products to the larger framework so finalized and uploaded.

22.6 To decide addition / deletion of any of the offered product(s)/Product category (ies) and their framework of technical parameters on GeM.

22.7 To work and co-ordinate with different Organizations/Departments / Agencies for integration of their Databases with the GeM portal on real time basis for the purpose of verification/authentication of data entries made by stakeholders.

22.8 To offer and manage Demand Aggregation services for identified categories across buyers with assured reasonability of price, recommending forplacement of orders by individual buyers

22.9 To co-ordinate with MSP for conducting workshops for the various Stakeholders in capacity building and in change management associated withthe implementation of technology enabled procurement process.

22.10 To monitor MSP that the Buyers, Sellers and Service Providers are being assisted properly by them to onboard their goods and services on the GeM platform.

22.11 To identify and offer services of 3rd parties for Vendor Assessment relating to technical, financial capacity, past experience of sellers including manufacturing / testing facilities / quality control arrangement(s) of manufacturing premises and/or any of the premises related to manufacturing process of products / services offered by the seller / service provider on GeM.

22.12 To identify and offer services of 3rd parties for testing and certifying the quality of the product offered/ supplied, through documents, test reports/ certificates, testing at any independent lab or through inspection/testing by its authorized representative/s at firm's premises or at user's premises, that buyer choose to use.

22.13 Overall monitoring and management of Call Centre/Help desk operations being provided by the MSP.

22.14 Removal / debarring the Sellers/Buyers and Goods / services in GeM.

22.15 Management of complaints and their redressal mechanism in GeM (not disputes related to concluded contracts).

22.16 To identify, integrate and manage MoUs with verifying, certifying and validating entities across government(s) and also professional agencies to reinforce the online paperless, contactless and cashless system on GeM.

22.17 To issue Notices, Circulars, News, Flashes, Updates etc in GeM

22.18 Reporting and MIS mechanism in GeM

22.19 Any other related activities in the GeM

22.20 In exceptional circumstances, for ensuring propriety of procurement processes or to obviate possible misuse of GeM functionalities, GeM SPV as GeM Admin may keep any Bidding / RA process on hold for some time as considered appropriate.

22.21 To take approved User Charges from Buyers and Sellers for the various transactions on the GeM portal as decided and notified on the GeM portal.

23. Miscellaneous Provisions

23.1 Assignment: Users understand and agree that the GTC, STC and ATC provisions, rights and obligations granted by GeM are non- transferrable or assignable by the User to any third party, without the prior written consent of GeM.

If same is permitted by GeM, all the conditions, rights and obligations of the GTC or any on–going STC/ATC shall also be binding upon such third party assignee besides the User.

23.2 Indemnification: The Seller shall at all time indemnify Buyer against all suits and claims which may be made in respect of the goods/services for infringement of any right protected by patent, registration of designs or trade mark. Provided always that in the event of any claim and suit in respect of alleged breach of patent, registered designs or trade-mark being made against the Buyer, the Buyer shall notify the Seller/ Service Provider of the same who shall at its own expense either settle any such dispute or conduct and litigation that may arise there from.

Buyers and Sellers agree to indemnify, defend and hold harmless GeM, its officials, Managed Service Provider (herein after individually and collectively referred to as "indemnified parties") from and against any and all losses, liabilities, claims, suits, proceedings, penalties, interests, damages, demands, costs and expenses (including legal and other statutory fees and disbursements in connection therewith and interest chargeable thereon) asserted against or incurred by the indemnified parties that arise out of, result from, or in connection with

23.2.1 Breach of the contract(s); or

23.2.2 Any claims made by any third party due to, or arising out of, or in connection with, use of the Website; or

23.2.3 Any claim made by any third party regarding content/ information or materials provided by Seller cause any damage to a third party; or arising out of, or in connection with, use of the Website.

23.2.4 Violation of any intellectual property rights or any other rights.

Once GeM notifies the Buyer/ Seller of such claims, they shall defend and indemnify GeM for the same. Further, in no case they shall compromise or settle any claim or admit any liability on the part of GeM without the express or prior written consent of GeM which can be withheld or denied or modified by GeM in its sole discretion or as per the Applicable Laws.

23.3 Severability: If due to any change in Applicable laws, certain part of the GTC or any applicable STC or any provisions of the GeM policies or portions thereof, becomes unenforceable, the remaining provisions shall continue in full force and effect so as to give effect to the intent of the parties.

23.4 Website Terms and Policies Updation: Buyers and Sellers are advised to check the website terms and conditions as well as policies such as Privacy Policy and the Website Disclaimer at all times, as GeM may update the Website and such terms from time to time.

23.5 List of Prohibitive Activities (Suggestive And Non-Exhaustive):

LIST OF PROHIBITIVE ACTIVITIES: The following is an indicative list of prohibitive activities which the Buyers and the Sellers registered on GeM platform shall not perform on the GeM platform. A breach of any of the prohibited activities shall give the right to GeM under the Applicable Laws or in terms of these GTC or the GeM Website Policies to take administrative action which may include partial or permanent disabling of account on GeM Website, debarment etc. Additionally, GeM may remove any non-compliant information and reserves the right to preserve and share with the appropriate authority such information and associated records for investigation purposes. The Buyer and the Seller understand that this list is only indicative and additional activities may be prohibited under the GeM Website Policies. The Buyers and the Sellers shall undertake to provide their full support that may be required by GeM for removal and disabling of the non compliant information. The prohibited activities include:

(i) Indulging in cyber crime or other criminal activities which can become a threat to GeM, GeM Website, to the Government of India or to any State Government or Government Agency.

(ii) Advertising, exhibiting, representing, publishing, pronouncing, listing, delivering, offering to sell or selling any kind of Goods/Services which can cause any kind of infringement or disparagement of intellectual property rights.

(iii) Selling refurbished, counterfeit and/or fake Goods / Services under a brand or misusing others brand name.

(iv) Offering to sell or selling above the MRP any Goods or misrepresenting the MRP.

(v) Delivering some other Goods or Services instead of the Goods or Services Contracted for or delivering empty parcels or used Goods in breach of the terms of the Contract.

(vi) Offering to sell or selling freebies which are 'Not for sale' Goods.

(vii) Listing of the Goods on GeM Website without authorization to sell Goods manufactured by the OEM in open market or without proper authorisation, if any required, for providing the Service.

(viii) Listing of the Goods or Services is done on GeM Website without guarantee/warranty or without a genuine guarantee/warranty.

(ix) Listing of the Goods or Services in irrelevant or inappropriate categories or with vague or conflicting specifications or description (including descriptive or pictorial description).

(x) The Buyer /Seller registering on GeM and/or offering or buying the Goods and/or Services and/or participating in e-bidding/reverse auction on GeM, without the requisite authorization to enter into contract on behalf of the concerned legal entity. Failing which such individual(s) shall be individually liable for its actions and also for any liability arising out of such actions.

(xi) If any Seller has been debarred from GeM then such Seller or their authorized sellers shall also not be permitted to register and offer/sell their products on GeM and / or participate in Bids / RA on GeM.

(xii) Using GeM prices for making procurement outside GeM Portal.

(xiii) Splitting of demands by creating multiple Bids/RAs of same goods / services or making repeated procurements of same goods/services through Direct Purchase / L-1 buying as per rule 149(i) and 9(ii) of GFR- 2017.

(xiv) Uploading goods / services containing information that —

(a) belongs to another person and to which the user does not have any right to;

(b) is grossly harmful, harassing, blasphemous, defamatory, obscene, pornographic, paedophilic, libellous, invasive of another's privacy, hateful, or racially, ethnically objectionable, disparaging, relating or encouraging money laundering or gambling, or otherwise unlawful in any manner whatever;

(c) harm minors in any way;

(d) infringes any patent, trademark, copyright or other proprietary rights;

(e) violates any law for the time being in force;

(f) deceives or misleads the addressee about the origin of such messages or communicates any information which is grossly offensive or menacing in nature;

(g) impersonate another person;

(h) contains software viruses or any other computer code, files or programs designed to interrupt, destroy or limit the functionality of any computer resource;

(xv) threatens the unity, integrity, defence, security or sovereignty of India, friendly relations with foreign states, or public order or causes incitement to the commission of any cognizable offence or prevents investigation of any offence or is insulting any other nation.

(xvi) Achieving or trying to achieve illegal access to features on GeM Website not specifically authorised or exceeding the scope of authorized access to or other features of the GeM Website;

(xvii) Obstructing or causing GeM to lose (in whole or in part) the services provided by any internet service provider ("ISPs") or carrying out any cyber security incident;

(xviii) Sending unsolicited emails, bulk messaging, auto messaging, junk email, spam and like.

24. **Incident management Policy on GeM:** GeM is a trust based system and self-declaration is the key, along with a strong automated process to penalize any deviant behaviour on part of Sellers / Buyers. For this purpose, deviations from the terms and conditions of procurement on GeM, including general terms and conditions, special and additional terms and conditions and any other relevant Government rules and guidelines, are termed as "deviation". A deviation can occur while listing the products on GeM, at pre-contract stage, during bidding or at post contract stage on GeM. The mechanism for reporting and initiating action on such deviation has been detailed in the Incident Management Policy available on GeM portal under Resources. All stake holders of GeM shall be bound by the actions as detailed in the Incident Management Policy.

All administrative actions under this Incident management Policy, taken by GeM against any of the stakeholders shall not cause any limitation on the legal and/or contractual remedies including any financial recoveries, available to Buyers/Sellers under the Terms and Conditions of contract and/or GeM policies. In case the Buyer / Seller choose to pursue any of these remedies, GeM shall not be made party to such proceedings / remedial actions taken by Buyer/Seller under the contractual provisions.

25. **Use of Aadhaar Number in GeM:** Purpose of the Aadhaar authentication in GeM is to identify the user using eKYC. GeM has provisioned the option for Sellers and Buyers to provide virtual Aadhaar ID instead Aadhaar number. GeM receives First Name, Last Name, Mobile Number, Email ID, DOB and Gender details. It is used to link the mobile number with the user who is registering on GeM; on which subsequently OTP is sent for achieving the property of non-repudiation in different artefacts / documents generated on GeM. GeM has provisioned an alternative Identity Information option through PAN based verification to Sellers.

26. **Compliance of Restrictions under Rule 144 (xi) of GFR 2017:** Restrictions on procurement from a bidder of a country which shares a land border with India

I. Any bidder from a country which shares a land border with India will be eligible to bid in this tender only if the bidder is registered with the Competent Authority.

II. "Bidder" (Seller / Service Provider) means any person or firm or company, including any member of a consortium or joint venture (that is an association of several persons, or firms or companies), every artificial juridical person not falling in any of the descriptions of bidders stated hereinbefore, including any agency branch or office controlled by such person, participating in a procurement process.

III. "Bidder from a country which shares a land border with India" for the purpose of this Order means: -

a. An entity incorporated, established, or registered in such a country; or

b. A subsidiary of an entity incorporated, established, or registered in such a country; or

c. An entity substantially controlled through entities incorporated, established, or registered in such a country; or

d. An entity whose beneficial owner is situated in such a country; or

e. An Indian (or other) agent of such an entity; or

f. A natural person who is a citizen of such a country; or

g. A consortium or joint venture where any member of the consortium or joint venture falls under any of the above

IV. The beneficial owner for the purpose of (iii) above will be as under:

1. In case of a company or Limited Liability Partnership, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical person, has a controlling ownership interest or who exercises control through other means. Explanation—

    a. "Controlling ownership interest" means ownership of or entitlement to more than twenty-five per cent. of shares or capital or profits of the company;

    b. "Control" shall include the right to appoint majority of the directors or to control the management or policy decisions including by virtue of their shareholding or management rights or shareholders agreements or voting agreements;

2. In case of a partnership firm, the beneficial owner is the natural person(s) who, whether acting alone or together, or through one or more juridical person, has ownership of entitlement to more than fifteen percent of capital or profits of the partnership;

3. In case of an unincorporated association or body of individuals, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical person, has ownership of

    or

    entitlement to more than fifteen percent of the property or capital or profits of such association or body of individuals;

4. Where no natural person is identified under (1) or (2) or (3) above, the beneficial owner is the relevant natural person who holds the position of senior managing official;

5. In case of a trust, the identification of beneficial owner(s) shall include identification of the author of the trust, the trustee, the beneficiaries with fifteen percent or more interest in the trust and any other natural person exercising ultimate effective control over the trust through a chain of control

or ownership.

V. An Agent is a person employed to do any act for another, or to represent another in dealings with third person.

VI. The successful bidder shall not be allowed to sub-contract works to any contractor from a country which shares a land border with India unless such contractor is registered with the Competent Authority.

Any false declaration and non-compliance of the above would be a ground for immediate termination of the contract and further legal action in accordance with the laws.

Clause 27: Caution Money Deposit:

(i) All sellers on GeM are required to deposit a one-time amount as underas caution money:

a) Seller Turnover less than 1 Crore: Rs 5,000/-

b) Seller Turn over > 1 Crore but < 10 Crore: Rs 10,000/-

c) Seller Turn over > 10 Crore: Rs 25,000/-

(ii) The above caution money shall remain at the disposal of GeM SPV. This can be forfeited in part or in full (as per approval of CEO (GeM)) in following circumstances:

a) Seller rejects or does not accept any Direct Purchase / L-1 Purchase order within defined timelines leading to order auto cancellation.

b) Failure of the seller in executing any GeM contract or if the Seller fails or neglects to observe or perform any of his obligations under the contract (applicable only in respect of contracts that did not have provision of Performance Security / PBG).

c) Withdraws any bid submitted on GeM within the period of validity of the bid.

d) Fails to furnish requisite performance security / PBG as per GeM e-bid / RA conditions.

(iii) In case the Caution Money of any seller is forfeited in full or part and his caution money deposit goes below the threshold indicated in para 1 above, the seller account shall be put on hold till the seller re-coups the caution Money account to required value. Seller's stock will become zero for all categories and seller will not be allowed to update anything till the caution money is topped up to minimum required amount.

(iv) Forfeiture of caution money as per above shall be over and above any otheractions taken against such sellers as per GeM Incident Management Policy and shall be without any prejudice to the rights and remedies available to GeM and / or Buyer as per provisions of the relevant contracts.

Clause 28: CMS 3.0 and OEM - Reseller responsibility matrix:

GeM has implemented enhanced Catalogue Management System (CMS 3.0) on GeM Portal. The Primary Objective of CMS 3.0 is to offer higher level of ownership & accountability to OEMs & its approved Resellers while maintaining Efficiency, Transparency & Inclusiveness of GeM. Complete and detailed Obligations and Privileges matrix of the different stakeholders in different quadrants is given in CMS document available on GeM Portal and OEMs and Resellers are bound to operate on GeM in compliance with the CMS document as updated from time to time.

1) CMS Quadrant 1 (CMS Q1): Product offers in categories under Q1 will be solely offered by GeM validated OEMs. OEM shall be exclusively responsible for maintaining currency and sanity of catalogue and its offer in the Market Place. OEM shall be absolutely and exclusively responsible and be legally liable for sanity and quality of offers including Warranty and After Sales Service obligations.

2) CMS Quadrant 2 (CMS Q2): OEMs as well as pre-Authorized Resellers can offer products in Q2. OEMs shall operate Market Place subject to providing its complete list of Open market authorized sellers along with formal commitment to list and maintain all appropriate and current Product Catalogue for pairing by its Resellers. OEM shall be absolutely and exclusively responsible and be legally liable for sanity and quality of catalogues including Warranty and After Sales Service obligations. Authorize Resellers shall be responsible for Pairing their offer with the already existing Product Catalogue created by the OEM. However, resellers can Update their Offer Price, Stock and Delivery Locations solely at their own discretion and shall be solely responsible for the same.

3) CMS Quadrant 3 (CMS Q3): Catalogue creation in categories under Q3 can be from OEMs and/or their Authorized Resellers concurrently. In case OEM has not created Product Catalogue, Authorized Resellers of OEMs are also permitted to do the same. However, OEM (when registered on GeM and taken OEM Dashboard) shall be responsible for Validating & verifying the Catalogue uploaded by Reseller, Maintaining the Catalogue by adding/updating the Specifications, MRP etc. specific to catalogue. OEM shall also assume all responsibility and legal liability for sanity and quality of offers including Warranty and After Sales Service obligations. However, resellers can Update their Offer Price, Stock and Delivery Locations solely at their own discretion and shall be solely responsible for the same.

4) CMS Quadrant 4 (CMS Q4): Catalogue creation in categories under Q4 can be done by OEMs as well as by any Reseller also. However, OEM (when registered on GeM and taken OEM Dashboard) shall be responsible for Validating & verifying the Catalogue uploaded by Reseller, Maintaining the Catalogue by adding/updating the Specifications, MRP etc. specific to catalogue. However, there is no requirement of any endorsement or authorization of the reseller by the OEM. Resellers can Update their Offer Price, Stock and Delivery Locations solely at their own discretion and shall be solely responsible for the same. Reseller will also be responsible for providing Replacement Warranty in case of Q4 products and Buyer shall not be required to take up with OEM for any warranty claims.

5) CMS (Special Category) : The Special Category is a specialized segment outside the four quadrants for select few categories that require a customized behavior such as Self-Help Groups (SHG) categories.

In Q3 and Q4, in case of re-sellers, if the reseller has not been approved as an authorized re-seller by the OEM on GeM, the re-seller is required to give an undertaking as under while uploading the product, while accepting any order and while participating in any bid:

"I hereby undertake that I have made arrangements for getting the stores from authorized distributor / dealer / channel partner of the OEM of the offered product. At the time of delivery of goods, I will provide necessary chain documents to prove that the supplied goods are genuine and are being sourced from authorized distributor / dealer / channel partner of the OEM. In case of any complaint from the Buyer / Consignee about genuineness of the supplied products, I shall be responsible for providing genuine replacement supplies."

By uploading any product on GeM or accepting any order on GeM or by participating in any bid on GeM, the re-seller is deemed to have given above undertaking and is liable for compliance of the same.

Further in view of the on-line verification of Seller credentials by the OEM on GeM platform, there is no need for Buyer to ask for or insist on furnishing of OEM authorization in bids in respect of "OEM verified Catalogue" offered by "OEM Verified Reseller". OEM authorization is also not required to be sought and checked by Buyers in case of bids for products in Q1 or Q2.

Clause 29: One Bid per Bidder

A Bidder shall submit only one bid in a particular bidding process (unless otherwise allowed in the bid STC / ATC conditions). In case of a holding company having more than one independent manufacturing units or more than one unit having common business ownership / management, only one unit should quote. Similar restrictions shall apply to closely related sister companies. Bidder's sister/ Associated/ Allied concern(s) participating or applying against the same tender, shall lead to disqualification of Bidders. Sister/ Associated/ Allied concern means a company, society, partnership firm or proprietorship firm having one or more common persons as Director/ Partner/ Member/ Owner. A Bidder who submits more than one bid will cause all the proposals submitted in the particular bid to be disqualified. In relation to the above, a person will include firm(s) of Proprietorship / Partnership Firm / Limited Liability Partnership / Private Limited / Limited company
/ Society registered under Society's Act / Statutory Bodies / any other legal entity, as the case maybe, & will be deemed to have submitted multiple bids in a particular bid if a person bids in any of the two formats given below:

a) individual or proprietorship format and/or
b) a partnership or association of persons format and/or
c) a company format

Whereby,

- A company shall for this purpose include any artificial person whether constituted under the Indian laws or of any other country.
- A person shall be deemed to have bid in a partnership format or in association of persons format if he is a partner of the firm which has submitted the bid or is a member of any association of persons which has submitted a bid.
- A person shall be deemed to have bid in a company format if the person holds:
    a) more than 10% (ten percent) of the voting share capital of the company which has submitted a bid, or
    b) is a director and / or Key Managerial Personnel of the company which has submitted a bid, or
    c) holds more than 10% (ten percent) of voting share capital in and/or is a director and / or Key Managerial Personnel of a holding company of that company which has submitted the bid.

By making a bid pursuant to the Tender Documents, the bidder / tenderer shall be deemed to have declared that the bidder / tenderer has not made any other bid or multiple bids as understood or deemed in terms of this clause.

All the bids of a bidder who has submitted multiple bids, as per the clause, shall be rejected and Earnest Money Deposit for all such bids shall be forfeited, not by way of penalty or liquidated damages but by way of reimbursement of the pre-estimated costs likely to be incurred by the buyer towards bidding process and in the scrutiny & evaluation of bids.

In addition to the above, bidders found to be in contravention to the said clause will be liable for administrative actions.

********** **END OF DOCUMENT** **********

Technical Pre-Qualifying Requirements Circuit Breaker:

Substation Package SS01 for (i) 400/220kV AIS Neemuch New S/S including 400kV class Transformer & Bus Reactor, (ii) Extension of 400kV Chittorgarh S/S and (iii) Extension of 400kV Mandsaur S/S associated with Transmission system for evacuation of power from Neemuch REZ through TBCB route

Technical requirements for Circuit Breaker:

(i) The manufacturer(s) whose 400/220/132kV* Circuit Breaker(s) are offered, must have, manufactured, type tested (as per IEC/IS or equivalent standard) and supplied 345/220/132kV* or higher voltage class Circuit Breaker(s), which are in satisfactory operation# for atleast two (2) years as on the date of NOA, i.e. 23.09.2022.

(ii) Alternatively, the manufacturer, who have established manufacturing and testing facilities in India for the offered Circuit Breaker and not meeting the requirement stipulated in (i) above, can also be considered provided that

a) 345/220/132kV* or higher Voltage class Circuit Breaker(s) must have been manufactured in the above Indian works & type tested (as per IEC/IS standard) and supplied as on the date of NOA, i.e. 23.09.2022.

b) In case manufacturer meets the technical requirement through clause (ii) above, warranty obligations for additional warranty of two (2) years over & above the warranty period as specified in the bidding documents shall be applicable for the entire quantity of the offered Circuit Breaker(s) to be supplied under the contract. Further, bidder shall furnish performance guarantee for an amount of 3% of the ex-works cost of the Circuit Breaker(s)* for the additional warranty period in addition to the contract performance guarantee to be submitted by the bidder.

Legend:

* : voltage class of respective circuit breaker as applicable.

: satisfactory operation means certificate issued by the Employer/Utility certifying the operation without any adverse remark.

NOA: Notification Of Award

Prepared By: Satyaki Chaudhuri (Manager) Satyaki Chaudhuri 18/10/22

Checked By: Neeraj Kumar (DGM) 19.10.2022

Approved By: Sanjeev K. Shrivastava (Sr DGM) 18.10.2022

BHARAT HEAVY ELECTRICALS LIMITED

TRANSMISSION BUSINESS ENGINEERING MANAGEMENT

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DOCUMENT No.	TB-418-316-001	Rev. No.	00	Prepared	Checked	Approved
TYPE OF DOC.	TECHNICAL SPECIFICATION		SIGN	Satyaki Chadha		Sanjay
TITLE			NAME	SC	NK	SKS
420kV, 245kV & 72.5kV Circuit Breaker			DATE	18/10/2022	18/10/2022	18/10/2022
			GROUP	TBEM	W.O. No	Awaited

CUSTOMER	***POWERGRID NEEMUCH TRANSMISSION SYSTEM LIMITED***
PROJECT	**Substation Package SS01 for (i) 400/220kV AIS Neemuch New S/S including 400kV class Transformer & Bus Reactor, (ii) Extension of 400kV Chittorgarh S/S and (iii) Extension of 400kV Mandsaur S/S associated with Transmission system for evacuation of power from Neemuch REZ through TBCB route**
NOA NO.	**TBCB/Neemuch REZ/400kV AIS/SS01/G5/NOA-I/05 dtd. 23/09/2022 & TBCB/Neemuch REZ/400kV AIS/SS01/G5/NOA-II/06 dtd. 23/09/2022**
Station	**400/220kV AIS Neemuch New S/S, Madhya Pradesh** **Extension of 400kV Chittorgarh S/S, Rajasthan** **Extension of 400kV Mandsaur S/S , Madhya Pradesh**

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SECTION-1

Scope, Bill of Quantity, Specific Technical Requirements

1.1 Scope

This technical specification covers the requirements of design, manufacture, inspection and testing at manufacturer's works, proper packing and delivery to project sites and supervision of erection, testing & commissioning of 420kV, 245kV & 72.5kV Circuit Breaker complete in all respect for efficient & trouble free operation mentioned under this specification.

The equipment is required for the following project:

Name of the customer	:	**POWERGRID NEEMUCH TRANSMISSION SYSTEM LIMITED**
Name of the project	:	**Substation Package SS01 for (i) 400/220kV AIS Neemuch New S/S including 400kV class Transformer & Bus Reactor, (ii) Extension of 400kV Chittorgarh S/S and (iii) Extension of 400kV Mandsaur S/S associated with Transmission system for evacuation of power from Neemuch REZ through TBCB route**
Site	:	**400/220kV AIS Neemuch New S/S, Madhya Pradesh** **Extension of 400kV Chittorgarh S/S, Rajasthan** **Extension of 400kV Mandsaur S/S , Madhya Pradesh**

***Note: The terms used in this specification namely, "Employer" refers to PowerGrid , "POWERGRID" refers to BHEL/POWERGRID, "Contractor" refers to Bidder, "GTR" refers to "section-3".**

In case of any conflict among the various sections of this specification, the order of precedence shall be section 1, section 2 & the section 3.

1.2 Bill of Quantities

1.2.1 Main Supply:

S. No.	Item Description	Unit	Quantity			
			Neemuch	Chittorgarh	Mandsaur	TOTAL
1	SUPPLY- CIRCUIT BREAKER : 420KV 63KA FOR 1S 25MM/KV CREEPAGE 3150A, 3 PHASE CIRCUIT BREAKER WITHOUT PIR, ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXES AND ALL ACCESSORIES COMPLETE IN ALL RESPECT EXCLUDING FOUNDATION BOLT	Nos.	11	3	2	16
2	SUPPLY- CIRCUIT BREAKER: CONTROLLED SWITCHING DEVICE FOR 420KV, 3-PH CIRCUIT BREAKER	Nos.	2	0	0	2
3	SUPPLY- CIRCUIT BREAKER : 245KV 50KA FOR 1S 25MM/KV CREEPAGE 3150A, 3 PHASE CIRCUIT BREAKER WITHOUT PIR, ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXES AND ALL ACCESSORIES COMPLETE IN ALL RESPECT EXCLUDING FOUNDATION BOLT	Nos.	1	0	0	1
4	SUPPLY- CIRCUIT BREAKER: 245KV 50KA FOR 1S 25MM/KV CREEPAGE 1600A, 3 PHASE CIRCUIT BREAKER WITHOUT PIR, ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXES AND ALL ACCESSORIES COMPLETE IN ALL RESPECT EXCLUDING FOUNDATION BOLT	Nos.	5	0	0	5
5	SUPPLY- CIRCUIT BREAKER: 72.5KV 25KA FOR 1S 25MM/KV CREEPAGE 1250A, 3 PHASE CIRCUIT BREAKER WITHOUT PIR, ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXES AND ALL ACCESSORIES COMPLETE IN ALL RESPECT EXCLUDING FOUNDATION BOLT	Nos.	1	0	0	1
6	SUPPLY- CIRCUIT BREAKER : 400KV, FOUNDATION BOLTS FOR CIRCUIT BREAKER, PLATFORM AND LADDER	Lot	1	1	1	3
7	SUPPLY- CIRCUIT BREAKER: 220KV, FOUNDATION BOLTS FOR CIRCUIT BREAKER, PLATFORM AND LADDER	Lot	1	0	0	1

8	SUPPLY- CIRCUIT BREAKER: 72.5KV, FOUNDATION BOLTS FOR CIRCUIT BREAKER, PLATFORM AND LADDER	Lot	1	0	0	1
9	SUPPLY- CIRCUIT BREAKER: TRANSDUCERS / FIXTURES REQUIRED FOR TRAVEL MEASUREMENT OF COMPLETE 3-PHASE CB	Lot	1	1	1	3
10	SUPPLY- CIRCUIT BREAKER: SF6 GAS FILLING ADOPTER, INCLUDING COUPLING, REGULATOR, CONNECTING HOSE PIPE UP TO GROUND LEVEL	Lot	1	1	1	3
11	SUPPLY- CIRCUIT BREAKER: SPECIAL CABLES FOR CB / CSD / RP INTERFACING.	Mtr.	300	0	0	300
12	SPARES- CIRCUIT BREAKER: 420KV 63KA FOR 1S 25MM/KV CREEPAGE 3150A , ONE COMPLETE POLE (Phase) OF CB WITHOUT PIR, WITH GRADING CAPACITOR (IF APPLICABLE), POLE COLUMN INTERRUPTER, OPERATING MECHANISM, MARSHALLING BOX AND CORONA RING, EXCLUDING SUPPORT STRUCTURE	Pole (No.)	1	1	1	3
13	SPARES- CIRCUIT BREAKER: 400KV, GRADING CAPACITORS (if applicable)	Nos.	2	2	2	6
14	SPARES- CIRCUIT BREAKER: 400KV, Rubber Gasket “O Ring” and seals	Set	1	1	1	3
15	SPARES- CIRCUIT BREAKER: 400KV, Trip coils with resistor (as applicable)	Set	2	2	2	6
16	SPARES- CIRCUIT BREAKER: 400KV, Closing coils with resistor (as applicable)	Set	2	2	2	6
17	SPARES- CIRCUIT BREAKER: 400KV, Terminal Pads (One No of each type)	Set	2	2	2	6
18	SPARES- CIRCUIT BREAKER: 400KV, Molecular filter	Nos.	2	2	2	6
19	SPARES- CIRCUIT BREAKER: 400KV, Corona Rings (if applicable)	Nos.	1	1	1	3
20	SPARES- CIRCUIT BREAKER: 400KV, Relay, Power contactors, switch fuse units, limit switches fuse units, limit switches, push buttons, timers & MCB etc	Set	1	1	1	3
21	SPARES- CIRCUIT BREAKER: 400KV, Pressure Switch of each type	Set	1	1	1	3
22	SPARES- CIRCUIT BREAKER: 400KV, Auxiliary Switch assembly	Set	1	1	1	3
23	SPARES- CIRCUIT BREAKER: 400KV, Operation Counter	No.	1	1	1	3

24	SPARES- CIRCUIT BREAKER: 400KV, Complete Drive Mechanism	Set	1	1	1	3
25	SPARES- CIRCUIT BREAKER: 400KV, SF6 Gas (Equivalent to 2 Poles)	Lot	1	1	1	3
26	SPARES- CIRCUIT BREAKER: 220KV 50KA FOR 1S 25MM/KV CREEPAGE 3150A, ONE COMPLETE POLE (Phase) OF CB WITHOUT PIR, WITH GRADING CAPACITOR (IF APPLICABLE), POLE COLUMN INTERRUPTER, OPERATING MECHANISM, MARSHALLING BOX AND CORONA RING, EXCLUDING SUPPORT STRUCTURE	Pole (No.)	1	0	0	1
27	SPARES- CIRCUIT BREAKER: 220KV, GRADING CAPACITORS (if applicable)	Nos.	2	0	0	2
28	SPARES- CIRCUIT BREAKER: 220KV, Rubber Gasket “O Ring” and seals	Set	1	0	0	1
29	SPARES- CIRCUIT BREAKER: 220KV, Trip coils with resistor (as applicable)	Set	2	0	0	2
30	SPARES- CIRCUIT BREAKER: 220KV, Closing coils with resistor (as applicable)	Set	2	0	0	2
31	SPARES- CIRCUIT BREAKER: 220KV, Terminal Pads (One No of each type)	Set	2	0	0	2
32	SPARES- CIRCUIT BREAKER: 220KV, Molecular filter	Nos.	2	0	0	2
33	SPARES- CIRCUIT BREAKER: 220KV, Corona Rings (if applicable)	Nos.	1	0	0	1
34	SPARES- CIRCUIT BREAKER: 220KV, Relay, Power contactors, switch fuse units, limit switches fuse units, limit switches, push buttons, timers & MCB etc	Set	1	0	0	1
35	SPARES- CIRCUIT BREAKER: 220KV, Pressure Switch of each type	Set	1	0	0	1
36	SPARES- CIRCUIT BREAKER: 220KV, Auxiliary Switch assembly	Set	1	0	0	1
37	SPARES- CIRCUIT BREAKER: 220KV, Operation Counter	No.	1	0	0	1
38	SPARES- CIRCUIT BREAKER: 220KV, Complete Drive Mechanism	Set	1	0	0	1
39	SPARES- CIRCUIT BREAKER: 220KV, SF6 Gas (Equivalent to 2 Poles)	Lot	1	0	0	1
40	SERVICES- CIRCUIT BREAKER : 400KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF 3 PHASE CIRCUIT BREAKER WITHOUT PIR	Nos.	11	3	2	16

41	SERVICES- CIRCUIT BREAKER : 400KV, SUPERVISION OF ERECTION TESTING AND COMMISSIONING OF CONTROLLED SWITCHING DEVICE FOR 3-PH CIRCUIT BREAKER	Nos.	2	0	0	2
42	SERVICES- CIRCUIT BREAKER: 245KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF 3 PHASE CIRCUIT BREAKER WITHOUT PIR	Nos.	6	0	0	6
43	SERVICES- CIRCUIT BREAKER: 72.5KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF 3 PHASE CIRCUIT BREAKER WITHOUT PIR	Nos.	1	0	0	1

Notes –

1. The above quantities may vary ± 25%.
2. Prices for all applicable accessories of Circuit Breakers shall be included in the equipment prices.
3. Respective dates for the commencement of erection, testing and commissioning activities of Circuit Breakers shall be communicated to manufacturers from time to time as per the readiness of respective sites.
4. For item at Sl. No. 6,7,8,9 ,10, each lot is defined as the total quantity required for successful completion of all Circuit Breakers under supply.
5. For items at Sl. No. 14-17,20-22,24,28-31,34-36,38, 1 (one) Set is defined as quantity required for 1 (one) pole of Circuit Breaker.

1.3 Specific Technical Requirements

1.3.1 Technical Parameters –

Sl. no.	Parameter	400kV system	220kV system	66 kV system
1.	Rated voltage (Umax) kV (rms)	420	245	72.5
2.	Rated frequency (Hz)	50	50	50
3.	No. of poles	3	3	3
4.	Type of circuit breaker	SF6 gas insulated	SF6 gas insulated	SF6 gas insulated
5.	Rated continuous current (A) at an ambient temperature of 50^0C	3150	1600/3150 (as applicable)	1250
6.	Rated short circuit capacity with percentage of DC component as per IEC62271-100 corresponding to minimum opening time under operating conditions specified.	63kA	50 kA	25kA

7.	Symmetrical interrupting capability kA (rms)	63	50	25
8.	Rated short circuit making current kAp	157.5	125	63
9.	Short time current carrying capability kA (rms)	63 for one second	50 for one second	25 for three second
10.	Out of phase breaking current carrying capability kA (rms)	15.75	As per IEC	As per IEC
11.	Rated line charging interrupting current at 90 deg. Leading power factor angle (A rms) (The breaker shall be able to interrupt the rated line charging current with test voltage immediately before opening equal to the product of U/√3 and 1.4 as per IEC-62271-100	600	As per IEC	As per IEC
12.	First pole to clear factor	1.3	1.3	1.5
13.	Temperature rise over an ambient temperature of 50^0C	As per IEC: 62271-100	As per IEC: 62271-100	As per IEC: 62271-100
14.	Rated break time as IEC (ms)	40	60	Less than 75
15.	Total break time (ms)	45	65	Less than 80
16.	Total closing time (ms)	Not more than 150	Not more than 150	Not more than 150
17.	Operating mechanism or a combination of these	Spring	Spring	Spring
18.	Rated operating duty cycle	O-0.3s-CO-3 min-CO	O-0.3s-CO3 min-CO	O-0.3s-CO-3 min-CO
19.	Reclosing	Single phase &Three phase auto reclosing.	Single phase &Three phase auto reclosing.	Three phase auto reclosing.
20.	Pre-insertion resistor requirement	NA	NA	NA
i)	Rating (ohms)	Approx. 400 with tolerance as applicable	NA	NA
ii)	Minimum electrical (mechanical insertion time +pre-arcing time) preinsertion time (ms)	8	NA	NA

iii)	Opening of PIR contacts	PIR contacts should open immediately after closing of main contacts OR At least 5 ms prior to opening of main contacts at rated air/gas pressure where the PIR contacts remain closed	NA	NA
21.	Max. difference in the instants of closing/opening of contacts (ms) between poles at rated control voltage and rated operating & quenching media pressures	2. 5(within a pole) 3. 3(opening) 5.0(closing)	3.3(opening) 5.0(closing)	As per IEC
22.	Maximum allowable switching over voltage under any switching condition	2.3 p.u.	As per IEC	As per IEC
23.	Trip coil and closing coil voltage with variation as specified	220V DC	220V DC	220V DC or 110V DC
24.	Noise level at base and up to 50 m distance from base of circuit breaker	140dB (max.)	140dB (max.)	140dB (max.)
25.	Rating of Auxiliary contacts	10A at 220V DC	10A at 220V DC	10A at 220V DC
26.	Breaking capacity of Aux. Contacts	2A DC with circuit time constant not less than 20ms	2A DC with circuit time constant not less than 20ms	2A DC with circuit time constant not less than 20ms
27.	**Rated insulation levels**			
i)	Full wave impulse withstand (1.2 /50 μs) between line terminals and ground	±1425 kVp	±1050 kVp	±325 kVp
ii)	Full wave impulse withstand (1.2 /50 μs) between terminals with circuit breaker open	1425 kVp impulse on one terminal & 240 kVp power frequency voltage of opposite polarity on the other terminal	±1050 kVp	±325 kVp
iii)	Rated switching impulse withstand voltage (250/2500 μs) Dry & wet between line terminals and ground	+1050 kVp	NA	NA

		.		
iv)	Rated switching impulse withstand voltage (250/2500 µs) Dry &wet Between terminals with circuit breaker open	900 kVp impulse on one terminal & 345 kVp power frequency voltage of opposite polarity on the other terminal	NA	NA
v)	One minute power frequency dry withstand voltage between line terminals and ground	520 kV rms.	460 kV rms.	140 kV rms
vi)	One minute power frequency dry withstand voltage between terminals with circuit breaker open	610 kV rms.	460 kV rms.	160 kV rms
28.	Minimum corona extinction voltage with CB in all positions	320kV rms	156 kV rms	NA
29.	Max. radio interference voltage for frequency between 0.5 MHz and 2 MHz (Micro volts)	1000 µV (at 266kV rms)	1000 µV (at 156kV rms)	NA
30.	Minimum Creepage distance*			
i)	Phase to ground (25mm/kV)	10500mm	6125mm	1813mm
ii)	Between CB terminals	10500mm	6125mm	1813mm
31.	System neutral earthing	Effectively earthed		
32.	Rated terminal load	As per IEC or as per the value calculated based on specific switchyard layout requirement, whichever is higher.		
33.	Auxiliary contacts	Besides requirement of technical specification, the manufacturer/bidder shall wire up 10 NO + 10 NC contacts exclusively for purchaser's use and wired up to common marshalling box.		
34.	No. of terminals in common marshalling box	All contacts & control circuits to be wired out up to common marshalling box + minimum 24 terminals exclusively for purchaser's future use		
35.	Seismic level	0.5g horizontal for the site location under the Zone-V as per IS-1893 0.3g horizontal for the site location under other than the Zone-V as per IS1893		

For other parameters, refer respective section 2 for the applicable voltage class of Circuit Breakers. The technical parameters of Circuit Breakers shall be as per latest Powergrid specification Section: Switchgear-CB, REV.11 C/ENGG/SPEC/SWGR/CB, DEC-2016(Sec-02).

1.3.2 Additional Specific Technical Requirements

A) Circuit Breaker:

i. All cables within & between circuit breaker poles and its marshalling box and up to the controlled switching device shall be in bidder's scope of supply. Bidder to provide detailed "**Bill of Quantity**" during detailed engineering stage.
ii. Cabling & termination schedule for the same shall be provided by successful bidder along with AS MANUFACTURED drawing during contract stage.
iii. TB's for incoming AC Power Cables shall be suitable for size (minimum) **4Cx16** sq. mm. Al.
iv. LED luminaries/light is to be provided as per technical requirement (minimum 7 watt).
v. Following minimum accessories are clarified as bidder's scope of supply
- **Structure** for Equipment support, Ladder & Platform etc.
- **Foundation bolts** for Circuit Breaker, CB ladder, CB Platform, common control cubicle.
- **Cable Tray** arrangement to be mounted on Breaker structure.
- Breaker **Terminal pad**.

vi. Following are not in bidder's scope of supply (BHEL supplied items)
- Terminal Connectors.

B) Specific Technical Requirements for CSD:

i. CSD shall be deployed for optimization of switching behavior of bidder supplied Circuit Breaker (under present scope).
ii. Where Control switching device is being provided for Circuit Breaker, it is the bidders responsibility to ensure compatibility with CB. Complete interfacing with CB and offered CSD shall be in bidder's scope. Any additional item like transducer, contact multiplication relay, switches, special/screened cables, modification hardwired, modification in schematics (if any) required for interfacing and for complying to the technical specification requirement shall be in bidder's scope and shall be included in quoted price.
iii. Supervision of Erection, Testing & Commissioning of CSD shall be in bidder's scope.
iv. The CSD should have display facility at the front for the display of settings and measured values. In case where CSD does not have complete display facility for settings and measured values, bidder to supply one number laptop PC with pre-installed, licensed software for each site. Cost of the same shall be deemed included in offer.
v. Special cables (i.e. screened/FO cable) other than 1100V LT Power & Control cables required for CB/CSD/Relay Panel interfacing shall be in bidder's scope.

C) Other Technical Requirement:

i. All equipments shall perform satisfactorily under various other electrical, electromechanical and meteorological conditions of the site of installation.
ii. All equipment shall be able to withstand all external and internal mechanical, thermal and electromechanical forces due to various factors like wind load, temperature variation, ice & snow, (wherever applicable) short circuit etc. for the equipment.
iii. The equipment shall also comply with the following:
    - To facilitate erection of equipment, all items to be assembled at site shall be "match marked".
    - All piping, if any between equipment control cabinet/operating mechanism to marshalling box of the equipment, shall bear proper identification to facilitate the connection at site.
iv. Bidder to submit detailed "guaranteed and technical particulars" and "detailed drawings" for Circuit Breakers during contract stage for approval. Bidder may need to visit to BHEL/Powergrid corporate engineering office, at his own cost, for drawing/document approval if standard approval is not available.

1.3.3 Technical Qualifying Requirement

Technical requirements for Circuit Breaker :

(i) The manufacturer(s) whose 400/220/132kV* Circuit Breaker(s) are offered, must have, manufactured, type tested (as per IEC/IS or equivalent standard) and supplied 345/220/132kV* or higher voltage class Circuit Breaker(s), which are in satisfactory operation# for atleast two (2) years as on the date of NOA, i.e. 23.09.2022.

(ii) Alternatively, the manufacturer, who have established manufacturing and testing facilities in India for the offered Circuit Breaker and not meeting the requirement stipulated in (i) above, can also be considered provided that

a) 345/220/132kV* or higher Voltage class Circuit Breaker(s) must have been manufactured in the above Indian works & type tested (as per IEC/IS standard) and supplied as on the date of NOA, i.e. 23.09.2022.

b) In case manufacturer meets the technical requirement through clause (ii) above, warranty obligations for additional warranty of two (2) years over & above the warranty period as specified in the bidding documents shall be applicable for the entire quantity of the offered Circuit Breaker(s) to be supplied under the contract. Further, bidder shall furnish performance guarantee for an amount of 3% of the ex-works cost of the Circuit Breaker(s)* for the additional warranty period in addition to the contract

performance guarantee to be submitted by the bidder.

Legend:

* : voltage class of respective equipment as applicable.

: satisfactory operation means certificate issued by the Employer/Utility certifying the operation without any adverse remark.

NOA: Notification Of Award

1.3.4 Type Tests

a. All equipment being supplied shall conform to type tests as per technical specification and shall be subject to routine tests in accordance with requirements stipulated under section II.

b. The reports for all type tests as per technical specification shall be furnished by the Bidder along with equipment / material drawings. However, type test reports of similar equipments/ material already accepted in POWERGRID shall be applicable for all projects with similar requirement. The type tests conducted earlier should have either been conducted in accredited laboratory (accredited based on ISO / IEC Guide 25 / 17025 or EN 45001 by the national accreditation body of the country where laboratory is located) or witnessed by POWERGRID/representative authorized by POWERGRID/representative of Utility /representative of accredited test lab/ representative of The National Accreditation Board for Certification Bodies(NABCB) certified agency shall also be acceptable.

   Unless otherwise specified elsewhere, the type test reports submitted shall be of the tests conducted within 10 years from the date of NOA (23-09-2022). In case the test reports are of the test conducted earlier than the years specified date of NOA, the Bidder shall repeat these test(s) at no extra cost to BHEL/Employer.

c. Further, in the event of any discrepancy in the test reports i.e. any test report not acceptable due to any design/manufacturing changes or due to non-compliance with the requirement stipulated in the Technical Specification or any/all type tests not carried out, same shall be carried out without any additional cost implication to the Employer/BHEL.

1.3.5 SUPERVISION OF ERECTION COMMISSIONING AND TESTING:

Supervision of Erection, testing and commissioning of all the supplied Circuit Breakers are in the bidder's scope. Bidder shall quote lump-sum price for supervision of installation, testing and commissioning of all offered breakers. Supplier's testing engineer shall bring SF6 gas

leak detector, SF6 gas filling adopter, timing kit and Transducer for operational analyser (as per requirement).

Required unskilled man power / Labor, tools (other than special tools and tackles which shall be in bidder's scope) shall be provided by BHEL.

The measurement at site shall be carried out as per Powergrid Standard Pre-commissioning procedures as indicated in Section-2 Technical Specification. The commissioning report shall be prepared and signed by the manufacturer's representative.

Following Instruments shall be made available by BHEL to testing engineer
a) 5kV Insulation tester
b) 1kV Insulation tester
c) Single phase variac
d) Dew Point meter
e) Capacitance and Tan Delta Kit
f) Contact Resistance measurement kit
g) Multimeter

All instruments listed above are indicative only.

Any other instrument(s), if required for Testing/commissioning of Circuit Breaker shall be arranged by bidder. Cost of the same shall be deemed inclusive in the offer.

The respective dates of commencement of erection, testing and commissioning activities by BHEL will be intimated to the equipment supplier from time to time, so that arrangements for supervising the activity can be made accordingly by the manufacturer.

1.3.6 Special Tools and Tackles

Bidder shall supply all special tools and tackle (other than maintenance tools as if mentioned in BOQ) which are specifically required for Circuit Breakers and are proprietary in nature. Cost of the same shall be deemed inclusive in the offer for main item. List of such special tools and tackle should be clearly listed along with the technical offer. Any special tool which is not listed in the technical spec / bid but required during the erection/commissioning of Circuit Breakers shall also be supplied by the bidder without time / cost implication.
In case, special tools and tackles which is proprietary in nature is not required for Erection/testing/commissioning or for smooth operation of Circuit Breaker, supplier has to submit a certificate mentioning that no special tools and tackles is required for Circuit Breakers.

1.3.7 Quality Plan

Bidder should have POWERGRID approved and valid SMQP by the date of technical bid opening..

1.3.8 Technical Deviations

The bidder shall list all the deviation from the specification separately. Offers without specific deviation will be deemed to be totally in compliance with the specification and NO DEVIATION on any account will be entertained at a later date.

1.3.9 Approval of Engineering Drawings and Documents

Date of Submission of first lot of drawings will be counted only from the date of submission of reasonably correct drawings. List of drawings required for technical clearance of manufacturing are as follows:

1. Approved GTP
2. Approved GA.
3. Approved Type Test Reports

SECTION-2

Refer Technical Specification, Section: Switchgear-CB, REV.11 C/ENGG/SPEC/SWGR/CB, DEC-2016

Section-2
Standard Technical Specification
Doc No. TB-418-316-001, Rev-0

TECHNICAL SPECIFICATION SECTION: SWITCHGEAR-CB REVISION-11

Remark - Please read Terminology of Section-2 of Technical Specification as follows :-
1. Read "GTR" as "Section-3 of Technical Specification".
2. Read "Powergrid" as "BHEL/Powergrid".
3. Read "Employer" as "Powergrid".
4. Read "Contractor" as Bidder.

Summary of major changes made in this revision w.r.t earlier Technical Specification, Section: Switchgear, Chapter-CB, Rev.10A & Section: Switchgear, Chapter 765kV CB, Rev.02

1) Technical specification, Section: Switchgear, Chapter 765kV CB, Rev.02 and Section: Switchgear, Chapter CB, Rev.10A are merged to prepare this combined technical specification section up to 765kV CB.

2) All 765kV & 400kV Circuit Breaker control schematics shall be finalized in such a way, that it may operate with or without CSD (refer clause 1.6)

3) Some duty requirements parameters added/modified (refer clause 2.0)

4) SF6 gas for main CBs shall be supplied in returnable cylinders (refer clause 5.0)

5) Insulators for Circuit breakers can be of Porcelain/polymer type (refer clause 6.0)

6) Included Indicative platform & ladder drawing for 400kV&765kV CB (refer clause 9.0)

7) Included Plug-in type arrangement for termination of inter pole cables (refer clause 11.0)

8) Included Technical parameters for 72.5kV CB (refer clause 16.0)

9) Some parameters like dielectric, creepage, seismic requirement etc w.r.t CBs are included (refer clause 16.0)

10) Included Actions required for defects observed during defect liability period (refer clause 18.0)

Note:
Changes made in this document are shown with bold letters, further major changes are listed above; however for complete details of changes, please refer the complete technical specification, Section: Switchgear-CB, REV.11

SECTION: SWITCHGEAR–CB (CIRCUIT BREAKER)

CONTENTS

SECTION: SWITCHGEAR–CB (CIRCUIT BREAKER)

1.0 GENERAL

1.1 The circuit breakers and accessories shall conform to IEC: 62271-100, IEC: 62271-1 and other relevant IEC standards except to the extent explicitly modified in the specification and shall also be in accordance with requirements specified in Section-GTR.

1.2 800/420/245/145/**72.5**kV circuit breakers offered would be of sulphur hexafluoride (SF6) type and of class C2-M2 as per IEC. The bidder may offer circuit breakers of either live tank type or dead tank type of proven design.

1.3 The circuit breaker shall be complete with operating mechanism, **common marshalling box**, piping, inter-pole cables, cable accessories like glands, terminal blocks, marking ferrules, lugs, pressure gauges, density monitors (with graduated scale), galvanised support structure, **platform with ladder** for CB, their foundation bolts and all other accessories required for carrying out all the functions of the CB.

All necessary parts to provide a complete and operable circuit breaker installation such as terminal pads, control parts and other devices shall be provided.

1.4 Painting shall be done in line with Section – GTR. **Paint shade RAL-7032** or similar shades can be used for painting. The support structure, **platform & ladder** of circuit breaker shall be hot dip galvanised. Exposed hardware items shall be hot dip galvanised or Electro-galvanised.

1.5 The circuit breakers shall be designed for use in the geographic and meteorological conditions as given in Section-**Project**.

1.6 **All 765kV & 400kV Circuit Breaker control schematics shall be finalized in such a way, that it may operate with or without CSD by using a suitable selector switch irrespective of whether circuit breakers to be supplied are envisaged along with CSD or not as per bid price schedules.**

2.0 DUTY REQUIREMENTS

2.1 The circuit breakers shall be capable of performing their duties without opening resistors.

2.2 The circuit breaker shall meet the duty requirements for any type of fault or fault location **and** also for line switching when used on effectively grounded system and perform make and break operations as per the stipulated duty cycles satisfactorily.

2.2.1 PRE-INSERTION RESISTER

800kV & 420kV circuit breakers shall be provided with single step pre-insertion closing resistors **(wherever the requirement of PIR is explicitly specified in bid price schedules)** to limit the switching surges. The resistance value of pre-insertion resistor and the duration of pre-insertion time **is** given in clause **16.0** of this section. The resistor shall have thermal rating for the following duties:

i) TERMINAL FAULT

Close .... 1 Min .... Open Close Open…..2 min ..... Close ..... 1 Min ..... Open Close Open.

ii) RECLOSING AGAINST TRAPPED CHARGES

Duty shall be the same as under (i) above. The first, third and fourth closures are to be on de - energised line while second closing is to be made with lines against trapped charge of 1.2 p.u. of opposite polarity.

iii) OUT OF PHASE CLOSING

One closing operation under phase opposition, that is with twice the voltage across the terminals.

iv) No allowance shall be made for heat dissipation of resistor during time interval between successive closing operations. The resistors and resistor supports shall perform all these duties without deterioration. Test reports of resistors proving thermal rating for duties specified above shall be furnished during detailed engineering. The calculations shall be provided to take care of the effect of tolerances on resistance values and insertion time.

2.3 The breaker shall be capable of:

i) Interrupting the steady and transient magnetizing current corresponding to Power transformers as follows:

Voltage rating of CB	**Type of Transformer**	**Rating (in MVA)**
800kV	**765/400kV**	**250 to 1500**
420kV	**765/400kV**	**250 to 1500**
	400/220kV	**250 to 630**
	400/132kV	**160 to 315**
245kV	**400/220kV**	**200 to 630**
	220/132kV	**50 to 200**

	220/66kV	**50 to 200**
145kV	**220/132kV**	**50 to 200**
	132/33kV	**10 to 50**

ii) Interrupting line/cable charging current as per IEC without use of opening resistors. **The breaker shall be able to interrupt the rated line charging current as per IEC-62271-100 with test voltage immediately before opening equal to the product of U/√3 and 1.4**

iii) Clearing short line fault (kilometric faults) with source impedance behind the bus equivalent to symmetrical fault current specified.

iii) Breaking 25% of the rated fault current at twice rated voltage under phase opposition condition.

i**v) Withstanding all dielectric stresses imposed on it in open condition at lock out pressure continuously (i.e. shall be designed for 2 p.u. across the breaker continuously, for validation of which a power frequency withstand test conducted for a duration of at least 15 minutes is acceptable).**

v) Circuit breakers shall be able to switch in and out the shunt reactor as detailed below:

Voltage rating of CB	**Reactor Rating (in MVAR)**	**Max. rise of over voltage (in p.u.)**
800kV	**150 to 330**	**1.9**
420kV	**50 to 150**	**2.3**
245kV	**25 to 50**	**2.3**

a. Capability of 400 kV circuit breakers to interrupt inductive current below 100 A without giving rise to overvoltage more than 2.3 p.u. (As specified in IEC-62271-110) shall be validated by carrying out the simulation study/analysis (EMTP/PSCAD) by modeling an equivalent circuit comprising all circuit component i.e. Inductance of Shunt Reactor, Stray capacitance of Shunt Reactor, Circuit Breaker, Stray capacitance of Bus Connection, Capacitance of grading Capacitor, inductance of neutral grounding reactor, Network Thevenin's equivalent, any other series/parallel inductance/capacitance connected to simulate the actual inductive load switching.

b. Current chopping capability (chopping number) of circuit breaker as per IEC-62271-306 to be figured out from actual Laboratory test and / or field test report and same Current chopping capability (chopping number) shall be used in above said simulation study/analysis.

c. To validate the results of above said simulation study/analysis report, the same study shall be carried out for capability of tested circuit breaker and the study/analysis results shall be comparable with actual Laboratory test and / or field test reports.

d. Laboratory test/ field test reports shall be submitted for 400 kV CBs in case there is change in design including change in following:

i. Different short circuit current capability

ii. Different model/type

vi) The breakers shall also withstand the voltages specified under clause **16.0** of this section.

2.6 CONTROLLED SWITCHING DEVICE (CSD) :

Circuit Breakers shall be equipped with controlled switching **device** with consequent optimization of switching behavior, when used in:

- Switching of transformer **(from 765kV and 400kV side circuit breakers only)**
- Switching of shunt Reactor

The CSD shall be provided in Circuit breaker of switchable line reactor **bay** and in Main & Tie **bay** circuit breakers of Transformers, line with non-switchable line reactors and Bus reactors. **The CSD shall be supplied as per bid price schedules.**

2.6.1 Technical Requirement for controlled switching device:

a) The CSD shall be designed to operate correctly and satisfactorily with the excursion of auxiliary A/C & DC voltages and frequency as specified in section - GTR.

b) The CSD shall meet the requirements **of IEC-61000-4-16 class IV** for HF disturbance test **(for short and long durations both)** and fast transient test shall be as per **IEC-61000-4-4 level IV** and insulation test as per IEC 60255–5.

c) The CSD shall have functions for switching ON & OFF the circuit breakers.

d) The CSD shall get command to operate the breakers manually. The controller shall be able to analyze the current and voltage waves available through the signals from secondaries of CTs & CVTs for the purpose of calculation of optimum moment of the switching the circuit breaker and issue command to circuit breaker to operate.

e) The CSD shall also have an adaptive control feature to consider the next operating time of the breaker in calculation of optimum time of issuing the switching command. In calculation of next operating time of the breaker, the CSD must consider all factors that may affect the operating time of the breaker such as, but not limited to, ambient temperature, control voltage variation, SF6 gas density variations etc. Schematic drawing for this purpose shall be provided by the contractor. The accuracy of the operating time estimation by the controller shall be better than **± 0.5 ms.**

f) The CSD should have display facility at the front for the display of settings and measured values.

In case where CSD does not have adequate display facility for settings and measured values, bidder to supply one number laptop PC with pre-installed/licensed software for each site. Cost of the same shall be deemed included in offer.

g) The CSD shall be PC compatible for the setting of various parameters and down loading of the settings and measured values, date, time of switching etc. Window based software for this purpose shall be supplied by the contractor to be used on the owner's PC.

h) The controller shall be suitable for current input of 1 ampere from the secondary of the CTs. and 110 V (Ph to Ph) from the CVTs. The CSD shall **withstand** transient and dynamic state values of the current from the secondary of the CTs and CVTs.

i) The CSD shall have time setting resolution of 0.1 ms or better.

j) The CSD shall have sufficient number of output/input potential free contacts for connecting the monitoring equipment and annunciation system available in the control room. Necessary details shall be worked out during engineering of the scheme.

k) The CSD shall also record and monitor the switching operations and make adjustments to the switching instants to optimize the switching behavior as necessary. It shall provide self-diagnostic facilities, signaling of alarms and enable downloading of data captured from the switching events.

l) The provision for bypassing the Controlled switching device shall be provided through BCU and SCADA both **so that whenever, the CSD is not healthy due to any reason (including auxiliary supply failure), uncontrolled trip/close command can be extended to the circuit**

Breaker. Alternatively, in case of any non-operation of the CSD after receiving a close/trip command after a pre-determined time delay, the CSD should automatically be bypassed so as to ensure that the trip and close commands are extended to the Trip/Close coils **through subsequent command.**

m) The CSD shall be provided with a communication port to facilitate online communication of the CSD with Substation automation system directly on IEC 61850 protocols. If the CSD does not meet the protocols of IEC 61850, suitable gateway shall be provided to enable the communication of CSD as per IEC 61850.

3.0 TOTAL BREAK TIME

3.1 The total break time as specified under this section shall not be exceeded under any of the following duties:

i) Test duties T10, T30, T60, T100a, and T100s (with TRV as per IEC: 62271-100)

ii) Short line fault L75, L90 (with TRV as per IEC: 62271-100)

3.2 The total break time of the breaker shall not be exceeded under any duty conditions specified such as with the combined variation of the trip coil voltage (70-110%), arc extinguishing medium pressure etc. While furnishing the proof of the total break time of complete circuit breaker, the effect of non-simultaneity between contacts within a pole or between poles **shall be brought out to establish** guaranteed total break time.

3.3 The values guaranteed shall be supported with the type test reports.

4.0 CONSTRUCTIONAL FEATURES

The features and constructional details of circuit breakers shall be in accordance with requirements stated hereunder:

4.1 Contacts

4.1.1 The gap between the open contacts shall be such that it can withstand at least the rated phase to ground voltage for 8 hours at zero gauge pressure of SF6 gas due to the leakage. The breaker should be able to withstand all dielectric stresses imposed on it in open condition at lock out pressure continuously (i.e. 2 p.u. across the breaker continuously, for validation of which a power frequency dielectric with stand test conducted for a duration of at least 15 minutes is acceptable).

4.2 If multi-break interrupters are used, these shall be so designed and augmented that a uniform voltage distribution is developed across them. Calculations/

test reports in support of the same shall be furnished. The thermal and voltage withstand rating of the grading elements shall be adequate for the service conditions and duty specified.

4.3 The SF6 Circuit Breaker shall meet the following additional requirements:

a) The circuit breaker shall be single pressure type. The design and construction of the circuit breaker shall be such that there is a minimum possibility of gas leakage and entry of moisture. There should not be any condensation of SF6 gas on the internal insulating surfaces of the circuit breaker.

b) All gasketted surfaces shall be smooth, straight and reinforced, if necessary, to minimise distortion and to make a tight seal, the operating rod connecting the operating mechanism to the arc chamber (SF6 media) shall have adequate seals. The SF6 gas leakage should not exceed 0.5% per year and the leakage rate shall be guaranteed **during the warrantee period**. In case the leakage under the specified conditions is found to be greater than 0.5% **per** year **after** commissioning of circuit breaker **during the warrantee period**, the manufacturer will have to supply free of cost, the total gas requirement for subsequent ten (10) years, based on actual leakage observed during **the warrantee period**.

c) In the interrupter assembly there shall be an absorbing product box to minimise the effect of SF6 decomposition products and moisture. The material used in the construction of the circuit breakers shall be fully compatible with SF6 gas decomposition products.

d) Each pole shall form an enclosure filled with SF6 gas independent of two other poles (for 800, 420 & 245 kV CBs) and the SF6 density of each pole shall be monitored individually. For CBs of voltage class of 145 kV or less, a common SF6 scheme/density monitor shall be acceptable.

e) The dial type SF6 density monitor shall be adequately temperature compensated to model the pressure changes due to variations in ambient temperature within the body of circuit breaker as a whole. **Separate density monitor and dial type temperature compensated pressure guage is also acceptable.** The density monitor shall have graduated scale and it shall be possible to dismantle the density monitor for checking/replacement without draining the SF6 gas by providing suitable interlocked non return valve coupling.

f) Circuit Breaker shall be capable of withstanding a vacuum of minimum 8 millibars without distortion or failure of any part.

g) Sufficient SF6 gas **(including that will be required for gas analysis during filling)** shall be provided to fill all the circuit breakers **being supplied.** Spare gas shall be supplied in separate unused cylinders as per requirement specified in **BPS.**

4.4 Provisions shall be made for attaching an operational analyser to record contact travel, speed and making measurement of operating timings, pre insertion timings of closing resisters if used, synchronisation of contacts in one pole.

4.5 **The CO (Close-open) operation and its timing shall be such as to ensure complete travel/insertion of the contact during closing operation and then follow the opening operation.**

5.0 SULPHUR HEXAFLUORIDE GAS (SF6 GAS)

a) The SF6 gas shall comply with IEC 60376 and shall be suitable in all respects for use in the switchgear under the operating conditions.

b) The high pressure cylinders in which the SF6 gas is shipped and stored at site shall comply with requirements of the relevant standards and regulations. **SF6 gas shall be supplied (in returnable cylinders) for all circuit breakers. However, SF6 gas for spare circuit breakers and mandatory spare quantity of SF6 gas shall be supplied in non-returnable cylinders.**

c) Test: SF6 gas shall be tested for purity, dew point, air, **hydro-soluble** fluorides and water content as per IEC 60376 and test certificates shall be furnished to Employer indicating all the tests as per IEC 60376 for each lot of SF6 gas and Material safety datasheet shall be provided. Gas bottles should be checked for leakage during receipt at site.

6.0 INSULATORS

a) The porcelain**/polymer** of the insulators shall conform to the requirements stipulated under Section-GTR.

b) The mechanical characteristics of insulators shall match with the requirements specified under this section.

c) All **porcelain & polymer** hollow **column** insulators shall conform to IEC-62155 & **IEC-61462 respectively.**

d) Hollow Porcelain**/polymer** for pressurised columns/chambers should be in one integral piece in green and fired stage.

7.0 SPARE PARTS AND MAINTENANCE EQUIPMENT

The bidder shall include in his proposal, spare parts and maintenance equipment in accordance with BPS. Calibration certificates of each maintenance equipment shall be supplied along with the equipment.

8.0 OPERATING MECHANISM AND CONTROL

8.1 General Requirements

8.1.1 **Circuit breaker shall be operated by spring charged mechanism. The mechanism box shall meet the requirements of IP-55.**

8.1.2 The operating mechanism **box** shall be strong, rigid, **rebound free and shall be readily accessible for maintenance**.

8.1.3 The mechanism shall be anti-pumping and trip free under every method of closing.

8.1.4 The mechanism shall be such that the failure of any auxiliary spring will not prevent tripping and will not cause **unwanted** trip or closing operation of the Circuit Breaker

8.1.5 A mechanical indicator shall be provided to show open and close position of the breaker. It shall be located in a position where it will be visible to a man standing on the ground level with the mechanism housing closed. An operation counter shall also be provided in the **common marshalling box**.

8.1.6 Working parts of the mechanism shall be of corrosion resisting material, bearings which require grease shall be equipped with pressure type grease fittings. Bearing pin, bolts, nuts and other parts shall be adequately pinned or locked to prevent loosening or changing adjustment with repeated operation of the breaker.

8.1.7 The **contractor** shall furnish detailed operation and maintenance manual of the mechanism alongwith the operation manual for the circuit breaker. The instruction manuals shall contain exploded diagrams with complete storage, handling, erection, commissioning, troubleshooting, servicing and overhauling instructions.

8.1.8 Size of common marshalling Box shall be such that adequate space is available for working in the panel and all wiring shall be routed through non-inflammable wire troughs with covers.

8.1.9 Space shall be available in 765kV CB common marshalling box to mount monitoring device, of about 300x300x150mm size and of approximately 7kg weight, by the owner in future.

8.1.10 Operating mechanism and Marshalling box should be provided with space heater with thermostat, CFL/LED lamp and AC point /Socket.

8.2 **Control:**

8.2.1 The close and trip circuits shall be designed to permit use of momentary contact switches and push buttons.

8.2.2 Each breaker shall be provided with two (2) independent tripping circuits, pressure switches and coils each to be fed from separate DC sources.

8.2.3 The breaker shall normally be operated by remote electrical control. Electrical tripping shall be performed by shunt trip coils. However, provisions shall be made for local electrical control. For this purpose a local/remote selector switch and close and trip control switch/push buttons shall be provided in the Breaker **common marshalling box**.

8.2.4 The trip coils shall be suitable for trip circuit supervision during both open and close position of breaker.

8.2.5 Closing coil and associated circuits shall operate correctly at all values of voltage between 85% and 110% of the rated voltage. Shunt trip coil and associated circuits shall operate correctly under all operating conditions of the circuit breaker up to the rated breaking capacity of the circuit breaker and at all values of supply voltage between 70% and 110% of rated voltage. However, even at 50% of rated voltage the breaker shall be able to open. If additional elements are introduced in the trip coil circuit their successful operation and reliability for similar applications on outdoor circuit breakers shall be clearly brought out during detailed engineering.

8.2.6 The 765kV kV, 3-Phase circuit breakers suitable for single phase switching shall be suitable for taking a spare pole into service in case of any operational requirement and their marshalling box shall be suitable for accommodating the additional relays etc. required for changeover arrangement of all contacts, alarms, signals, indications, interlocks and lockouts.

8.2.7 In trip and closing circuits, relays/relay contacts shall preferably be used instead of contactors.

8.2.8 Controlled switching scheme/device, wherever required shall be considered as integral part of CB and shall be commissioned along with CB.

8.2.9 Density Monitor contacts and pressure switch contacts shall be **preferably** suitable for direct use as permissive in closing and tripping circuits. **The devices shall provide continuous & automatic monitoring of the state of the gas as follows:**

a) 'Gas Refill' level

This contact will be used for remote indication/ to annunciate the need for gas refilling.

b) 'SF6 gas density Low' Alarm level - 1
This contact will be used for remote indication/ to annunciate the need for the urgent gas refilling.

c) 'SF6 gas density Low' Alarm level - 2
This contact will be used to annunciate the need for gas refilling under emergency or trip the Circuit Breaker.

d) 'Breaker Block' level
This is the minimum gas density at which the manufacturer will guarantee the rated fault interrupting capability of the breaker. At this level the breaker block contact shall operate & the tripping & closing circuit shall be blocked.

It shall be possible to test all gas monitoring relays/devices without de-energizing the primary equipment & without reducing pressure in the main section. Plugs & sockets shall be used for test purposes. It shall also damp the pressure pulsation while filling the gas in service, so that flickering of the pressure switch contacts does not take place.

The density monitor shall be placed suitably inclined in such a way so that the readings are visible from ground level with or without using binoculars. Separate contacts have to be used for each of tripping and closing circuits. If contacts are not suitably rated and multiplying relays are used then fail safe logic/schemes are to be employed. DC supplies for all auxiliary circuits shall be monitored and provision shall be made for remote annunciations and operation lockout in case of D.C. failures. Density monitors are to be so mounted that the contacts do not change on vibration during operation of circuit Breaker.

8.2.10 The auxiliary switch of the breaker shall be positively driven by the breaker operating rod.

8.3 **Spring operated mechanism:**

a) Spring operated mechanism shall be complete with motor **as per manufacturer practice**. Opening spring and closing spring with limit switch for automatic charging and other necessary accessories to make the mechanism a complete operating unit shall also be provided.

b) As long as power is available to the motor, a continuous sequence of the closing and opening operations shall be possible. The motor shall have adequate thermal rating for this duty.

c) After failure of power supply to the motor one close open operation shall be possible with the energy contained in the operating mechanism.

d) Breaker operation shall be independent of the motor which shall be used solely for compressing the closing spring. Facility for manual charging of the closing spring shall also be provided. The motor rating shall be such that it requires not more than 30 seconds for full charging of the closing spring.

e) Closing action of circuit breaker shall compress the opening spring ready for tripping.

f) When closing springs are discharged after closing a breaker, closing springs shall be automatically charged for the next operation and an indication of this shall be provided in the local and remote control cabinet.

g) Provisions shall be made to prevent a closing operation of the breaker when the spring is in the partial charged condition. Mechanical interlocks shall be provided in the operating mechanism to prevent discharging of closing springs when the breaker is already in the closed position.

h) The spring operating mechanism shall have adequate energy stored in the operating spring to close and latch the circuit breaker against the rated making current and also to provide the required energy for the tripping mechanism in case the tripping energy is derived from the operating mechanism.

i) **The spring charging failure alarm shall be provided with a time delay relay having setting range from 0-1minute.**

j) **Separate MCBs shall be provided for each spring charging motor and the rating of MCBs shall be suitably selected to match the starting, running and stalling time.**

k) **An overload relay shall be provided for protection of the spring charging motor.**

9.0 SUPPORT STRUCTURE

a) The structure design shall be such that during operation of circuit breaker vibrations are reduced to minimum.

b) **Ladder and Maintenance platform for 400kV and 765kV Circuit breaker:**

A suitable ladder with the safety cage and a free standing maintenance platform with railing for each pole of the circuit breaker shall be supplied along with the equipment and it's support structure. The platform shall be suitable for maintenance personnel to stand and carryout the activities along with the tools and plant.
The ladder cum maintenance platform shall be designed as a free standing structure without taking any support from the main circuit breaker structure. The ladder having height more than 3.0m shall have at least 15 degree slope and is to be provided with safety guard above 2.0m level. All structural steel for the platform shall be as per IS: 2062 and to be galvanized. An indicative drawing of ladder and platform (Drg.Ref.: C-ENGG-IND.DWG-PLATFORM-CB, Rev.0) is added at page 27 of 27 with this specification for guidance which may be modified to suit the requirement of CB by CB manufacturer. However, the minimum size of the structural members shall be maintained as mentioned in the drawing.

c) **For 220kV, 132kV & 66kV circuit breakers a suitable platform cum ladder shall be provided as per manufacturer design.**

10.0 TERMINAL CONNECTOR PAD

The circuit breaker terminal pads shall be made up of high quality electrolytic copper or aluminium and shall be conforming to Australian Standard AS-2935 **or equivalent standard** for rated current. The terminal pad shall have protective covers which shall be removed before interconnections.

11.0 INTER-POLE CABLING

11.1 All cables to be used by contractor shall be armoured and shall be as per IS – 1554/ IEC-60502 (1100 Volts Grade). All cables within & between circuit breaker poles and its marshaling box and up to the controlled switching device is included in the scope of work. Special cables like screened cable if required for Circuit Breaker, **temperature Transducer/CB Status Signals for CSD** and its associated C&R panel shall be laid in 50mm diameter PVC pipe. Suitable supports for PVC pipe shall be included in the scope of Supply.

11.2 Only stranded conductor shall be used. Minimum size of the conductor for inter-pole control wiring shall be 1.5 sq.mm. Copper.

11.3 The cables shall be with oxygen index Minimum 29 and temperature index as 250^{O}C as per relevant standards.

11.4 **Separate cables shall be used for AC, DC-I, DC-II and selected DC.**

11.5 **All inter-pole cabling of Circuit breakers and up to common marshalling box shall be done by plug-in type arrangement. Suitable removable type**

encasing cover shall be provided in case plug-in type connection arrangement is provided exterior side of LCC/MB. The plug-in type cable termination shall be conforming to IP-67 as per IEC60529. Cable sealing arrangement shall be provided (as per requirement) to avoid entry of moisture etc.

11.6 **Vertical run of cables to the operating mechanism box shall be properly supported by providing the perforated closed type galvanized cable tray (Cable tray also to be supplied along with the Circuit Breaker) to be fixed as an integral part of the structures. The load of the cable shall not be transferred to the mechanism box/plug-in type terminal arrangement in any circumstances. Hanging or loose run of cable is not permitted. The drawing of cable tray including fixing arrangement shall be incorporated in the GA drawing of CB also.**

11.7 **Wiring** shall be done with stud type terminals and ring type lugs. More than two wires shall not be connected on each side of terminal.

12.0 FITTINGS AND ACCESSORIES

12.1 Following is **list of** some of the major fittings and accessories to be furnished by Contractor in the **common marshalling box**. Number and exact location of these parts shall be indicated **in the drawing**.

i) Cable glands (Double compression type), Lugs, Ferrules etc.

ii) Local/remote changeover switch.

iii) Operation counter

iv) Control switches to cut off control power supply.

v) Fuses/**MCBs** as required.

vi) The number of terminals provided shall be adequate enough to wire out all contacts and control circuits plus 24 terminals spare for future use.

vii) Anti-pumping relay.

viii) Pole discrepancy relay (for electrically ganged CBs).

ix) D.C. Supervision relays.

x) Rating plate description in accordance with IEC incorporating year of manufacture.

xi) Controlled switching **accessories** like sensors, timers, relays etc.(as applicable)

xii) **Transducers/Fixtures required for travel measurement shall be supplied by CB manufacturer. The complete set of Transducers/Fixtures for measurement of complete 3-phase CB shall be supplied for each station. Further, one set of gas filling adopter (Including coupling, regulator, connecting hose pipe up to ground level) shall be supplied as per BPS.**

13.0 ADDITIONAL DATA TO BE FURNISHED

a) Drawing, showing contacts in close, arc initiation, full arcing, arc extinction and open position.

b) The temperature v/s pressure curves for each setting of density monitor along with details of density monitor.

c) Method of checking the healthiness of voltage distribution devices (condensers) provided across the breaks at site.

d) Data on capabilities of circuit breakers in terms of time and number of operations at duties ranging from 100% fault currents to load currents of the lowest possible value without requiring any maintenance or checks.

e) **Maximum** non-simultaneity between contacts, between poles and **effect of the same on the** guaranteed total break time.

f) Sectional view of non-return couplings used for SF6 pipes.

g) Details & type of filters used in interrupter assembly and also the operating experience with such filters.

h) Details of SF6 gas:

   i) The test methods used in controlling the quality of gas used in the circuit breakers particularly purity and moisture content.

   ii) Proposed tests to assess the conditions of the SF6 within a circuit breaker after a period of service particularly with regard to moisture contents of the gas.

j) Shall furnish curves supported by test data indicating the opening time under close open operation with combined variation of trip coil voltage.

k) Detailed literature and schematic diagrams of switching mechanism for closing resistor showing the duration of insertion shall also be furnished alongwith the calculations in respect of thermal rating of resistors for the duties specified under clause **2.2.1** of this section in case of 420 kV **& 800kV** circuit breakers.

l) All duty requirements as applicable to 800 kV, 420 kV, 245 kV, 145 kV & 72.5kV CBs specified under Clause **2.0** of this section shall be provided with the support of adequate test reports.

14.0 DEAD TANK TYPE CIRCUIT BREAKER

14.1 In case dead tank type circuit breaker is offered, the Bidder shall offer bushing type CTs (whose secondary parameters are given in under **Section: Switchgear-Instrument Transformer** and in case of 765kV and 400kV these secondaries shall be provided in sets of 3 cores, i.e., 2 cores of PX class and one core of metering, on both sides of dead tank circuit breaker instead of conventional outdoor CTs.

14.2 The enclosure shall be made of either Al/Al Alloy or mild steel (suitably hot dip galvanized). The enclosure shall be designed for the mechanical and thermal loads to which it is subjected in service. The enclosure shall be manufactured and tested according to the pressure vessel codes {i.e., latest edition of the ASME code for pressure vessel - Section VIII of BS-5179, IS4379, IS-7311 (as applicable) and also shall meet Indian Boiler Regulations}.

The maximum temperature of enclosure with CB breaker carrying full load current shall not exceed the ambient by more than 20 deg C.

14.3 The enclosure has to be tested as a routine test at 1.5 times the design pressure for one minute. A bursting pressure test shall be carried out at 5 times the design pressure as type test on the enclosure.

15.0 TESTS

15.1 In accordance with the requirements stipulated under Section-GTR the circuit breaker alongwith its operating mechanism shall conform to **the type tests as per** IEC: 62271-100.

15.2 The type test reports **as per IEC** and the following additional type test reports shall also be submitted for purchaser's/**employer's** review:

i) Corona extinction voltage test (**procedure** as per Annexure-A of Section-GTR).

ii) Out of phase closing test as per IEC: 62271-100.

iii) Line charging interrupting current for proving parameters as per clause no. **16.0** of this section.

iv) Test to demonstrate the Power Frequency withstand capability of breaker in open condition at Zero Gauge pressure and at lockout pressure (Ref. Clause 4.1.1).

v) Seismic withstand test **(procedure** as per Annexure-B of Section-GTR) in unpressurised condition.

vi) Verification of the degree of protection.

vii) Low temperature test (applicable only for minimum ambient temperatures of less than (-) 10 deg.C application purpose) and High temperature test. Contractor can also submit the field performance report in line with IEC stipulations.

viii) Static Terminal Load test.

ix) Critical Currents test (if applicable).

x) Switching of Shunt Reactors. **Test reports shall be submitted as per IEC. Calculations shall be submitted for meeting the requirements of clause 2.3(v) of this section.**

xi) Circuit breakers meant for controlled switching shall conform to requirements of IEC/TR-62271 – 302. The contractor shall submit test reports to demonstrate that the offered CB conforms to the requirements of performance verification tests and parameter definition tests as per IEC/TR 62271-302. The contractor shall also furnish the report for the re-ignition free arcing window for switching 3-phase shunt reactor as demonstrated in the shunt reactor switching test.

15.3 **Routine Tests**

Routine tests as per IEC:62271-100 shall be performed on all circuit breakers.

In addition to the mechanical and electrical tests specified by IEC, the following tests shall also be performed.

i) Speed curves for each breaker shall be obtained with the help of a suitable operation analyzer to determine the breaker contact movement during opening, closing, auto reclosing and trip free operation under normal as well as limiting operating **control voltage conditions**. The tests shall show the speed of contacts directly at various stages of operation, travel of contacts, opening time, closing time, shortest time between separation and meeting of contacts at break make operation etc. This test shall also be performed at site for which the necessary operation analyzer along with necessary transducers, cables, console etc. shall be **arranged by the contractor at his own cost**.

ii) **During testing of CB, dynamic contact resistance measurement (DCRM) shall be carried out for close-open (CO) operations with delay of 300ms between close and trip operations. Minimum 100A**

current shall be injected for DCRM test. Travel characteristics, injected current, trip/close coil current shall also be recorded along with DCRM test.

iii) **Routine tests on Circuit breakers with Controlled switching device as per IEC/TR 62271-302.**

iv) **Tan delta and Capacitance measurement for grading capacitors at rated voltage and also at 10kV (for reference).**

16.0 TECHNICAL PARAMETERS FOR CIRCUIT BREAKER

(In addition to those indicated in section-GTR)

Sl. no.	**Parameter**	**765kV system**	**400kV system**	**220kV system**	**132 kV system**	**66 kV system**
1.	Rated voltage (Umax) kV (rms)	800	420	245	145	72.5
2.	Rated frequency (Hz)	50	50	50	50	50
3.	No. of poles	3	3	3	3	3
4.	Type of circuit breaker	SF6 gas insulated	SF6 gas insulated	SF6 gas insulated	SF6 gas insulated	SF6 gas insulated
5.	Rated continuous current (A) at an ambient temperature of 50^0C	3150/4000	2000/3150/ 4000 (as applicable)	1600/2500 (as applicable)	1250	1250
6.	Rated short circuit capacity with percentage of DC component as per IEC-62271-100 corresponding to minimum opening time under operating conditions specified.	50kA (As applicable)	40/50/63kA (As applicable)	40/50 kA (As applicable)	31.5kA	25kA
7.	Symmetrical interrupting capability kA (rms)	50	40/50/63 (As applicable)	40/50 (As applicable)	31.5	25
8.	Rated short circuit making current kAp	125	100/125/ 157.5 (As applicable)	100/125 (As applicable)	80	63
9.	Short time current carrying capability kA (rms)	50 for one second	40/50/63 As applicable for one second	40/50 As applicable for one second	31.5 for one second	25 for three second
10.	Out of phase breaking current carrying capability kA (rms)	12.5	10/12.5/15.75 (As applicable)	**As per IEC**	**As per IEC**	**As per IEC**
11.	Rated line charging interrupting current at 90 deg. Leading power factor angle (A rms) (The breaker shall be able to interrupt the rated line charging current with test voltage immediately before	900	600	As per IEC	As per IEC	As per IEC

	opening equal to the product of U/√3 and 1.4 as per IEC-62271-100					
12.	First pole to clear factor	1.3	1.3	1.3	1.3	1.5
13.	Temperature rise over an ambient temperature of 50^0C	As per IEC: 62271-100	As per IEC: 62271-100	As per IEC: 62271-100	As per IEC: 62271-100	As per IEC: 62271-100
14.	Rated break time as IEC (ms)	40	40	60	60	Less than 75
15.	Total break time (ms)	45	45	65	65	Less than 80
16.	Total closing time (ms)	Not more than 150	Not more than 150	Not more than **150**	Not more than **150**	Not more than **150**
17.	Operating mechanism or a combination of these	Spring	Spring	Spring	Spring	Spring
18.	Rated operating duty cycle	O-0.3s-CO-3 min-CO	O-0.3s-CO-3 min-CO	O-0.3s-CO-3 min-CO	O-0.3s-CO-3 min-CO	O-0.3s-CO-3 min-CO
19.	Reclosing	Single phase &Three phase auto reclosing.	Single phase &Three phase auto reclosing.	Single phase &Three phase auto reclosing.	Three phase auto reclosing. (Single phase auto reclosing if specified in section-project)	Three phase auto reclosing.
20.	Pre-insertion resistor requirement	As per BPS	As per BPS	NA	NA	NA
i)	Rating (ohms)	450(max.) with tolerance as applicable	400(max.) with tolerance as applicable	NA	NA	NA
ii)	Minimum electrical (mechanical insertion time +pre-arcing time) pre-insertion time (ms)	9	8	NA	NA	NA
iii)	Opening of PIR contacts	PIR contacts should open immediately after closing of main contacts OR At least 5 ms prior to opening of main contacts at rated air/gas pressure where the	PIR contacts should open immediately after closing of main contacts OR At least 5 ms prior to opening of main contacts at rated air/gas pressure where the	NA	NA	NA

		PIR contacts remain closed	PIR contacts remain closed			
21.	Max. difference in the instants of closing/opening of contacts (ms) between poles at rated control voltage and rated operating & quenching media pressures	2.5(within a pole) 3.3(opening) 5.0(closing)	2.5(within a pole) 3.3(opening) 5.0(closing)	3.3(opening) 5.0(closing)	3.3(opening) 3.3(closing)	As per IEC
22.	Maximum allowable switching over voltage under any switching condition	1.9 p.u.	2.3 p.u.	As per IEC	As per IEC	As per IEC
23.	Trip coil and closing coil voltage with variation as specified	220V DC	220V DC	220V DC	220V DC or 110V DC	220V DC or 110V DC
24.	Noise level at base and up to 50 m distance from base of circuit breaker	As per IEC	140dB (max.)	140dB (max.)	140dB (max.)	140dB (max.)
25.	Rating of Auxiliary contacts	10A at 220V DC	10A at 220V DC	10A at 220V DC	10A at 220V DC	10A at 220V DC
26.	Breaking capacity of Aux. Contacts	2A DC with circuit time constant not less than 20ms	2A DC with circuit time constant not less than 20ms	2A DC with circuit time constant not less than 20ms	2A DC with circuit time constant not less than 20ms	2A DC with circuit time constant not less than 20ms
27.	**Rated insulation levels**					
i)	Full wave impulse withstand (1.2 /50 µs) between line terminals and ground	±2100kVp	±1425 kVp	±1050 kVp	±650 kVp	±325 kVp
ii)	Full wave impulse withstand (1.2 /50 µs) between terminals with circuit breaker open	2100kVp impulse on one terminal & 455 kVp power frequency voltage of opposite polarity on the other terminal	1425 kVp impulse on one terminal & 240 kVp power frequency voltage of opposite polarity on the other terminal	±1050 kVp	+ 650kVp	±325 kVp
iii)	Rated switching impulse withstand voltage (250/2500 µs) Dry & wet between line terminals and ground	+ 1550kVp	+1050 kVp .	NA	NA	NA
iv)	Rated switching impulse withstand voltage (250/2500 µs) Dry &wet Between terminals with circuit breaker open	1175kVp impulse on one terminal & 650 kVp power frequency	900 kVp impulse on one terminal & 345 kVp power frequency	NA	NA	NA

		voltage of opposite polarity on the other terminal	voltage of opposite polarity on the other terminal			
v)	One minute power frequency dry withstand voltage between line terminals and ground	830kV rms	520 kV rms.	460 kV rms.	275 kV rms	140 kV rms
vi)	One minute power frequency dry withstand voltage between terminals with circuit breaker open	1150kV rms	610 kV rms.	460 kV rms.	275 kV rms	160 kV rms
28.	Minimum corona extinction voltage with CB in all positions	508 kV rms	320kV rms	156 kV rms	92 kV rms	NA
29.	Max. radio interference voltage for frequency between 0.5 MHz and 2 MHz (Micro volts)	2500 µV (at 508kV rms)	1000 µV (at 266kV rms)	1000 µV (at 156kV rms)	500µV (at 92kV rms)	NA
30.	Minimum Creepage distance*					
i)	Phase to ground (25mm/kV)	20000mm	10500mm	6125mm	3625mm	1813mm
ii)	Between CB terminals	18000mm	10500mm	6125mm	3625mm	1813mm
31.	System neutral earthing	Effectively earthed				
32.	Rated terminal load	As per IEC or as per the value calculated based on specific switchyard layout requirement, whichever is higher.				
33.	Auxiliary contacts	Besides requirement of technical specification, the manufacturer/contractor shall wire up 10 NO + 10 NC contacts exclusively for purchaser's use and wired up to common marshalling box.				
34.	No. of terminals in common marshalling box	All contacts & control circuits to be wired out up to common marshalling box + minimum 24 terminals exclusively for purchaser's future use				
35.	Seismic level	0.5g horizontal for the site location under the Zone-V as per IS-1893 0.3g horizontal for the site location under other than the Zone-V as per IS-1893				

*** The values indicated are for specific creepage of 25mm/kV. In case of specific creepage of 31mm/kV specified, the Minimum Creepage distance values shall be concidered proportionately.**

17.0 PRE-COMMISSIONING TESTS

17.1 An indicative list of tests is given below. All routine tests except power frequency voltage dry withstand test on main circuit breaker shall be repeated on the completely assembled breaker at site. For Pre-commissioning tests, procedures and formats for circuit breakers, POWERGRID document no. CF/CB/03/R-4 dated 01/04/2013 of document no. D-2-01-03-01-04 dated 01-04-2013 will be the reference document. This document will be available at respective sites and shall be referred by the contractor. Contractor shall perform any additional test based on specialties of the items as per the field Q.P./instructions of the equipment Supplier or Employer without any extra cost to the Employer. The Contractor

Supervision of Erection, Testing and commissioning is in the scope of bidder

shall arrange all instruments required for conducting these tests alongwith calibration certificates and shall furnish the list of instruments to the Employer for approval.

(a) Insulation resistance of each pole.

(b) Check adjustments, if any suggested by manufacturer.

(c) Breaker closing and opening time.

(d) Slow and Power closing operation and opening.

(e) Trip free and anti pumping operation.

(f) Minimum pick-up voltage of coils.

(g) Dynamic Contact resistance measurement.

(h) Functional checking of control circuits interlocks, tripping through protective relays and auto reclose operation.

(i) Insulation resistance of control circuits, motor etc.

(j) Resistance of closing and tripping coils.

(k) SF6 gas leakage check.

(l) Dew Point Measurement

(m) Operation check of pressure switches and gas density monitor during gas filling.

(n) Checking of mechanical 'CLOSE' interlock, wherever applicable.

(o) Testing of grading capacitor.

(p) Resistance measurement of main circuit.

(q) Checking of operating mechanisms

(r) Check for annunciations in control room.

(s) Point of wave switching test (wherever applicable)

17.2 The contractor shall ensure that erection, testing and commissioning of circuit breaker shall be carried out under the supervision of the circuit breaker manufacturer's representative. The commissioning report shall be signed by the manufacturer's representative.

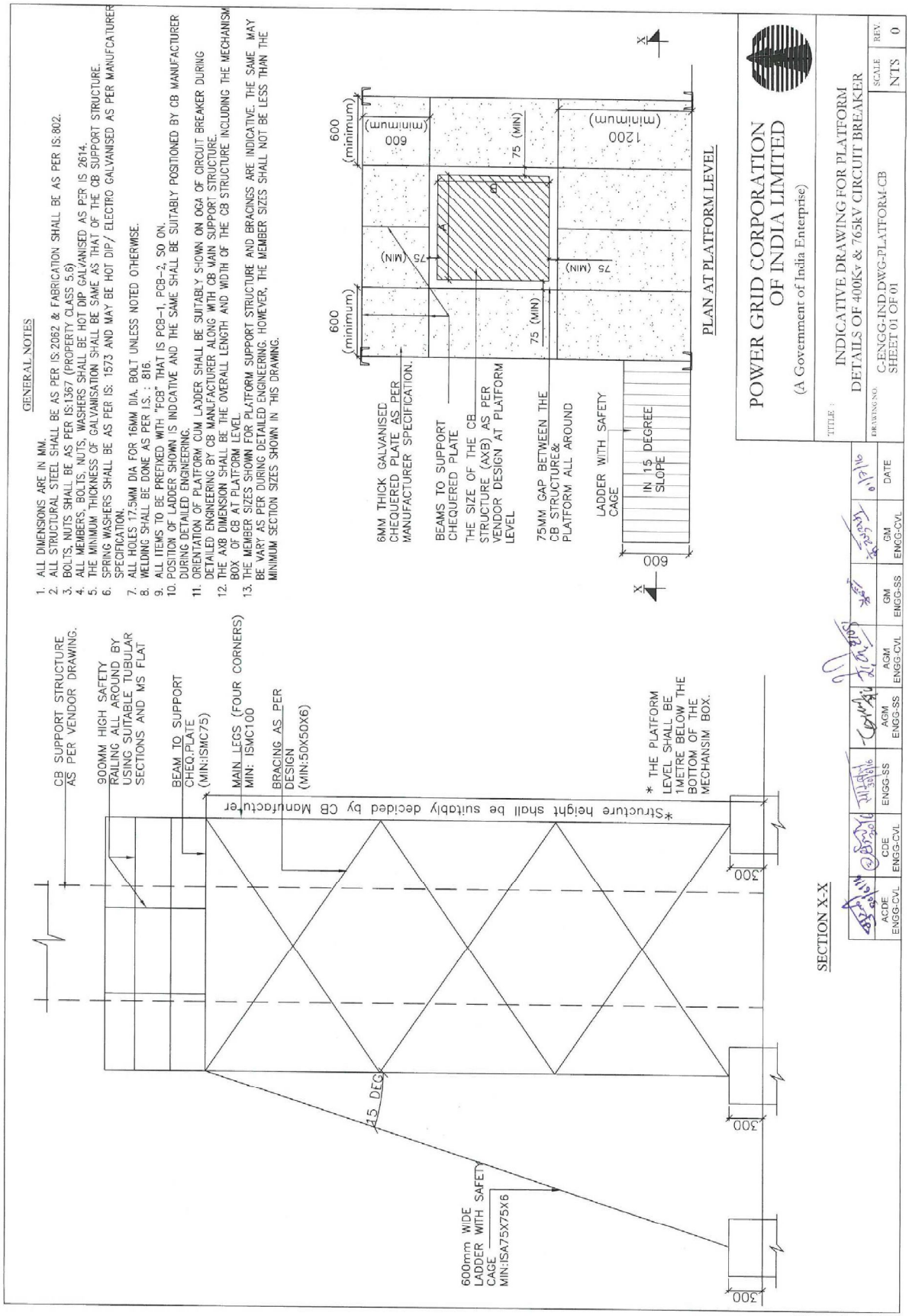
18.0 ACTIONS REQUIRED FOR DEFECTS OBSERVED DURING DEFECT LIABILITY PERIOD

The actions required to be taken by contractor in case of defects observed in AIS type Circuit Breakers of ratings 132kV & above during the warranty period (defect liability period) shall be as per following. Further, the replaced/repaired/ refurbished equipment (or part of equipment) shall have warranty in line with the GCC clause 22 in SCC.

Sl.no.	Nature of problem	Corrective measures to be taken by contractor
1.	Blasting of interrupter, PIR, pole column,	Replacement of compete CB pole Including SF6 gas
	a. Abnormal DCRM and Travel Measurement b. Contact assembly and internal component damage, misalignment not leading to complete failure of interrupter/ PIR	Repair/replacement of affected assembly/ component based on repair procedure approved by QA
2.	Crack in insulator, cementing joint of interrupter , PIR , pole column	Replacement of affected part
3.	SF6 gas leakage from sealing and bolted joints. SF6 gas leakage detectable by any Leakage Detection Method	Rectification by replacement of gasket, O-ring, sealing, Interrupter or affected part to be replaced etc If unable to arrest the leakage in 02 attempts, replacement of interrupter/ column
4.	SF6 gas low dew point: > (-)35 deg C at atmospheric pressure.	Re-conditioning of gas. If does not improve, complete evacuation of CB, replacement filter material and gas
5.	Oil leakage of grading capacitor Change in Capacitance value beyond +/- 5 % w.r.t. to value of Capacitance obtained at site during pre-commissioning test.	Replacement or Refurbishment of grading capacitor
6.	Pole/ break discrepancy (during O&M) Limits: Break to Break (Opening/Closing) : max. 2.5 ms Phase to Phase (Opening) : max. 3.33 ms Phase to Phase (Closing) : max 5 ms	Rectification/replacement of affected parts
7.	Static Contact Resistance: increase >50% from factory/ pre-commissioning value or >75 micro-ohm/ break whichever is lower	Rectification/Replacement of pole
8.	Drive mechanism assembly failure	Rectification/ Replacement of affected part
9.	Trip/ close coil, density monitor, relays and contactors and components of common MB	Replacement of affected part

Note: 1) Replaced/Repaired/Refurbished Equipment (or part of equipment) shall have 2 years warranty without prejudice to contractual warranty period.

2) The measurement at site shall be carried out as per POWERGRID standard Pre-commissioning procedures as indicated in Technical Specification.


GENERAL NOTES
1. ALL DIMENSIONS ARE IN MM.
2. ALL STRUCTURAL STEEL SHALL BE AS PER IS:2062 & FABRICATION SHALL BE AS PER IS:802.
3. BOLTS, NUTS SHALL BE AS PER IS:1367 (PROPERTY CLASS 5.6)
4. ALL MEMBERS, BOLTS, NUTS, WASHERS SHALL BE HOT DIP GALVANISED AS PER IS 2614.
5. THE MINIMUM THICKNESS OF GALVANISATION SHALL BE SAME AS THAT OF THE CB SUPPORT STRUCTURE.
6. SPRING WASHERS SHALL BE AS PER IS: 1573 AND MAY BE HOT DIP/ ELECTRO GALVANISED AS PER MANUFACTURER SPECIFICATION.
7. ALL HOLES 17.5MM DIA FOR 16MM DIA. BOLT UNLESS NOTED OTHERWISE.
8. WELDING SHALL BE DONE AS PER I.S. : 816.
9. ALL ITEMS TO BE PREFIXED WITH "FCB" THAT IS PCB-1, PCB-2, SO ON.
10. POSITION OF LADDER SHOWN IS INDICATIVE AND THE SAME SHALL BE SUITABLY POSITIONED BY CB MANUFACTURER DURING DETAILED ENGINEERING.
11. ORIENTATION OF PLATFORM CUM LADDER SHALL BE SUITABLY SHOWN ON OGA OF CIRCUIT BREAKER DURING DETAILED ENGINEERING BY CB MANUFACTURER ALONG WITH CB MAIN SUPPORT STRUCTURE.
12. THE AXB DIMENSION SHALL BE THE OVERALL LENGTH AND WIDTH OF THE CB STRUCTURE INCLUDING THE MECHANISM BOX OF CB AT PLATFORM LEVEL.
13. THE MEMBER SIZES SHOWN FOR PLATFORM SUPPORT STRUCTURE AND BRACINGS ARE INDICATIVE. THE SAME MAY BE VARY AS PER DURING DETAILED ENGINEERING. HOWEVER, THE MEMBER SIZES SHALL NOT BE LESS THAN THE MINIMUM SECTION SIZES SHOWN IN THIS DRAWING.
CB SUPPORT STRUCTURE AS PER VENDOR DRAWING.
900MM HIGH SAFETY RAILING ALL AROUND BY USING SUITABLE TUBULAR SECTIONS AND MS FLAT
BEAM TO SUPPORT CHEQ.PLATE (MIN:ISMC75)
MAIN LEGS (FOUR CORNERS) MIN: ISMC100
BRACING AS PER DESIGN (MIN:50X50X6)
*Structure height shall be suitably decided by CB Manufacturer
* THE PLATFORM LEVEL SHALL BE 1METRE BELOW THE BOTTOM OF THE MECHANSIM BOX.
300
15 DEG
600mm WIDE LADDER WITH SAFETY CAGE MIN:ISA75X75X6
SECTION X-X
600 (minimum)
6MM THICK GALVANISED CHEQUERED PLATE AS PER MANUFACTURER SPECIFICATION.
BEAMS TO SUPPORT CHEQUERED PLATE
THE SIZE OF THE CB STRUCTURE (AXB) AS PER VENDOR DESIGN AT PLATFORM LEVEL
75MM GAP BETWEEN THE CB STRUCTURE& PLATFORM ALL AROUND
LADDER WITH SAFETY CAGE
IN 15 DEGREE SLOPE
75 (MIN)
1200 (minimum)
PLAN AT PLATFORM LEVEL
POWER GRID CORPORATION OF INDIA LIMITED
(A Government of India Enterprise)
INDICATIVE DRAWING FOR PLATFORM DETAILS OF 400kV & 765kV CIRCUIT BREAKER
C-ENGG-IND.DWG-PLATFORM.CB
SHEET 01 OF 01
SCALE NTS
REV. 0
ACDE ENGG-CVL
CDE ENGG-CVL
ENGG-SS
AGM ENGG-SS
AGM ENGG-CVL
GM ENGG-SS
GM ENGG-CVL
DATE

SECTION-3

Refer document

General Technical Requirements: TB-418-316-000 Rev 00.

BHARAT HEAVY ELECTRICALS LIMITED

TRANSMISSION BUSINESS ENGINEERING MANAGEMENT

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DOCUMENT No.	TB-418-316-000	Rev. No.	00		Prepared	Checked	Approved
TYPE OF DOC.	**TECHNICAL SPECIFICATION**			SIGN			
TITLE	**GENERAL TECHNICAL REQUIREMENTS-SECTION 3**			NAME	SC	NK	SKS
				DATE	15.10.22	15.10.22	15.10.22
				GROUP	TBEM	W.O.	**Awaited**

CUSTOMER	Powergrid Corporation of India Ltd. (POWERGRID)
PROJECT	**Substation Package SS01 for (i) 400/220kV AIS Neemuch New S/S including 400kV class Transformer & Bus Reactor, (ii) Extension of 400kV Chittorgarh S/S and (iii) Extension of 400kV Mandsaur S/S associated with Transmission system for evacuation of power from Neemuch REZ through TBCB route**
NOA NO.	**TBCB/Neemuch REZ/400kV AIS/SS01/G5/NOA-I/05 dtd. 23/09/2022 & TBCB/Neemuch REZ/400kV AIS/SS01/G5/NOA-II/06 dtd. 23/09/2022**
Station	**400/220kV AIS Neemuch New S/S, Madhya Pradesh** **Extension of 400kV Chittorgarh S/S, Rajasthan** **Extension of 400kV Mandsaur S/S , Madhya Pradesh**

RevNo.	Date	Altered	Checked	Approved	REVISION DETAILS

Distribution	To	TBEM	TBMM	TBQM	Supplier
	Copies	1	1	1	4

GENERAL TECHNICAL REQUIREMENTS-SECTION 3

Site Information

S.No.	Particular	Details
a)	Owner	Neemuch Transmission Limited - a 100% wholly owned subsidiary of Power Grid Corporation of India Limited
b)	Customer	Neemuch Transmission Limited - a 100% wholly owned subsidiary of Power Grid Corporation of India Limited
c)	Project Title	Substation Package SS01 for (i) 400/220kV AIS Neemuch New S/S including 400kV class Transformer & Bus Reactor, (ii) Extension of 400kV Chittorgarh S/S and (iii) Extension of 400kV Mandsaur S/S associated with Transmission system for evacuation of power from Neemuch REZ through TBCB route
d)	Location	Neemuch, MP Chittorgarh, Rajasthan Mandsaur, MP
e)	Transport Facilities	Road/Train Nearest Rail Head For Neemuch: Neemuch Nearest Rail Head For Chittorgarh: Chittorgarh Nearest Rail Head For Mandsaur: Mandsaur Nearest Airport : Udaipur
	SITE CONDITIONS	
a)	Max. ambient air temp.	50°C
b)	Min. ambient air temp.	0°C
c)	Max. design ambient temp.	50°C
d)	Design reference temp.	50°C
e)	Average Humidity	Max. 100%
f)	Special corrosion conditions	No
g)	Solar Radiation	2 kW/sqmtr
h)	Atmospheric UV radiation	High
i)	Altitude above sea level	Less than 1000 meter above mean sea level (MSL)
j)	Pollution Severity	High Pollution level

k)	Seismic Zone	Zone-II
WIND DATA		
	Wind Zone	47m/sec
	Average No. of thunderstorm days per annum	As per IS
	Main Electrical Parameters:	
	Fault Levels:	400kV: 63kA for 1 sec. 220kV : 50kA for 1 sec.
	Creepage Distance	25mm/kV for All Equipment i.e BPI/Bushings, CB, Isolator, CT, CVT, LA, WT etc. 31mm/kV for string insulators

GENERAL TECHNICAL REQUIREMENTS-SECTION 3

1.0 FOREWORD

The provisions under this section are intended to supplement requirements for the materials, equipment's and services covered under other sections of tender documents and are not exclusive.

The Supplier shall note that the standards mentioned herein are not mutually exclusive or complete in themselves, but are intended to complement each other, with minimum repetition, to define the requirements of the Specification. In the event of a conflict between requirements of any two clauses of the Specification/ documents or requirements of different codes/ standards specified, the more stringent requirement as per the interpretation of the owner shall apply, unless confirmed otherwise by the owner in writing based on a written request from the Supplier.

In case of conflicting requirements between this document (General Technical Requirement Section 3) and equipment specification (Section 1 & Section 2), equipment specification shall prevail.

When specific requirements stipulated in the Specification exceed or change those required by the applicable standards, the stipulations of the Specification shall take precedence.

Unless specifically agreed to by the Purchaser prior to Award of Contract, the Work shall be in accordance with the standards indicated and the requirements of the Specification. The Supplier shall be held responsible for any deviation.

In case of conflict between the various standards, the decision of owner shall be binding & final.

The following words and expressions shall have the meanings hereby assigned to them throughout this document

"Employer/Owner" means Power Grid Corporation of India Ltd.

"Purchaser" means Bharat Heavy Electricals Limited

"Supplier/Manufacturer/Bidder" means the person or persons, firm or company assigned to execute the works as defined by the scope of supply, described here.

"Specification" refers to this document.

The supplier should be approved by Power Grid. If not, it is the responsibility of the vendor to be assessed and approved by Power Grid, before placement of order by BHEL. Any cost involved in vendor assessment/approval must be borne by the vendor himself.

2.0 GENERAL REQUIREMENT

2.1 a) All equipment/materials/items, as per Annexure-K, as applicable under present scope of works, shall be supplied by domestic manufacturers only.

Any imported equipment/material/item/parts/component (comprising of embedded systems) to be supplied under the contract shall be tested in the certified laboratories to check for any kind of embedded malware/trojans/cyber threats and for adherence to Indian Standards as per the directions issued by Ministry of Power/Govt. of India from time to time. In case of such import from specified "prior reference" countries, the requirement of prior permission from the Govt. of India including protocol for testing in certified and designated laboratories by Ministry of Power/Govt. of India shall also be complied with by the Bidder.

The bidder/contractor shall list out the products and components producing Toxic e-waste under the contract and shall furnish to the Employer the procedure of safe disposal at the time of closing of the contract.

2.1 b) The Supplier/Manufacturer shall furnish catalogues, engineering data, technical information, design documents, drawings etc., fully in conformity with the technical specification during detailed engineering.

2.2 It is recognised that the Bidder may have standardised on the use of certain components, materials, processes or procedures different from those specified herein. Alternate proposals offering similar equipment based on the manufacturer's standard practice will also be considered provided such proposals meet the specified designs, standard and performance requirements and are acceptable to Employer.

2.3 Wherever a material or article is specified or defined by the name of a particular brand, Manufacturer or Vendor, the specific name mentioned shall be understood as establishing type, function and quality and not as limiting competition.

2.4 Equipment furnished shall be complete in every respect with all mountings, fittings, fixtures and standard accessories normally provided with such equipment and/or needed for erection, completion and safe operation of the equipment as required by applicable codes though they may not have been specifically detailed in the Technical Specifications unless included in the list of exclusions. Materials and components which are minor in nature and incidental to the requirement but not specifically stated in the specification, which are necessary for commissioning and satisfactory operation of the switchyard/ substation unless specifically excluded shall be deemed to be included in the scope of the specification and shall be supplied without any extra cost. All similar standard components/parts of similar standard equipment provided, shall be inter-changeable with one another.

2.5 Deleted.

2.6 Deleted.

3.0 STANDARDS

3.1 The works covered by the specification shall be designed, engineered, manufactured, built, tested and commissioned in accordance with the Acts, Rules, Laws and Regulations of India.

3.2 The equipment offered by the Bidder shall at least conform to the requirements specified under relevant IS standard. In case of discrepancy between IS and other international standard, provisions of IS shall prevail. The Bidder shall also note that the list of standards presented in Annexure-C is not complete. Whenever necessary, the list of standards shall be considered in conjunction with specific IS. If the IS standard is not available for an equipment/material, then other applicable International standard (IEC/Equivalent), as per the specification, shall be accepted.

3.3 The Bidder shall note that standards mentioned in the specification are not mutually exclusive or complete in themselves, but intended to complement each other.

3.4 When the specific requirements stipulated in the specifications exceed or differ than those required by the applicable standards, the stipulation of the specification shall take precedence.

3.5 Other internationally accepted standards which ensure equivalent or better performance than that specified in the standards specified under Annexure-C / individual sections for various equipments shall also, be accepted, however the salient points of difference shall be clearly brought out during detailed engineering along with English language version of such standard. The equipment conforming to standards other than specified under Annexure-C /individual sections for various equipments shall be subject to Employer's approval.

4.0 SERVICES TO BE PERFORMED BY THE EQUIPMENT BEING FURNISHED

4.1 Switching surge over voltage and power frequency over voltage is specified in the system parameters below. In case of the 400kV system, the initial value of the temporary overvoltages could be 2.0 p.u. for 1-2 cycles. The equipment furnished under this specification shall perform all its functions and operate satisfactorily without showing undue strain, restrike etc under such over voltage conditions.

4.2 All equipments shall also perform satisfactorily under various other electrical, electromechanical and meteorological conditions of the site of installation.

4.3 All equipment shall be able to withstand all external and internal mechanical, thermal and electromechanical forces due to various factors like wind load, temperature variation, ice & snow, (wherever applicable) short circuit etc. for the equipment.

4.4 The Bidder shall design terminal connectors of the equipment taking into account various forces as above at Sl.No.4.3 that are required to withstand.

4.5 The equipment shall also comply to the following:

a) To facilitate erection of equipment, all items to be assembled at site shall be "match marked".

b) All piping, if any between equipment control cabinet/operating mechanism to marshalling box of the equipment, shall bear proper identification to facilitate the connection at site.

4.6 **System Parameter**

400kV & 220kV System

SL No	Description of parameters	400kV System	220kV System
1.	System operating voltage	400kV	220kV
2.	Maximum operating voltage of the system (rms)	420kV	245kV
3.	Rated frequency	50Hz	50Hz
4.	No. of phase	3	3
5.	Rated Insulation levels		
i)	Full wave impulse withstand voltage (1.2/50 microsec.)	1550kVp	1050 kVp
ii)	Switching impulse withstand voltage (250/2500 micro sec.) dry and wet	1050kVp	-
iii)	One minute power frequency dry withstand voltage (rms)	630kV	-
iv)	One minute power frequency dry and wet withstand voltage (rms)	-	460kV
6.	Corona extinction voltage	320kV	-
7.	Max. radio interference voltage for frequency between 0.5 MHz and 2 MHz	1000 μV at 266kV rms	1000 μV at 156kV rms
8.	Minimum creepage distance - for Equipment other than Insulator string	10500 mm	6125 mm
	Minimum creepage distance - for Insulator String	13020 mm	7595 mm
9.	Min. clearances		

i.	Phase to phase	4000mm (for conductor conductor configuration) 4200mm (for rod - conductor configuration)	2100 mm
ii.	Phase to earth	3500 mm	2100 mm
iii)	Sectional clearances	6500 mm	5000 mm
10.	Rated short circuit current for 1 sec. duration	63 kA	50kA
11.	System neutral earthing	Effectively earthed	Effectively earthed

66kV, 52kV , 33kV System

SL No	Description of parameters	66kV System	52 kV System	33 kV System
1.	System operating voltage	66kV	52kV	33kV
2.	Maximum operating voltage of the system(rms)	72.5kV	52kV	36kV
3.	Rated frequency	50Hz	50Hz	50Hz
4.	No. of phase	3	3	3
5.				
i)	Full wave impulse withstand voltage (1.2/50 microsec.)	325 kVp	250 kVp	170 kVp
ii)	One minute power frequency dry and wet withstand voltage (rms)	140kV	95kV	70kV

6.	Max. radio interference voltage for frequency between 0.5 MHz and 2 MHz	-	-	-
7.	Minimum creepage distance	1813 mm (2248mm for coastal area)	1300mm (1612 mm for coastal area)	900 mm (1116m m for coastal area)
8.	Min. Clearance			
i.	Phase to phase	750 mm	530mm	320 mm
ii.	Phase to earth	630 mm	480mm	320 mm
iii.	Sectional clearances	3100 mm	3100mm	2800 mm
9.	Rated short circuit current	25kA for 3 Sec*	25kA for 1 Sec	25 kA for 3 sec
10.	System neutral earthing	Effectively earthed	Effectively earthed	Effectively earthed

Notes:

1. The above parameters are applicable for installations up to an altitude of 1000m above mean sea level. For altitude exceeding 1000m, necessary altitude correction factor shall be applicable as per relevant IEC/IS.
2. The insulation and RIV levels of the equipments shall be as per values given in the Technical Specification of respective equipment.
3. Corona and radio interference voltage test and seismic withstand test procedures for equipments shall be in line with the procedure given at **Annexure-A** and **Annexure-B** respectively.
4. "*" For tertiary loading Equipment's fault level shall be 25kA for 3 Sec.

5.0 ENGINEERING DATA AND DRAWINGS

5.1 Deleted.

5.2 Deleted.

5.3 Drawings

5.3.1 All drawings submitted by the Bidder shall be in sufficient detail to indicate the type, size, arrangement, material description, Bill of Materials, weight of each component, break-up for packing and shipment, dimensions, internal & the external connections, fixing arrangement required and any other information specifically requested in the specifications.

5.3.2 Drawings submitted by the Bidder shall be clearly marked with the name of the Employer, the unit designation, the specifications title, the specification number and the name of the Project. POWERGRID has standardized a large number of drawings/documents of various make including type test reports which can be used for all projects having similar requirements and in such cases no project specific approval (except for list of applicable drawings alongwith type test reports) is required. However, distribution copies of standard drawings/documents shall be submitted as per provision of the contract. All titles, noting, markings and writings on the drawing shall be in English. All the dimensions should be in SI units.

5.3.3 The review of these data by the Employer will cover only general conformance of the data to the specifications and documents, interfaces with the equipment provided under the specifications, external connections and of the dimensions which might affect substation layout. This review by the Employer may not indicate a thorough review of all dimensions, quantities and details of the equipment, materials, any devices or items indicated or the accuracy of the information submitted. This review and/or approval by the Employer shall not be considered by the Contractor, as limiting any of his responsibilities and liabilities for mistakes and deviations from the requirements, specified under these specifications and documents.

5.5 All manufacturing and fabrication work in connection with the equipment prior to the approval of the drawings shall be at the Bidder's risk. The Bidder may make any changes in the design which are necessary to make the equipment conform to the provisions and intent of the Contract and such changes will again be subject to approval by the Employer. Approval of Bidder's drawing or work by the Employer shall not relieve the bidder of any of his responsibilities and liabilities under the Contract.

5.6 All engineering data submitted by the Bidder after final process including review and approval by the Employer shall form part of the Contract Document and the entire works performed under these specifications shall be performed in strict conformity, unless otherwise expressly requested by the Employer in Writing.

5.7 Approval Procedure

The following schedule shall be followed generally for approval and for providing final documentation.

i)	Approval/comments/ by Employer on initial submission	15 days
ii)	Resubmission (whenever required)	Within 3 (three) weeks from date of comments
iii)	Approval or comments	Within 3 (three) weeks of receipt of resubmission
iv)	Furnishing of distribution copies (2 hard copies to each substation and one scanned copy (pdf format)	Within 3 (three) weeks of receipt of resubmission
v)	Furnishing of distribution copies of test reports	
	a) Type test reports (one scanned softcopy in pdf format to each substation plus one for corporate centre & one hardcopy per substation)	2 weeks from the date of final approval
	b) Routine Test Reports (one copy for each substation)	-do-
vi)	Furnishing of instruction/ operation manuals (2 copies per substation and one softcopy (pdf format) for corporate centre & per substation)	On completion of Engineering

vii)	As built drawings (two sets of hardcopy per substation & one softcopy (pdf format) for corporate centre & per substation)	On completion of entire works

NOTE :

(1) The bidder may please note that all resubmissions must incorporate all comments given in the earlier submission by the Employer or adequate justification for not incorporating the same must be submitted failing which the submission of documents is likely to be returned.

(2) Deleted.

(3) The instruction Manuals shall contain full details of drawings of all equipment being supplied under this contract, their exploded diagrams with complete instructions for storage, handling, erection, commissioning, testing, operation, trouble shooting, servicing and overhauling procedures.

(4) If after the commissioning and initial operation of the substation, the instruction manuals require any modifications/additions/changes, the same shall be incorporated and the updated final instruction manuals shall be submitted by the Contractor to the Employer.

(5) The Bidder shall furnish to the Employer catalogues of spare parts.

(6) Deleted.

5.8 Deleted.

6.0 MATERIAL/ WORKMANSHIP

6.1 General Requirement

6.1.1 Where the specification does not contain references to workmanship, equipment, materials and components of the covered equipment, it is essential that the same must be new, of highest grade of the best quality of their kind, conforming to best engineering practice and suitable for the purpose for which they are intended.

6.1.2 In case where the equipment, materials or components are indicated in the specification as "similar" to any special standard, the Employer shall decide upon the question of similarity. When required by the specification or when required by the Employer the Contractor shall submit, for approval, all the information concerning the materials or components to be used in manufacture. Machinery, equipment, materials and components supplied, installed or used without such approval shall run the risk of subsequent rejection, it is to be understood that the cost as well as the time delay associated with the rejection shall be borne by the Bidder.

6.1.3 The design of the Works shall be such that installation, future expansions, replacements and general maintenance may be undertaken with a minimum of time and expenses. Each component shall be designed to be consistent with its duty and suitable factors of safety, subject to mutual agreements. All joints and fastenings shall be devised, constructed and documented so that the component parts shall be accurately positioned and restrained to fulfil their required function. In general, screw threads shall be standard metric threads. The use of other thread forms will only be permitted when prior approval has been obtained from the Employer.

6.1.4 Whenever possible, all similar part of the Works shall be made to gauge and shall also be made interchangeable with similar parts. All spare parts shall also be interchangeable and shall be made of the same materials and workmanship as the corresponding parts of the Equipment supplied under the Specification. Where feasible, common component units shall be employed in different pieces of equipment in order to minimize spare parts stocking requirements. All equipment of the same type and rating shall be physically and electrically interchangeable.

6.1.5 Deleted.

6.1.6 The Bidder shall apply oil and grease of the proper specification to suit the machinery, as is necessary for the installation of the equipment. Lubricants used for installation purposes shall be drained out and the system flushed through where necessary for applying the lubricant required for operation. The Bidder shall apply all operational lubricants to the equipment installed by him.

6.1.7 All oil, grease and other consumables used in the Works/Equipment shall be purchased in India unless the Bidder has any special requirement for the specific application of a type of oil or grease not available in India. If such is the case, he shall declare source of oil/grease /other consumables in the GTP/Drawings, where such oil or grease is available. He shall help Employer in establishing equivalent Indian make and Indian Contractor. The same shall be applicable to other consumables too.

6.2 Provisions For Exposure to Hot and Humid climate

Outdoor equipment supplied under the specification shall be suitable for service and storage under tropical conditions of high temperature, high humidity, heavy rainfall and environment favourable to the growth of fungi and mildew. The indoor equipments located in non-air conditioned areas shall also be of same type.

6.2.1 Space Heaters

6.2.1.1 The heaters shall be suitable for continuous operation at 240V as supply voltage. Onoff switch and fuse shall be provided.

6.2.1.2 One or more adequately rated thermostatically connected heaters shall be supplied to prevent condensation in any compartment. The heaters shall be installed in the compartment and electrical connections shall be made sufficiently away from below the heaters to minimize deterioration of supply wire insulation. The heaters shall be suitable to maintain the compartment temperature to prevent condensation.

6.2.2 FUNGI STATIC VARNISH

Besides the space heaters, special moisture and fungus resistant varnish shall be applied on parts which may be subjected or predisposed to the formation of fungi due to the presence or deposit of nutrient substances. The varnish shall not be applied to any surface of part where the treatment will interfere with the operation or performance of the equipment. Such surfaces or parts shall be protected against the application of the varnish.

6.2.3 Ventilation opening

Wherever ventilation is provided, the compartments shall have ventilation openings with fine wire mesh of brass to prevent the entry of insects and to reduce to a minimum the entry of dirt and dust.

6.2.4 Degree of Protection

The enclosures of the Control Cabinets, Junction boxes and Marshalling Boxes, panels etc. to be installed shall comply with following degree of protection as detailed here under:

a) Installed out door: IP- 55
b) Installed indoor in air conditioned area: IP-31
c) Installed in covered area: IP-52
d) Installed indoor in non-air conditioned area where possibility of entry of water is limited: IP-41.
e) For LT Switchgear (AC & DC distribution Boards): IP-52

The degree of protection shall be in accordance with IS/IEC60947; IS/IEC/60529 . Type test report for of relevant Degree of Protection test, shall be submitted for approval.

6.3 RATING PLATES, NAME PLATES AND LABELS

6.3.1 Each main and auxiliary item of substation is to have permanently attached to it in a conspicuous position a rating plate of non-corrosive material upon which is to be engraved manufacturer's name, Customer Name, year of manufacture, equipment name, type or serial number together with details of the loading conditions under which the item of substation in question has been designed to operate, and such diagram plates as may be required by the Employer. The rating plate of each equipment shall be according to IS/ IEC requirement.

6.3.2 All such nameplates, instruction plates, rating plates of transformers, reactors, CB, CT, CVT, SA, Isolators, C & R panels and PLCC equipments shall be bilingual with Hindi

inscription first followed by English. Alternatively two separate plates one with Hindi and the other with English inscriptions may be provided.

6.4 FIRST FILL OF CONSUMABLES, OIL AND LUBRICANTS

All the first fill of consumables such as oils, lubricants, filling compounds, touch up paints, soldering/brazing material for all copper piping of circuit breakers and essential chemicals etc. which will be required to put the equipment covered under the scope of the specifications, into operation, shall be furnished by the Bidder unless specifically excluded under the exclusions in these specifications and documents.

7.0 DESIGN IMPROVEMENTS / COORDINATION

7.1 Deleted.

7.2 Deleted.

7.3 The Bidder shall be responsible for the selection and design of appropriate equipments to provide the best co-ordinated performance of the entire system. The basic design requirements are detailed out in this Specification. The design of various components, sub-assemblies and assemblies shall be so done that it facilitates easy field assembly and maintenance.

7.4 The Bidder has to coordinate designs and terminations with the agencies (if any) who are Consultants/Bidder for the Employer. The names of agencies shall be intimated to the successful bidders.

7.5 The Bidder will be called upon to attend design co-ordination meetings with the Engineer, other Contractor's and the Consultants of the Employer (if any) during the period of Contract. The Bidder shall attend such meetings at his own cost at POWERGRID Corporate Centre, Gurgaon (Haryana) or at mutually agreed venue as and when required and fully cooperate with such persons and agencies involved during those discussions.

8.0 QUALITY ASSURANCE PROGRAMME

8.1 To ensure that the equipment and services under the scope of this Contract, whether manufactured or performed within the Bidder's Works or at his Sub-Bidder's premises or at the Employer's site or at any other place of Work as applicable, are in accordance with the specifications, the Contractor shall ensure suitable quality assurance programme to control such activities at all points necessary. A quality assurance programme of the Contractor shall be in line with ISO requirements & shall generally cover the following:

a) The organisation structure for the management and implementation of the proposed quality assurance programme.

b) System for Document and Data Control.

c) Qualification and Experience data of Bidder's key personnel.

d) The procedure for purchases of materials, parts, components and selection of sub-Bidder's services including vendor analysis, source inspection, incoming raw material inspection, verification of material purchases etc.

e) System for shop manufacturing and site erection controls including process controls, fabrication and assembly control.

f) System for Control of non-conforming products including deviation dispositioning, if any and system for corrective and preventive actions based on the feedback received from the Customers and also internally documented system for Customer complaints.

g) Inspection and test procedure both for manufacture and field activities.

h) System for Control of calibration of testing and measuring equipment and the indication of calibration status on the instruments.

i) System for indication and appraisal of inspection status.

j) System of Internal Quality Audits, Management review and initiation of corrective and Preventive actions based on the above.

k) System for authorising release of manufactured product to the Employer.

l) System for maintenance of records.

m) System for handling, storage and delivery.

n) A quality plan detailing out the specific quality control measures and procedure adopted for controlling the quality characteristics relevant to each item of equipment furnished and /or service rendered.

o) System for various field activities i.e. unloading, receipt at site, proper storage, erection, testing and commissioning of various equipment and maintenance of records. In this regard, the Employer has already prepared Standard Field Quality Plan for transmission line/substation equipments as applicable, Civil/erection Works which is required to be followed for associated works.

The Employer or his duly authorised representative reserves the right to carry out quality audit and quality surveillance of the system and procedure of the Bidder/his vendor's quality management and control activities.

8.2 Quality Assurance Documents

The Bidder shall ensure availability of the following Quality Assurance Documents:

i) All Non-Destructive Examination procedures, stress relief and weld repair procedure actually used during fabrication, and reports including radiography interpretation reports.

ii) Welder and welding operator qualification certificates.

iii) Welder's identification list, welding operator's qualification procedure and welding identification symbols.

iv) Raw Material test reports on components as specified by the specification and in the quality plan.

v) The Manufacturing Quality Plan(MQP) indicating Customer Inspection Points (CIPs) at various stages of manufacturing and methods used to verify that the inspection and testing points in the quality plan were performed satisfactorily.

vi) Factory test results for testing required as per applicable quality plan/technical specifications/GTP/Drawings etc.

vii) Stress relief time temperature charts/oil impregnation time temperature charts, wherever applicable.

8.3 INSPECTION, TESTING & INSPECTION CERTIFICATE

8.3.1 The responsibility and the basis of inspection for various items & equipment is placed at **Annexure-G** along with the requirement of MQP (Manufacturing Quality Plan), ITP(Inspection & Test Plan), FAT(Factory Acceptance Test) which should be valid & POWERGRID approved and Level of inspection envisaged against each item.

Bidder shall ensure that order for items where MQP/ITP/FAT is required will be placed only on vendors having valid MQP/ITP/FAT and where the supplier's MQP/ITP/FAT is either not valid or has not been approved by POWERGRID, MQP shall be generally submitted as per POWERGRID format before placing order.

Items not covered under MQP/ITP/FAT shall be offered for inspection as per POWERGRID LOA/technical Specifications/POWERGRID approved data sheets/ POWERGRID approved drawings and relevant Indian/International standards.

Inspection **Levels**: For implementation of projects in a time bound manner and to avoid any delay in deputation of POWERGRID or its authorized representative, involvement of POWERGRID for inspection of various items / equipment will be based on the level below:

Level –I: Bidder to raise all inspection calls and review the report of tests carried out by the manufacturer, on his own, as per applicable standards/ POWERGRID specification, and submit to concerned POWERGRID inspection office/Inspection Engineer. CIP/MICC will be issued by POWERGRID based on review of test reports/certificates of manufacturers.

Level – II: Bidder to raise all inspection calls and carry out the inspection on behalf of POWERGRID on the proposed date of inspection as per applicable standards/specification. However, in case POWERGRID wishes to associate itself during inspection, the same would be intimated to Bidder and CIP/MICC will be issued by POWERGRID. Else, Bidder would submit their test reports/certificates to POWERGRID. CIP/MICC will be issued by POWERGRID based on review of test reports/ certificates.

Level - III: Bidder to raise inspection calls for both, stage (as applicable) & final inspection and carry out the stage inspections (if applicable) on behalf of POWERGRID on the proposed date of inspection as per applicable standards/specification. However, in case POWERGRID wishes to associate itself during stage inspection, the same would be intimated to Bidder and CIP will be issued by POWERGRID. Else, Bidder would submit the test reports / certificates of stage inspection after their own review and CIP will be issued by POWERGRID based on review of test reports / certificates. Final inspection will be carried out by POWERGRID and CIP/MICC will be issued by POWERGRID.

Level – IV: Bidder to raise inspection calls for both, stage (as applicable) & final inspections. POWERGRID will carry out the inspection for both stage & final inspection as per applicable standards/specification and CIP/MICC will be issued by POWERGRID.

8.3.2 Bidder shall ensure that to implement the above inspection levels, particularly for the quality control and inspection at sub-vendor's works, they would depute sufficient qualified & experienced manpower in their Quality Control and Inspection department. Further, to assure quality of construction, Bidder shall have a separate workforce having appropriate qualification & experience and deploy suitable tools and plant for maintaining quality requirement during construction in line with applicable Field Quality Plan (FQP).

8.3.3 The Employer, his duly authorised representative and/or outside inspection agency acting on behalf of the Employer shall have at all reasonable times access to the Bidder's premises or Works and shall have the power at all reasonable times to ensure that proper Quality Management practices / norms are adhered to, inspect and examine the materials & workmanship of the Works, to carry out Quality/Surveillance Audit during manufacture or erection and if part of the Works is being manufactured or assembled at other premises or works. The Bidder shall obtain for the

Employer and for his duly authorised representative permission to inspect as if the works were manufactured or assembled on the Bidder's own premises or works. The item/equipment, if found unsatisfactory with respect to workmanship or material is liable to be rejected. The observations for improvements during product/ process inspection by POWERGRID shall be recorded in Quality Improvement Register (available & maintained at works) for review & timely compliance of observations.

8.3.4 Bidder shall submit inspection calls over internet through POWERGRID website. The required vendor code and password to enable raising inspection call will be furnished to the main Contractor within 30 days of award of contract on submission of documents by Contractor. After raising the inspection calls, Contractor shall then proceed as per the message of that particular call which is available on the message board.

8.3.5 The Employer reserves the right to witness any or all type, acceptance and routine tests specified for which the Bidder shall give the Employer/Inspector Twenty one (21) days written notice of any material being ready for testing for each stage of testing as identified in the approved quality plan as customer inspection point (CIP) for indigenous inspections. All inspection calls for overseas material shall be given at least forty five (45) days in advance. Such tests shall be to the Bidder's account except for the expenses of the Inspection Engineer. The Employer/inspector, unless witnessing of the tests is waived by Employer, will attend such tests within Twenty one (21) days of the date of which the equipment is notified as being ready for test/inspection, failing which the Bidder may proceed with the test which shall be deemed to have been made in the Inspector's presence and he shall forthwith forward to the Inspector three copies of tests, duly certified. Bidder shall ensure, before giving notice for type test, that all drawings and quality plans have been got approved. The equipment shall be dispatched to site only after approval of Routine and Acceptance test results and Issuance of Dispatch Clearance in writing by the Employer. CIP/Material Inspection clearance certificate (MICC) shall be issued by the Employer after inspection of the equipment or review of test reports as applicable. Employer may waive off the presence of Employer's inspecting engineer. In that case test will be carried out as per approved QP and test certificate will be furnished by the supplier for approval. CIP/MICC will be issued only after review and approval of the test reports.

8.3.6 Bidder shall generally offer material for inspection as per supply bar chart approved by POWERGRID and not before 30 days from schedule indicated in the bar chart. In case Bidder offers material(s) for inspection prior to 30 days from the scheduled date with necessary approval of POWERGRID, POWERGRID shall inspect the material and issue CIP only. However, in such an exceptional case, MICC shall be issued only as per provision of original / revised approved supply schedule.

8.3.7 Bidder shall minimize the number of inspection calls by offering optimum quantities in each inspection call at the respective manufacturer's works.

8.3.8 Bidder shall inspect the material themselves and only after they are fully convinced about the Quality, they shall offer the material for POWERGRID inspection and shall also ensure that relevant portion of LOA/NOA, approved drawing and data sheets along with applicable Quality Plans are available at the works of Contractor or their Sub-vendor before the material is offered for inspection.

8.3.9 Bidder shall ensure that material which has been cleared for dispatch after inspection will be dispatched within 30 days in case of domestic supplies and within 60 days in case of Off-shore supplies from the date of issuance of CIP. Material which is not dispatched within stipulated time as above will be reoffered for POWERGRID inspection or specific approval of POWERGRID QA&I shall be obtained for delayed dispatch.

8.3.10 The Employer or IE shall give notice in writing to the Bidder, of any objection either to conformance to any drawings or to any equipment and workmanship which in his opinion is not in accordance with the Contract. The Bidder shall give due consideration to such objections and shall either make the modifications that may be necessary to meet the said objections or shall confirm in writing to the Employer/Inspection Engineer giving reasons therein, that no modifications are necessary to comply with the Contract.

8.3.11 All Test Reports and documents to be submitted in English during final inspection of equipment by POWERGRID or as and when required for submission.

8.3.12 When the factory tests have been completed at the Bidder's or Sub-Bidder's works, the Employer/Inspection Engineer(IE) shall issue a certificate to this effect within fifteen (15) days after completion of tests & submission of documents by Bidder/manufacturer but if the tests are not witnessed by the Employer/IE, the certificate shall be issued within fifteen (15) days of receipt of the Bidder's Test certificate by the Employer/IE. Bidder shall, on completion of all tests, submit test reports within Ten (10) days to POWERGRID IE. Failure of the Employer/IE to issue such a certificate shall not prevent the Contractor from proceeding with the Works. The completion of these tests or the issue of the certificate shall not bind the Employer to accept the equipment should, it, on further tests after erection, be found not to comply with the Contract.

8.3.13 In all cases, where the Contract provides for tests whether at the premises or works of the Bidder or of any Sub-Bidder, the Bidder, except where otherwise specified, shall provide free of charge such items as labour, materials, electricity, fuel, water, stores, apparatus and instruments as may be reasonably demanded by the Employer/Inspector or his authorised representative to carry out effectively such tests of the equipment in accordance with the Contract and shall give facilities to the Employer/Inspection Engineer or to his authorised representative to accomplish testing.

8.3.14 The inspection and acceptance by Employer and issue of Inspection Certificate thereon shall in no way limit the liabilities and responsibilities of the Contractor in respect of the agreed quality assurance programme forming a part of the Contract, or if such equipment is found to be defective at a later stage.

8.3.15 The Employer will have the right of having at his own expenses any other test(s) of reasonable nature carried out at Contractor's premises or at site or in any other place in addition of aforesaid type and routine tests, to satisfy that the material comply with the specification.

8.3.16 The Employer reserves the right for getting any additional field tests conducted on the completely assembled equipment at site to satisfy that material complies with specifications.

8.3.17 Rework/ Re-engineering, if any, on any item/equipment shall be carried out only after mutual discussions and in accordance with mutually agreed procedure. Bidder shall submit Joint Inspection Report of equipments under Re-Work/Re-Engineering alongwith procedure for the

same to POWERGRID for approval, before taking up the Re-Work/Re-Engineering, failing which POWERGRID reserves the right to reject the equipment.

8.3.18 Bidder may establish a field test Laboratory to execute Civil Construction testing requirements at site with the condition that all testing equipment shall be calibrated from POWERGRID approved accredited Testing laboratories, with calibration certificates kept available at site and all testing personnel employed in the Field Testing Laboratories to be qualified and experienced Engineers or testing to be carried out at POWERGRID approved Third Party Laboratories.

8.3.19 Bidder shall ensure that all possible steps are taken to avoid damages to the equipment during transport, storage and erection.

8.3.20 Deleted.

8.3.21 Bidder shall ensure commissioning of all CSDs along with Circuit Breakers wherever applicable.

8.3.22 For EHV transformers/reactors:

Insulation oil shall be as per POWERGRID Technical specifications and same grade shall be used for impregnation of the active part & testing at the works of Transformer/Reactor Manufacturer and as well as for filling the Transformer/Reactors at site. Bidder to ensure that windings for Transformer/Reactors are made in air conditioned environment. Core-coil assembly shall be performed in positive pressurized dust controlled environment. Dust measurements shall be monitored regularly at Transformer / Reactor Manufacturer works. Contractor shall ensure that respective civil foundations & Fire walls for Transformer/Reactors units to be commissioned, shall be made ready at concerned sites before receipt of Transformer/Reactors units.

8.3.23 The Employer reserves the right to increase or decrease their involvement in inspections at Bidder's Works or at his Sub-Bidder's premises or at the Employer's site or at any other place of Work based on performance of Bidder/sub-bidder.

9.0 TYPE TESTING & CLEARANCE CERTIFICATE

9.1 Deleted.

9.2 Deleted.

9.3 The Employer intends to repeat those type tests which are indicated in the price schedule and the same shall be payable as per provision of contract. The price of conducting type tests shall be included in Bid price and break up of these shall be given in the relevant schedule of Bid Proposal Sheets. These Type test charges would be considered in bid evaluation. In case Bidder does not indicate charges for any of the type tests or does not mention the name of any test in the price schedules, it will be presumed that the particular test has been offered free of charge. Further, in case any Bidder indicates that he shall not carry out a particular test, his offer shall be considered incomplete and shall be liable to be rejected. The Employer reserves the right to waive the repeating of type tests partly or fully and in case of waival, test charges for the same shall not be payable.

9.4 The Employer reserves the right to witness any or all the type tests. The Employer shall bear all expenses for deputation of Employer's representative(s) for witnessing the type tests except in the case of re-deputation if any, necessitated due to no fault of the Employer.

9.5 Deleted

10.0 Deleted.

11.0 PACKAGING & PROTECTION

11.1 All the equipments shall be suitably protected, coated, covered or boxed and crated to prevent damage or deterioration during transit, handling and storage at Site till the time of erection. On request of the Employer, the Bidder shall also submit packing details/associated drawing for any equipment/material under his scope of supply, to facilitate the Employer to repack any equipment/material at a later date, in case the need arises. While packing all the materials, the limitation from the point of view of availability of Railway wagon sizes in India should be taken into account. The Bidder shall be responsible for any loss or damage during transportation, handling and storage due to improper packing. Any demurrage, wharfage and other such charges claimed by the transporters, railways etc. shall be to the account of the Contractor. Employer/BHEL takes no responsibility of the availability of the wagons.

11.2 All coated surfaces shall be protected against abrasion, impact, discolouration and any other damages. All exposed threaded portions shall be suitably protected with either a metallic or a non-metallic protecting device. All ends of all valves and pipings and conduit equipment connections shall be properly sealed with suitable devices to protect them from damage.

12.0 FINISHING OF METAL SURFACES

12.1 All metal surfaces shall be subjected to treatment for anti-corrosion protection. All ferrous surfaces for external use unless otherwise stated elsewhere in the specification or specifically agreed, shall be hot-dip galvanized after fabrication. All steel conductors including those used for earthing/grounding (above ground level) shall also be galvanized according to IS: 2629.

12.2 HOT DIP GALVANISING

12.2.1 The minimum weight of the zinc coating shall be 610 gm/sq.m and minimum average thickness of coating shall be 86 microns for all items having thickness 6mm and above. For items lower than 6mm thickness requirement of coating thickness shall be as per relevant ASTM. For surface which shall be embedded in concrete, the zinc coating shall be 610 gm/sq.m minimum.

12.2.2 The galvanized surfaces shall consist of a continuous and uniform thick coating of zinc, firmly adhering to the surface of steel. The finished surface shall be clean and smooth and shall be free from defects like discoloured patches, bare spots, unevenness of coating, spelter which is loosely attached to the steel globules, spiky deposits, blistered surface, flaking or peeling off, etc. The presence of any of these defects noticed on visual or microscopic inspection shall render the material liable to rejection.

12.2.3 After galvanizing, no drilling or welding shall be performed on the galvanized parts of the equipment excepting that nuts may be threaded after galvanizing. Sodium dichromate or alternate approved treatment shall be provided to avoid formation of white rust after hot dip galvanization.

12.2.4 The galvanized steel shall be subjected to four numbers of one minute dips in copper sulphate solution as per IS-2633.

12.2.5 Sharp edges with radii less than 2.5 mm shall be able to withstand four immersions of the Standard Preece test. All other coatings shall withstand six immersions. The following galvanizing tests should essentially be performed as per relevant Indian Standards.

- Coating thickness
- Uniformity of zinc
- Adhesion test
- Mass of zinc coating

12.2.6 Galvanised material must be transported properly to ensure that galvanised surfaces are not damaged during transit. Application of touch-up zinc rich paint at site shall be allowed with approval of Engineer Incharge.

12.3 PAINTING

12.3.1 All sheet steel work shall be degreased, pickled, phosphated in accordance with the IS6005 “Code of practice for phosphating iron and sheet”. All surfaces, which will not be easily accessible after shop assembly, shall beforehand be treated and protected for the life of the equipment. The surfaces, which are to be finished painted after installation or require corrosion protection until installation, shall be shop painted with at least two coats of primer. Oil, grease, dirt and swaf shall be thoroughly removed by emulsion cleaning. Rust and scale shall be removed by pickling with dilute acid followed by washing with running water, rinsing with slightly alkaline hot water and drying.

12.3.2 Hot Phosphating shall be done for phosphating process under pretreatment of sheets After phosphating, thorough rinsing shall be carried out with clean water followed by final rinsing with dilute dichromate solution and oven drying. The phosphate coating shall be sealed with application of two coats of ready mixed, stoving type zinc chromate primer. The first coat may be “flash dried” while the second coat shall be stoved.

12.3.3 After application of the primer, two coats of finishing synthetic enamel paint shall be applied, each coat followed by stoving. The second finishing coat shall be applied after inspection of first coat of painting.

12.3.4 The exterior and interior colour of the paint in case of new substations shall preferably be RAL 7032 for all equipment, marshalling boxes, junction boxes, control cabinets, panels etc. unless specifically mentioned under respective sections of the equipments. Glossy white colour inside the equipments /boards /panels/junction boxes is also acceptable. The exterior colour for panels shall be matching with the existing panels in case of extension of a substation. Each coat of primer and finishing paint shall be of slightly different shade to enable inspection of the painting. A small quantity of finishing paint shall be supplied for minor touching up required at site after installation of the equipments.

12.3.5 In case the contractor proposes to follow his own standard surface finish and protection procedures or any other established painting procedures, like electrostatic painting etc., the procedure shall be submitted during detailed engineering for Employer's review & approval.

12.3.6 The colour scheme as given below shall be followed for Fire Protection and Air Conditioning systems

S.No.	PIPE LINE	Base colour	Band colour
Fire Protection System			
1	Hydrant and Emulsifier system pipeline/NIFPS	FIRE RED	-
2	Emulsifier system detection line – water	FIRE RED	Sea Green
3	Emulsifier system detection line –Air	FIRE RED	Sky Blue
4	Pylon support pipes	FIRE RED	
Air Conditioning Plant			
5	Refrigerant gas pipeline – at compressor suction	Canary Yellow	-
6	Refrigerant gas pipeline – at compressor discharge	Canary Yellow	Red
7	Refrigerant liquid pipeline	Dark Admiralty Green	-
8	Chilled water pipeline	Sea Green	-
9	Condenser water pipeline	Sea Green	Dark Blue

The direction of flow shall be marked by → (arrow) in black colour.

Base Colour Direction of flow Band Colour

12.3.7 For aluminium casted surfaces, the surface shall be with smooth finish. Further, in case of aluminium enclosures, the surface shall be coated with powder (coating thickness of 60 microns) after surface preparation for painting. For stainless steel surfaces, no painting is envisaged.

12.3.8 Band colour is required for Emulsifier system detection line only if both water and air detection lines are present at the same substation. Further, band colour shall be applied at an interval of 2 meters approx. along the length and minimum width of band shall be 25mm.

13.0 Deleted.

14.0 TOOLS

14.1 Deleted.

14.2 SPECIAL TOOLS AND TACKLES

The bidder shall supply all special tools and tackles required for Operation and maintenance of equipment. The special tools and tackles shall only cover items which are specifically required for the equipment offered and are proprietary in nature. The list of special tools and tackles, if any, shall be finalized during detail engineering and the same shall be supplied without any additional cost implication to the Employer.

14.3 Deleted.

15.0 AUXILIARY SUPPLY

15.1 The auxiliary power for station supply, including the equipment drive, cooling system of any equipment, air-conditioning, lighting etc shall be designed for the specified Parameters as under. The DC supply for the instrumentation and PLCC system shall also conform the parameters as indicated in the following table:

Normal Voltage	Variation in Voltage	Frequency in HZ	Phase/Wire	Neutral connection
415V	± 10%	50 ± 5%	3/4 Wire	Solidly Earthed.
240V	± 10%	50 ± 5%	1/2 Wire	Solidly Earthed.
220V	190V to 240V	DC	Isolated 2 wire System	-
110V	95V to 120V	DC	Isolated 2 wire System	-
48V	--	DC	2 wire system (+) earthed	-

Combined variation of voltage and frequency shall be limited to ± 10%.

15.2 Pickup value of binary input modules of Intelligent Electronic Devices, Digital protection couplers, Analog protection couplers shall not be less than 50% of the specified rated station auxiliary DC supply voltage level.

16.0 SUPPORT STRUCTURE (ONLY OF CIRCUIT BREAKER)

16.1 The equipment support structures shall be suitable for equipment connections at the first level i.e 14.0 meter, 8.0 meter, 5.9 meter and 4.6 meter from plinth level for 765kV, 400kV, 220kV and 132kV substations respectively. All equipment support structures shall be supplied alongwith brackets, angles, stools etc. for attaching the operating mechanism, control cabinets & marshalling box (wherever applicable) etc.

16.2 The minimum vertical distance from the bottom of the lowest porcelain/polymer part of the bushing, porcelain/polymer enclosures or supporting insulators to the bottom of the equipment base, where it rests on the foundation pad shall be 2.55 metres.

17.0 CLAMPS AND CONNECTORS INCLUDING TERMINAL CONNECTORS (For Lightning Arrester & Wave Trap only)

17.1 All power clamps and connectors shall conform to IS:5561 or other equivalent international standard and shall be made of materials listed below :

Sl. No.	Description	Materials
a)	For connecting ACSR conductors/AAC conductors/ Aluminium tube	Aluminum alloy casting, conforming to designation **4600** of IS:617 and all test shall conform to IS:617
b)	For connecting equipment terminals mad of copper with ACSR conductors/AAC conductors/ Aluminium tube	Bimetallic connectors made from aluminum alloy casting, conforming to designation **4600** of IS:617 with 2mm thick bimetallic liner/strip and all test shall conform to IS:617
c)	For connecting G.I	Galvanised mild steel shield wire
d)	Bolts, nuts & plain washers	Electro-galvanised for sizes below M12, for others hot dip galvanised.
e)	Spring washers	Electro-galvanised mild steel suitable for atleast service condition-3 as per IS:1573

17.2 Necessary clamps and connectors shall be supplied for all equipment and connections. If corona rings are required to meet these requirements they shall be considered as part of that equipment and included in the scope of work.

17.3 Where copper to aluminum connections are required, bi-metallic clamps shall be used, which shall be properly designed to ensure that any deterioration of the connection is kept to a minimum and restricted to parts which are not current carrying or subjected to stress.

17.4 Low voltage connectors, grounding connectors and accessories for grounding all equipment as specified in each particular case, are also included in the scope of Work.

17.5 No current carrying part of any clamp shall be less than 10 mm thick. All ferrous parts shall be hot dip galvanised. Copper alloy liner/strip of minimum 2 mm thickness shall be cast integral with aluminum body or 2 mm thick bi-metallic liner/strips shall be provided for Bi-metallic clamps.

17.6 All casting shall be free from blow holes, surface blisters, cracks and cavities. All sharp edges and corners shall be blurred and rounded off.

17.7 Flexible connectors, braids or laminated straps made for the terminal clamps for bus posts shall be suitable for both expansion or through (fixed/sliding) type connection of IPS AL tube as required. In both the cases the clamp height (top of the mounting pad to centre line of the tube) should be same.

17.8 Current carrying parts (500A and above) of the clamp/connector shall be provided with minimum four numbers of bolts preferably for 132kV and above.

17.9 All current carrying parts shall be designed and manufactured to have minimum contact resistance.

17.10 Power Clamps and connectors shall be designed to control corona as per requirement.

17.11 Tests

Clamps and connectors should be type tested on minimum three samples as per IS:5561 and shall also be subjected to routine tests as per IS:5561. Following type test reports shall be submitted for approval. Type test once conducted shall hold good. The requirement of test conducted within last ten years, shall not be applicable.

i) Temperature rise test (maximum temperature rise allowed is 35°C over 50°C ambient)

ii) Short time current test

iii) Corona (dry) and RIV (dry) test [for 132kV and above voltage level clamps]

iv) Resistance test and Pullout strength test

v) Cantilever Strength test on bus support clamps & connectors

vi)

18.0 CONTROL CABINETS, JUNCTION BOXES, TERMINAL BOXES MARSHALLING BOXES FOR OUTDOOR EQUIPMENT

18.1 All types of boxes, cabinets etc. shall generally conform to & be tested in accordance with IS/IEC 61439-0, as applicable, and the clauses given below:

18.2 Control cabinets, junction boxes, Marshalling boxes & terminal boxes, Out door ACDB cum DCDB panels shall be made of stainless steel of atleast 1.5 mm thick or aluminum enclosure of atleast 1.6 mm thick and shall be dust, water and vermin proof. Stainless steel used shall be of grade SS304 (SS316 for coastal area) or better. The box shall be properly braced to prevent wobbling. There shall be sufficient reinforcement to provide level surfaces, resistance to vibrations and rigidity during transportation and installation. In case of aluminum enclosed box the thickness of aluminum shall be such that it provides adequate rigidity and long life as comparable with sheet steel of specified thickness.

Control cabinets, junction boxes, marshalling boxes & terminal boxes, out-door ACDB cum DCDB panels shall have adequate space/clearance as per guidelines/technical specifications to access/replace any component. Necessary component labelling to be also done on non-conducting sheet.

For CONTROL CABINETS, JUNCTION BOXES, TERMINAL BOXES MARSHALLING BOXES FOR OUTDOOR EQUIPMENT Junction Box, wire should be as per IS or equivalent IEC with FRLS grade

Machine laid PU Foam gasket may be permitted for use in Control Cabinets etc.

18.3 A canopy and sealing arrangements for operating rods shall be provided in marshalling boxes / Control cabinets to prevent ingress of rain water.

18.4 Cabinet/boxes with width more than 700 mm shall be provided with double hinged doors with padlocking arrangements. The distance between two hinges shall be adequate to ensure uniform sealing pressure against atmosphere.

18.5 All doors, removable covers and plates shall be gasketed all around with suitably profiled EPDM/Neoprene/PU gaskets. The gasket shall be tested in accordance with approved quality plan, IS:11149 and IS:3400. Ventilating Louvers, if provided, shall have screen and filters. The screen shall be fine wire mesh made of brass.

Further, the gasketing arrangement shall be such that gaskets are pasted in slots (in door fabrication/gasket itself) in order to prevent ingression of dust and moisture inside the panels so that no internal rusting occurs in panels during the operation of the equipment.

18.6 All boxes/cabinets shall be designed for the entry of cables by means of weather proof and dust-proof connections. Boxes and cabinets shall be designed with generous clearances to avoid interference between the wiring entering from below and any terminal blocks or accessories mounted within the box or cabinet. Suitable cable gland plate above the base of the marshalling kiosk/box shall be provided for this purpose along with the proper blanking plates. Necessary number of cable glands shall be supplied and fitted on this gland plate. Gland plate shall have provision for some future glands to be provided later, if required. The Nickel plated glands shall be dust proof, screw on & double compression type and made of brass. The gland shall have provision for securing armour of the cable separately and shall be provided with earthing tag. The glands shall conform to BS:6121.

18.7 A 240V, single phase, 50 Hz, 15 amp AC plug and socket shall be provided in the cabinet with ON-OFF switch for connection of hand lamps. Plug and socket shall be of industrial grade.

18.8 LED based illumination of minimum 9 watts shall be provided. The switching of the fittings shall be controlled by the door switch.

For junction boxes of smaller sizes such as lighting junction box, manual operated earth switch mechanism box etc., plug socket, heater and illumination is not required to be provided.

18.9 All control switches shall be of MCB/rotary switch type and Toggle/piano switches shall not be accepted.

18.10 Earthing of the cabinet shall be ensured by providing two separate earthing pads. The earth wire shall be terminated on to the earthing pad and secured by the use of self etching washer. Earthing of hinged door shall be done by using a separate earth wire.

18.11 The bay marshalling kiosks shall be provided with danger plate and a diagram showing the numbering/connection/feruling by pasting the same on the inside of the door.

18.12 The following routine tests alongwith the routine tests as per IS:5039 shall also be conducted:

i) Check for wiring

ii) Visual and dimension check

18.13 The enclosure of bay marshalling kiosk, junction box, terminal box and control cabinets shall conform to IP-55 as per IS/IEC60947 including application of 1kV rms for 1 (one) minute, after IP-55 test.

19.0 Deleted.

20.0 TERMINAL BLOCKS AND WIRING

20.1 Control and instrument leads from the switchboards or from other equipment will be brought to terminal boxes or control cabinets in conduits. All interphase and external connections to equipment or to control cubicles will be made through terminal blocks.

20.2 Terminal blocks shall be 650V grade and have continuous rating to carry the maximum expected current on the terminals and non-breakable type. These shall be of moulded piece, complete with insulated barriers, stud type terminals, washers, nuts and lock nuts. Screw clamp, overall insulated, insertion type, rail mounted terminals can be used in place of stud type terminals. But the terminal blocks shall be non-disconnecting stud type except for the secondary junction boxes of Current Transformer and Voltage Transformer.

20.3 Terminal blocks for current transformer and voltage transformer secondary leads shall be provided with test links and isolating facilities. The current transformer secondary leads shall also be provided with short circuiting and earthing facilities.

20.4 The terminal shall be such that maximum contact area is achieved when a cable is terminated. The terminal shall have a locking characteristic to prevent cable from escaping from the terminal clamp unless it is done intentionally.

20.5 The conducting part in contact with cable shall preferably be tinned or silver plated however Nickel plated copper or zinc plated steel shall also be acceptable.

20.6 The terminal blocks shall be of extensible design, multilayer terminal arrangement is not allowed in any junction box (Common MB, Individual MB, JB etc.). There should be sufficient space at both sides of terminals so that ferrule number of wires / TB numbers are clearly visible during wire removal or insertion.

20.7 The terminal blocks shall have locking arrangement to prevent its escape from the mounting rails.

20.8 The terminal blocks shall be fully enclosed with removable covers of transparent, nondeteriorating type plastic material. Insulating barriers shall be provided between the terminal blocks. These barriers shall not hinder the operator from carrying out the wiring without removing the barriers.

20.9 Unless otherwise specified terminal blocks shall be suitable for connecting the following conductors on each side.

a)	All circuits except CT/PT circuits	Minimum of two of 2.5 sq mm copper flexible.
b)	All CT/PT circuits	Minimum of 4 nos. of 2.5 sq mm copper flexible.

20.10 The arrangements shall be in such a manner so that it is possible to safely connect or disconnect terminals on live circuits and replace fuse links when the cabinet is live.

20.11 Atleast 20 % spare terminals shall be provided on each panel/cubicle/box and these spare terminals shall be uniformly distributed on all terminals rows.

20.12 There shall be a minimum clearance of 250 mm between the First/bottom row of terminal block and the associated cable gland plate for outdoor ground mounted marshalling box and the clearance between two rows of terminal blocks shall be a minimum of 150 mm.

20.13 The Contractor shall furnish all wire, conduits and terminals for the necessary interphase electrical connections (where applicable) as well as between phases and common terminal boxes or control cabinets

21.0 LAMPS & SOCKETS

21.1 Lamps & Sockets

All lamps shall use a socket base as per IS-1258, except in the case of signal lamps.

All sockets (convenience outlets) shall be suitable to accept both 5 Amp & 15 Amp pin round Standard Indian plugs. They shall be switched sockets with shutters.

21.2 Hand Lamp:

A 240 Volts, single Phase, 50 Hz AC plug point shall be provided in the interior of each cubicle with ON-OFF Switch for connection of hand lamps.

21.3 Switches and Fuses:

21.3.1 Each panel shall be provided with necessary arrangements for receiving, distributing, isolating and fusing of DC and AC supplies for various control, signaling, lighting and space heater circuits. The incoming and sub-circuits shall be separately provided with miniature circuit breaker / switch fuse units. Selection of the main and Sub-circuit fuse ratings shall be such as to ensure selective

clearance of sub-circuit faults. Potential circuits for relaying and metering shall be protected by HRC fuses.

21.3.2 All fuses shall be of HRC cartridge type conforming to relevant IS mounted on plug-in type fuse bases. Miniature circuit breakers with thermal protection and alarm contacts will also be accepted. All accessible live connection to fuse bases shall be adequately shrouded. Fuses shall have operation indicators for indicating blown fuse condition. Fuse carrier base shall have imprints of the fuse rating and voltage.

22.0 BUSHINGS, HOLLOW COLUMN INSULATORS, SUPPORT INSULATORS:

22.1 Bushings shall be manufactured and tested in accordance with IS:2099 & IEC-60137 while hollow column insulators shall be manufactured and tested in accordance with IEC-62155/IS:5621.The support insulators shall be manufactured and tested as per IS:2544/IEC-60168 and IEC-60273. The insulators shall also conform to IEC-60815 as applicable.

The bidder may also offer composite hollow insulators, conforming to IEC-61462.

22.2 Support insulators, bushings and hollow column insulators shall be manufactured from high quality porcelain. Porcelain used shall be homogeneous, free from laminations, cavities and other flaws or imperfections that might affect the mechanical or dielectric quality and shall be thoroughly vitrified tough and impervious to moisture.

22.3 Glazing of the porcelain shall be uniform brown in colour, free from blisters, burrs and similar other defects.

22.4 Support insulators/bushings/hollow column insulators shall be designed to have ample insulation, mechanical strength and rigidity for the conditions under which they will be used.

22.5 When operating at normal rated voltage there shall be no electric discharge between the conductors and bushing which would cause corrosion or injury to conductors, insulators or supports by the formation of substances produced by chemical action. No radio interference shall be caused by the insulators/bushings when operating at the normal rated voltage.

22.6 Bushing porcelain shall be robust and capable of withstanding the internal pressures likely to occur in service. The design and location of clamps and the shape and the strength of the porcelain flange securing the bushing to the tank shall be such that there is no risk of fracture. All portions of the assembled porcelain enclosures and supports other than gaskets, which may in any way be exposed to the atmosphere shall be composed of completely non hygroscopic material such as metal or glazed porcelain.

22.7 All iron parts shall be hot dip galvanised and all joints shall be air tight. Surface of joints shall be trued up porcelain parts by grinding and metal parts by machining. Insulator/bushing design shall be such as to ensure a uniform compressive pressure on the joints.

22.8 Void

22.9 Deleted.

23.0 MOTORS

Motors shall be "Squirrel Cage" three phase induction motors of sufficient size capable of satisfactory operation for the application and duty as required for the driven equipment and shall be subjected to routine tests as per applicable standards. The motors shall be of approved make.

23.1 Enclosures

a) Motors to be installed outdoor without enclosure shall have hose proof enclosure equivalent to IP-55 as per IS: 4691. For motors to be installed indoor i.e. inside a box, the motor enclosure, shall be dust proof equivalent to IP-44 as per IS: 4691.

b) Two independent earthing points shall be provided on opposite sides of the motor for bolted connection of earthing conductor.

c) Motors shall have drain plugs so located that they will drain water resulting from condensation or other causes from all pockets in the motor casing.

d) Motors weighing more than 25 Kg. shall be provided with eyebolts, lugs or other means to facilitate lifting.

23.2 Operational Features

a) Continuous motor rating (name plate rating) shall be at least ten (10) percent above the maximum load demand of the driven equipment at design duty point and the motor shall not be over loaded at any operating point of driven equipment that will rise in service.

b) Motor shall be capable at giving rated output without reduction in the expected life span when operated continuously in the system having the particulars as given in Clause 15.0 of this Section.

23.3 Starting Requirements:

a) All induction motors shall be suitable for full voltage direct-on-line starting. These shall be capable of starting and accelerating to the rated speed alongwith the driven equipment without exceeding the acceptable winding temperature even when the supply voltage drops down to 80% of the rated voltage.

b) Motors shall be capable of withstanding the electrodynamic stresses and heating imposed if it is started at a voltage of 110% of the rated value.

c) The locked rotor current shall not exceed six (6) times the rated full load current for all motors, subject to tolerance as given in IS:325.

d) Motors when started with the driven equipment imposing full starting torque under the supply voltage conditions specified under Clause 15.0 shall be capable of withstanding atleast two successive starts from cold condition at room temperature and one start from hot condition without injurious heating of winding. The motors shall also be suitable for three equally spread starts per hour under the above referred supply condition.

e) The locked rotor withstand time under hot condition at 110% of rated voltage shall be more than starting time with the driven equipment of minimum permissible voltage by at least two seconds or 15% of the accelerating time whichever is greater. In case it is not possible to meet the above requirement, the Bidder shall offer centrifugal type speed switch mounted on the motor shaft

which shall remain closed for speed lower than 20% and open for speeds above 20% of the rated speed. The speed switch shall be capable of withstanding 120% of the rated speed in either direction of rotation.

23.4 Running Requirements:

a) The maximum permissible temperature rise over the ambient temperature of 50 degree C shall be within the limits specified in IS:325 (for 3-phase induction motors) after adjustment due to increased ambient temperature specified.

b) The double amplitude of motor vibration shall be within the limits specified in IS: 4729. Vibration shall also be within the limits specified by the relevant standard for the driven equipment when measured at the motor bearings.

c) All the induction motors shall be capable of running at 80% of rated voltage for a period of 5 minutes with rated load commencing from hot condition.

23.5 TESTING AND COMMISSIONING

An indicative list of tests is given below. Contractor shall perform any additional test based on specialities of the items as per the field Q.P./Instructions of the equipment Contractor or Employer without any extra cost to the Employer. The Contractor shall arrange all instruments required for conducting these tests alongwith calibration certificates and shall furnish the list of instruments to the Employer for approval.

(a) Insulation resistance.

(b) Phase sequence and proper direction of rotation.

(c) Any motor operating incorrectly shall be checked to determine the cause and the conditions corrected

ANNEXURE-A

CORONA AND RADIO INTERFERENCE VOLTAGE (RIV) TEST

1. General

Unless otherwise stipulated, all equipment together with its associated connectors, where applicable, shall be tested for external corona (for 400kV & above) both by observing the voltage level for the extinction of visible corona under falling power frequency voltage and by measurement of radio interference voltage (RIV) for 132kV and above.

2. Test Levels:

The test voltage levels for measurement of external RIV and for corona extinction voltage are listed under the relevant clauses of the specification.

3. Test Methods for RIV:

3.1 RIV tests shall be made according to measuring circuit as per International Special-Committee on Radio Interference (CISPR) Publication 16-1(1993) Part -1. The measuring circuit shall preferably be tuned to frequency with 10% of 0.5 Mhz but other frequencies in the range of 0.5 MHz to 2 MHz may be used, the measuring frequency being recorded. The results shall be in microvolts.

3.2 Alternatively, RIV tests shall be carried out in accordance with relevant IEC of respective equipment or NEMA standard Publication No. 107-1964.

3.3 In measurement of, RIV, temporary additional external corona shielding may be provided. In measurements of RIV only standard fittings of identical type supplied with the equipment and a simulation of the connections as used in the actual installation will be permitted in the vicinity within 3.5 meters of terminals.

3.4 Ambient noise shall be measured before and after each series of tests to ensure that there is no variation in ambient noise level. If variation is present, the lowest ambient noise level will form basis for the measurements. RIV levels shall be measured at increasing and decreasing voltages of 85%, 100%, and 110% of the specified RIV test voltage for all equipment unless otherwise specified. The specified RIV test voltage for 765kV, 400 kV, 220 KV is listed in the detailed specification together with maximum permissible RIV level in microvolts.

3.5 The metering instruments shall be as per CISPR recommendation or equivalent device so long as it has been used by other testing authorities.

3.6 The RIV measurement may be made with a noise meter. A calibration procedure of the frequency to which noise meter shall be tuned shall establish the ratio of voltage at the high voltage terminal to voltage read by noise meter.

4. Test Methods for Visible Corona

The purpose of this test is to determine the corona extinction voltage of apparatus, connectors etc. The test shall be carried out in the same manner as RIV test described above with the exception that RIV measurements are not required during test and a search technique shall be used near the onset and extinction voltage, when the test voltage is raised and lowered to determine their precise values. The test voltage shall be raised to 110% of specified corona extinction voltage and maintained there for five minutes. In case corona inception does not take place at 110%, test shall be stopped,

otherwise test shall be continued and the voltage will then be decreased slowly until all visible corona disappears. The procedure shall be repeated at least 3 times with corona inception and extinction voltage recorded each time. The corona extinction voltage for purposes of determining compliance with the specification shall be the lowest of the three values at which visible corona (negative or positive polarity) disappears.

The test to determine the visible corona extinction voltage need not be carried out simultaneously with test to determine RIV levels.

However, both test shall be carried out with the same test set up and as little time duration between tests as possible. No modification on treatment of the sample between tests will be allowed. Simultaneous RIV and visible corona extinction voltage testing may be permitted at the discretion of Employer's inspector if, in his opinion, it will not prejudice other test

5. Test Records:

In addition to the information previously mentioned and the requirements specified as per CISPR or NEMA 107-1964 the following data shall be included in test report:

a) Background noise before and after test.

b) Detailed procedure of application of test voltage.

c) Measurements of RIV levels expressed in micro volts at each level.

d) Results and observations with regard to location and type of interference sources detected at each step.

e) Test voltage shall be recorded when measured RIV passes through 100 microvolts in each direction.

f) Onset and extinction of visual corona for each of the four tests required shall be recorded.

SEISMIC WITHSTAND TEST PROCEDURE

The seismic withstanding test on the complete equipment (for 400kV and above) shall be carried out along with supporting structure. Seismic Withstand Test carried out using either lattice or pipe structure is acceptable." **Seismic Calculations certified by NABL Labs shall also be acceptable**

The Bidder shall arrange to transport the structure from his Contractor's premises/ POWERGRID sites for the purpose of seismic withstand test only.

The seismic level specified shall be applied at the base of the structure. The accelerometers shall be provided at the Terminal Pad of the equipment and any other point as agreed by the Employer. The seismic test shall be carried out in all possible combinations of the equipment. The seismic test procedure shall be furnished for approval of the Employer.

The frequency range for the earthquake spectra shall be as per IEC–62271-300.

ANNEXURE-C

LIST OF GENERAL STANDARDS AND CODES

CODES	TITLE
--	India Electricity Rules
--	Indian Electricity Act
--	Indian Electricity (Supply) Act
--	Indian Factories Act
IS-5	Colors for Ready Mixed Paints and Enamels
IS-335	New Insulating Oils
IS-617	Aluminium and Aluminium Alloy Ingots and Castings for General Engineering Purposes
IS-1448 (P1 to P 145)	Methods of Test for Petroleum and its Products
IS-2071 (P1 to P3)	Methods of High Voltage Testing
IS-12063	Classification of degrees of protection provided by enclosures of electrical equipment
IS-2165 ; P1:1997, P2:1983	Insulation Coordination
IS-3043	Code of Practice for Earthing
IS-6103	Method of Test for Specific Resistance (Resistivity) of Electrical Insulating Liquids
IS-6104	Method of Test for Interfacial Tension of Oil against Water by the Ring Method
IS-6262	Method of test for Power factor & Dielectric Constant of Electrical Insulating Liquids
IS-6792	Method for determination of electric strength of insulating oils
IS-5578	Guide for marking of insulated conductors
IS-11353	Guide for uniform system of marking & identification of conductors & apparatus terminals.
IS-8263	Methods for Radio Interference Test on High voltage Insulators
IS-9224 (Part 1,2&4)	Low Voltage Fuses
IEC-60060 (Part 1 to P4)	High Voltage Test Techniques
IEC 60068	Environmental Test
IEC-60117	Graphical Symbols
IEC-60156	Method for the Determination of the Electrical Strength of Insulation Oils
IEC-60270	Partial Discharge Measurements
IEC-60376	Specification and Acceptance of New Sulphur Hexafloride
IEC-60437	Radio Interference Test on High Voltage Insulators
IEC-60507	Artificial Pollution Tests on High Voltage Insulators to be used on AC Systems
IEC-62271-1	Common Specification for High Voltage Switchgear & Control gear Standards
IEC-60815	Guide for the Selection of Insulators in respect of Polluted Conditions

CODES	TITLE
IEC-60865 (P1 & P2)	Short Circuit Current - Calculation of effects
ANSI-C.1/NFPA.70	National Electrical Code
ANSI-C37.90A	Guide for Surge Withstand Capability (SWC) Tests
ANSI-C63.21, C63.3	Specification for Electromagnetic Noise and Field Strength Instrumentation 10 KHz to 1 GHZ
C36.4ANSI-C68.1	Techniquest for Dielectric Tests
ANSI-C76.1/EEE21	Standard General Requirements and Test Procedure for Outdoor Apparatus Bushings
ANSI-SI-4	Specification for Sound Level Meters
ANSI-Y32-2/C337.2	Drawing Symbols
ANSI-Z55.11	Gray Finishes for Industrial Apparatus and Equipment No. 61 Light Gray
NEMA-107T	Methods of Measurements of RIV of High Voltage Apparatus
NEMA-ICS-II	General Standards for Industrial Control and Systems Part ICSI-109
CISPR-1	Specification for CISPR Radio Interference Measuring Apparatus for the frequency range 0.15 MHz to 30 MHz
CSA-Z299.1-1978h	Quality Assurance Program Requirements
CSA-Z299.2-1979h	Quality Control Program Requirements
CSA-Z299.3-1979h	Quality Verification Program Requirements
CSA-Z299.4-1979h	Inspection Program Requirements
TRANSFORMERS AND REACTORS	
IS:10028 (Part 2 & 3)	Code of practice for selection, installation & maintenance of Transformers (P1:1993), (P2:1991), (P3:1991)
IS-2026 (P1 to P4)	Power Transformers
IS-3347 (part 1 to Part 8)	Dimensions for Porcelain transformer Bushings for use in lightly polluted atmospheres
IS-3639	Fittings and Accessories for Power Transformers
IS-6600	Guide for Loading of oil immersed Transformers
IEC-60076 (Part 1 to 5)	Power Transformers
IEC-60214	On-Load Tap-Changers
IEC-60289	Reactors
IEC- 60354	Loading Guide for Oil - Immersed power transformers
IEC-60076-10	Determination of Transformer and Reactor Sound Levels
ANSI-C571280	General requirements for Distribution, Power and Regulating Transformers
ANSI-C571290	Test Code for Distribution, Power and Regulation Transformers
ANSI-C5716	Terminology & Test Code for Current Limiting Reactors
ANSI-C5721	Requirements, Terminology and Test Code for Shunt Reactors Rated Over 500 KVA
ANSI-C5792	Guide for Loading Oil-Immersed Power Transformers upto and including 100 MVA with 55 deg C or 65 deg C Winding Rise

CODES	TITLE
ANSI-CG,1EEE-4	Standard Techniques for High Voltage Testing
IEC 60076	Power transformers
IEC 60076-1	Part 1: General
IEC 60076-2	Part 2: Temperature rise
IEC 60076-3	Part 3: Insulation levels, dielectric tests and external clearances in air
IEC 60076-4	Part 4: Guide to the lightning impulse and switching impulse testing - Power transformers and reactors
IEC 60076-3-1	Part 3-1: Insulation Levels and Dielectric Tests –External Clearances in Air
IEC 60076-5	Part 5: Ability to withstand short circuit
IEC 60076-6	Part 6: Reactors
IEC 60076-7	Part 7: Loading guide for oil-immersed power transformers
IEC 60076-8	Part 8: Application guide
IEC 60076-10	Part 10: Determination of sound levels
IEC 60076-10-1	Part 10-1: Determination of sound levels - Application guide
IEC 60076-11	Part 11: Dry-type transformers
IEC 60076-12	Part 12: Loading guide for dry-type power transformers
IEC 60076-13	Part 13: Self-protected liquid-filled transformers
IEC 60076-14	Part 14: Design and application of liquid-immersed power transformers using high-temperature insulation materials
IEC 60076-15	Part 15: Gas-filled power transformers
IEC 60076-16	Part 16: Transformers for wind turbine applications
IEC 60076-18	Part 18: Measurement of frequency response
IEC 60076-19	Part 19: Rules for the determination of uncertainties in the measurement of losses in power transformers and reactors
IEC 60076-21	Part 21: Standard requirements, terminology, and test code for step-voltage regulators
IEC 60044, BS 3938	Current transformers
IEC 60050	International Electrotechnical Vocabulary
IEC 60050(421)	International Electrotechnical vocabulary- Chapter 421 : Power Transformers and Reactors
IEC 60060	High Voltage test techniques
IEC 60060-1	General definitions and test requirements
IEC 60060-2	Measuring systems
IEC 60071	Insulation co-ordination
IEC 60071-1	Part 1: Definitions, principles and rules
IEC 60071-2	Part 2 : Application guide
IEC 60137	Bushing for alternating voltage above 1000V
IEC 60214	On-Load Tap changers
IEC 255-21-3	Relays vibration

CODES	TITLE
IEC 60270	Partial discharge measurements
IEC 60296	Specification for Unused Mineral Oil for Transformers and Switchgear
IEC 60422	Supervision and Maintenance guide for Mineral Insulating Oil in Electrical Equipment
IEC 60475	Method of Sampling Liquid dielectrics
IEC 60529	Classification of Degrees of Protection provided by Enclosures
IEC 60542	Application Guide for On-Load Tap-Changers
IEC 60567	Guide for the Sampling of Gases and of Oil from Oil-filled Electrical Equipment for the Analysis of Free and Dissolved Gases
IEC 60651	Sound Level Meters
IEC 61083	Digital Recorders and Software for High Voltage Impulse testing
IEC 61083-1	Part 1: Requirements for digital recorders in high voltage impulse tests
IEC 61083-2	Part 2: Evaluation of software used for the determination of the parameters of impulse waveforms
CISPR 16	Specification for radio disturbance and immunity measuring apparatus
CISPR 16-1	Radio disturbance and immunity measuring apparatus
CISPR-18	Radio Interference Characteristics of Power Lines and High Voltage Equipment
ISO 9001	Quality system-Model for Quality Assurance in Design /development
Cigre Publication 202	Guidelines for conducting design reviews for transformers 100 MVA and 123 kV and above. August 2002-Cigre Working Group 12.22
WG 12-15	Guide for Customers Specifications for Transformers 100 MVA and 123 kV and above
WG 12 19	Short Circuit Performance of Transformers.
BS-4360	Specification for weldable structural steel
BS-5135	Specification for arc welding of carbon and carbon manganese steels
BS-5500	Specification for unfired fusion welded pressure vessels
IS-3618	Specification for phosphate treatment of iron & steel for protection against corrosion
IS-6005	Code of practice for phosphating of Iron and Steel
ISO-8501	Preparation of steel surface before application of Paints and related product
IEC-60599	Mineral oil impregnated electrical equipment in service – guide to the interpretation of dissolved and free gases analysis
IS-10593	Method of evaluating the analysis of gases in oil filled electrical equipment in service
IS-2099	Bushings for alternating voltages above 1000 volts

CODES	TITLE
IS-3347 Part I to 8	Dimension for porcelain transformer bushing
DIN-42530	Bushing up to 1000kV from 250A-5000A for liquid filled Transformer
IS-2026 Part 1 to 5	Power transformer
IS-4691	Degrees of protection provided by enclosure for rotating electrical machinery
IEC-60034-5	Degrees of protection provided by integral design of rotating electrical machines(IP Code) classification
IS:325 / IEC -60034	Performance of cooling fan / oil pump motor
IS-13947 part 1 to 5	Specification for low voltage switchgear and control gear
IS:3400	Methods of test for vulcanised rubber
IS:7016 part 1 to 14	Methods of test for coated and treated fabrics
IS:803	Code of practice for design, fabrication and erection of vertical mild steel cylindrical welded oil storage tanks.
IS:3637	Gas operated Relays
IS:335	New Insulating oils – Specification
IEC-62271-203	Gas insulated metal enclosed switchgear for rated voltage above 52kV
IEC-61639	Direct connection between power transformers and gas-insulated metal enclosed switchgear for rated voltages of 52.5 kV and above.
IS:3400 / BS 903 / IS:7016	Air cell (Flexible Air Separator)
IEC 60529 / IP : 55	Degree of protection for cooler control cabinet , MOLG, Cooling fan , oil pump, Buchholz Relay
IEC 60529 / IP : 56	Degree of protection for Pressure Relief Device
IEC 60529 / IP : 43	Degree of protection for Remote tap Changer cubicle (RTCC)
CIRCUIT BREAKERS	
IEC-62271-100	High-voltage switchgear and control gear - Part 100: Alternating current circuit-breakers
IEC-62271-101	High-voltage switchgear and control gear - Part 101: Synthetic testing
IEC-62155	Hollow pressurized and unpressurized ceramic and glass insulators for use in electrical equipment with rated voltages greater than 1000 V
IEC-62271-110	High-voltage switchgear and control gear - Part 110: Inductive load switching
IEC-62271-109	High-voltage switchgear and control gear - Part 110: Inductive load switching
CURRENT TRANSFORMERS, VOLTAGE TRANSFORMERS AND COUPLING CAPACITOR VOLTAGE TRANSFORMERS	
IS-2705- (P1 to P4)	Current Transformers

CODES	TITLE
IS:3156- (P1 to P4)	Voltage Transformers
IS-4379	Identification of the Contents of Industrial Gas Cylinders
IEC-61869 (Part-1)	Instrument transformers - Part 1: General requirements
IEC-61869 (Part-2)	Instrument transformers - Part 2: Additional requirements for current transformers
IEC-61869 (Part-3)	Instrument transformers - Part 3: Additional requirements for inductive voltage transformers
IEC-61869 (Part-4)	Instrument transformers - Part 4: Additional requirements for combined transformers
IEC-61869 (Part-5)	Instrument transformers - Part 5: Additional requirements for capacitor voltage transformers
IEC-61869 (Part-6)	Instrument transformers - Part 6: Additional general requirements for low-power instrument transformers
IEC-61869 (Part-9)	Instrument transformers - Part 9: Digital interface for instrument transformers
IEC-61869 (Part-102)	Instrument transformers - Part 102: Ferroresonance oscillations in substations with inductive voltage transformers
IEC-61869 (Part-103)	Instrument transformers - The use of instrument transformers for power quality measurement
BUSHING	
IS-2099	Bushings for Alternating Voltages above 1000V
IEC-60137	Insulated Bushings for Alternating Voltages above 1000V
SURGE ARRESTERS	
IS-3070 (PART2)	Lightning arresters for alternating current systems : Metal oxide lightning arrestors without gaps
IEC-60099-4	Metal oxide surge arrestors without gaps
IEC-60099-5	Selection and application recommendation
ANSI-C62.1	IEE Standards for S A for AC Power Circuits
NEMA-LA 1	Surge Arresters
CUBICLES AND PANELS & OTHER RELATED EQUIPMENTS	
IS-722, IS-1248	Electrical relays for power system
IS-3231, 3231 (P-3)	Protection
IS:5039	Distributed pillars for Voltages not Exceeding 1000 Volts
IEC-60068.2.2	Basic environmental testing procedures Part 2: Test B: Dry heat
IEC-60529	Degree of Protection provided by enclosures
IEC-60947-4-1	Low voltage switchgear and control gear
IEC-61095	Electromechanical Contactors for household and similar purposes
IEC-60439 (P1 & 2)	Low Voltage Switchgear and control gear assemblies
ANSI-C37.20	Switchgear Assemblies, including metal enclosed bus
ANSI-C37.50	Test Procedures for Low Voltage Alternating Current Power

CODES	TITLE
	Circuit Breakers
ANSI-C39	Electric Measuring instrument
ANSI-C83	Components for Electric Equipment
IS: 8623: (Part I to 3)	Specification for Switchgear & Control Assemblies
NEMA-AB	Moulded Case Circuit and Systems
NEMA-CS	Industrial Controls and Systems
NEMA-PB-1	Panel Boards
NEMA-SG-5	Low voltage Power Circuit breakers
NEMA-SG-3	Power Switchgear Assemblies
NEMA-SG-6	Power switching Equipment
NEMA-5E-3	Motor Control Centers
1248 (P1 to P9)	Direct acting indicating analogue electrical measuring instruments & their accessories
Disconnecting switches	
IEC-62271-102	High-voltage switchgear and control gear - Part 102: Alternating current disconnectors and earthing switches
IEC-60265 (Part 1 & 2)	High Voltage switches
ANSI-C37.32	Schedule of preferred Ratings, Manufacturing Specifications and Application Guide for high voltage Air Switches, Bus supports and switch accessories
ANSI-C37.34	Test Code for high voltage air switches
NEMA-SG6	Power switching equipment
PLCC and line traps	
IS-8792	Line traps for AC power system
IS-8793	Methods of tests for line traps
IS-8997	Coupling devices for PLC systems
IS-8998	Methods of test for coupling devices for PLC systems
IEC-60353	Line traps for A.C. power systems
IEC-60481	Coupling Devices for power line carrier systems
IEC-60495	Single sideboard power line carrier terminals
IEC-60683	Planning of (single Side-Band) power line carrier systems
CIGRE	Teleprotection report by Committee 34 & 35
CIGRE	Guide on power line carrier 1979
CCIR	International Radio Consultative Committee
CCITT	International Telegraph & Telephone Consultative Committee
EIA	Electric Industries Association
Protection and control equipment	
IEC-60051: (P1 to P9)	Recommendations for Direct Acting indicating analogue electrical measuring instruments and their accessories
IEC-60255 (Part 1 to 23)	Electrical relays
IEC-60297 (P1 to P4)	Dimensions of mechanical structures of the 482.6mm (19 inches)

CODES	TITLE
	series
IEC-60359	Expression of the performance of electrical & electronic measuring equipment
IEC-60387	Symbols for Alternating-Current Electricity meters
IEC-60447	Man machine interface (MMI) - Actuating principles
IEC-60521	Class 0.5, 1 and 2 alternating current watt hour metres
IEC-60547	Modular plug-in Unit and standard 19-inch rack mounting unit based on NIM Standard (for electronic nuclear instruments)
ANSI-81	Screw threads
ANSI-B18	Bolts and Nuts
ANSI-C37.1	Relays, Station Controls etc
ANSI-C37.2	Manual and automatic station control, supervisory and associated telemetering equipment
ANSI-C37.2	Relays and relay systems associated with electric power apparatus
ANSI-C39.1	Requirements for electrical analog indicating instruments
MOTORS	
IS-325	Three phase induction motors
IS-4691	Degree of protection provided by enclosure for rotating electrical machinery
IEC-60034 (P1 to P19:)	Rotating electrical machines
IEC-Document 2	Three phase induction motors
(Central Office) NEMA-MGI	Motors and Generators
Electronic equipment and components	
MIL-21B, MIL-833 & MIL-2750	Environmental testing
EC-60068 (P1 to P5)	Printed boards
IEC-60326 (P1 to P2)	Material and workmanship standards
IS-1363 (P1 to P3)	Hexagon head bolts, screws and nuts of product grade C
IS-1364 (P1 to P5)	Hexagon head bolts, screws and nuts of products grades A and B
IS-3138	Hexagonal Bolts and Nuts (M42 to M150)
ISO-898	Fasteners: Bolts, screws and studs
ASTM	Specification and tests for materials
Clamps & connectors	
IS-5561	Electric power connectors
NEMA-CC1	Electric Power connectors for sub station
NEMA-CC 3	Connectors for Use between aluminium or aluminum-Copper Overhead Conductors
Bus hardware and insulators	
IS: 2121	Fittings for Aluminum and steel cored Al conductors for overhead

CODES	TITLE
	power lines
IS-731	Porcelain insulators for overhead power lines with a nominal voltage greater than 1000 V
IS-2486 (P1 to P4)	Insulator fittings for overhead power lines with a nominal voltage greater than 1000 V
IEC-60120	Dimensions of Ball and Socket Couplings of string insulator units
IEC-60137	Insulated bushings for alternating voltages above 1000 V
IEC-60168	Tests on indoor and outdoor post insulators of ceramic material or glass for Systems with Nominal Voltages Greater than 1000 V
IEC-62155	Hollow pressurized and unpressurized ceramic and glass insulators for use in electrical equipment with rated voltages greater than 1 000 V
IEC-60273	Characteristics of indoor and outdoor post insulators for systems with nominal voltages greater than 1000V
IEC-61462	Pressurized and un-pressurized insulator for use in electrical equipment with rated voltage greater than 1000V – Definitions, Test methods, acceptance criteria and design recommendations
IEC-60305	Insulators for overhead lines with nominal voltage above 1000V-ceramic or glass insulator units for ac systems Characteristics of String Insulator Units of the cap and pin type
IEC-60372 (1984)	Locking devices for ball and socket couplings of string insulator units : dimensions and tests
IEC-60383 (P1 and P2)	Insulators for overhead lines with a nominal voltage above 1000 V
IEC-60433	Characteristics of string insulator units of the long rod type
IEC-60471	Dimensions of Clevis and tongue couplings of string insulator units
ANSI-C29	Wet process porcelain insulators
ANSI-C29.1	Test methods for electrical power insulators
ANSI-C92.2	For insulators, wet-process porcelain and toughened glass suspension type
ANSI-C29.8	For wet-process porcelain insulators apparatus, post-type
ANSI-G.8	Iron and steel hardware
CISPR-7B	Recommendations of the CISPR, tolerances of form and of Position, Part 1
ASTM A-153	Zinc Coating (Hot-Dip) on iron and steel hardware
Strain and rigid bus-conductor	
IS-2678	Dimensions & tolerances for Wrought Aluminum and Aluminum Alloys drawn round tube
IS-5082	Wrought Aluminum and Aluminum Alloy Bars. Rods, Tubes and Sections for Electrical purposes
ASTM-B 230-82	Aluminum 1350 H19 Wire for electrical purposes

CODES	TITLE
ASTM-B 231-81	Concentric - lay - stranded, aluminum 1350 conductors
ASTM-B 221	Aluminum - Alloy extruded bar, road, wire, shape
ASTM-B 236-83	Aluminum bars for electrical purpose (Bus-bars)
ASTM-B 317-83	Aluminum-Alloy extruded bar, rod, pipe and structural shapes for electrical purposes (Bus Conductors)
Batteries	
IS:1651	Stationary Cells and Batteries, Lead-Acid Type (with Tubular Positive Plates)
IS:1652	Stationary Cells and Batteries, Lead-Acid Type (with Plante Positive Plates)
IS:1146	Rubber and Plastic Containers for Lead-Acid Storage Batteries
IS:6071	Synthetic Separators for Lead-Acid Batteries
IS:266	Specification for Sulphuric Acid
IS:1069	Specification for Water for Storage Batteries
IS:3116	Specification for Sealing Compound for Lead-Acid Batteries
IS:1248	Indicating Instruments
IS:10918	Vented type nickel Cadmium Batteries
IEC:60896-21&22	Lead Acid Batteries Valve Regulated types – Methods of Tests & Requirements
IEC: 60623	Vented type nickel Cadmium Batteries
IEC:60622	Secondary Cells & Batteries – Sealed Ni-Cd rechargeable single cell
IEC:60623	Secondary Cells & Batteries – Vented Ni-Cd rechargeable single cell
IEC:60896-11	Stationary Lead Acid Batteries – Vented Type – General requirements & method of tests
IEEE-485	Recommended practices for sizing of Lead Acid Batteries
IEEE-1115	Sizing of Ni-Cd Batteries
IEEE-1187	Recommended practices for design & installation of VRLA Batteries
IEEE-1188	Recommended practices for design & installation of VRLA Batteries
IEEE-1189	Guide for selection of VRLA Batteries
Battery Charger	
IS:3895	Mono-crystalline Semiconductor Rectifier Cells and Stacks
IS:4540	Mono-crystalline Semiconductor Rectifier Assemblies and Equipment
IS:6619	Safety Code for Semiconductor Rectifier Equipment
IS:2026	Power Transformers

CODES	TITLE
IS:2959	AC Contactors for Voltages not Exceeding 1000 Volts
IS:1248	Indicating Instruments
IS:2208	HRC Fuses
IS:13947 (Part-3)	Air break switches, air break disconnectors & fuse combination units for voltage not exceeding 1000V AC or 1200V DC
IS:2147	Degree of protection provided by enclosures for low voltage switchgear and control gear
IS:6005	Code of practice for phosphating of Iron and Steel
IS:3231	Electrical relays for power system protection
IS:3842	Electrical relay for AC Systems
IS:5	Colours for ready mix paint
IEEE-484	Recommended Design for installation design and installation of large lead storage batteries for generating stations and substations
IEEE-485	Sizing large lead storage batteries for generating stations and substations
Wires and cables	
ASTMD-2863	Measuring the minimum oxygen concentration to support candle like combustion of plastics (oxygen index)
IS-694	PVC insulated cables for working voltages upto and including 1100 Volts
IS-1255	Code of practice for installation and maintenance of power cables, upto and including 33 kV rating
IS-1554 (P1 and P2)	PVC insulated (heavy duty) electric cables (part 1) for working voltage upto and including 1100 V Part (2) for working voltage from 3.3 kV upto and including 11kV
IS:1753	Aluminium conductor for insulated cables
IS:2982	Copper Conductor in insulated cables
IS-3961 (P1 to P5)	Recommended current ratings for cables
IS-3975	Mild steel wires, formed wires and tapes for armouring of cables
IS-5831	PVC insulating and sheath of electric cables
IS-6380	Elastometric insulating and sheath of electric cables
IS-7098	Cross linked polyethylene insulated PVC sheathed cables for working voltage upto and including 1100 volts
IS-7098	Cross-linked polyethyle insulated PVC sheathed cables for working voltage from 3.3kV upto and including 33 kV
IS-8130	Conductors for insulated electrical cables and flexible cords
IS-1753	Aluminum Conductors for insulated cables
IS-10418	Specification for drums for electric cables
IEC-60096 (part 0 to p4)	Radio Frequency cables
IEC-60183	Guide to the Selection of High Voltage Cables

CODES	TITLE
IEC-60189 (P1 to P7)	Low frequency cables and wires with PVC insulation and PVC sheath
IEC-60227 (P1 to P7)	Polyvinyl Chloride insulated cables of rated voltages up to and including 450/750V
IEC-60228	Conductors of insulated cables
IEC-60230	Impulse tests on cables and their accessories
IEC-60287 (P1 to P3)	Calculation of the continuous current rating of cables (100% load factor)
IEC-60304	Standard colours for insulation for low-frequency cables and wires
IEC-60331	Fire resisting characteristics of Electric cables
IEC-60332 (P1 to P3)	Tests on electric cables under fire conditions
IEC-60502	Extruded solid dielectric insulated power cables for rated voltages from 1 kV upto to 30 kV
IEC-754 (P1 and P2)	Tests on gases evolved during combustion of electric cables
AIR conditioning and ventilation	
IS-659	Safety code for air conditioning
IS-660	Safety code for Mechanical Refrigeration
ARI:520	Standard for Positive Displacement Refrigeration Compressor and Condensing Units
IS:4503	Shell and tube type heat exchanger
ASHRAE-24	Method of testing for rating of liquid coolers
ANSI-B-31.5	Refrigeration Piping
IS:2062	Steel for general structural purposes
IS:655	Specification for Metal Air Dust
IS:277	Specification for Galvanised Steel Sheets
IS-737	Specification for Wrought Aluminium and Aluminium Sheet & Strip
IS-1079	Hot rolled cast steel sheet & strip
IS-3588	Specification for Electrical Axial Flow Fans
IS-2312	Propeller Type AC Ventilation Fans
BS-848	Methods of Performance Test for Fans
BS-6540 Part-I	Air Filters used in Air Conditioning and General Ventilation
BS-3928	Sodium Flame Test for Air Filters (Other than for Air Supply to I.C. Engines and Compressors)
US-PED-2098	Method of cold DOP & hot DOP test
MIL-STD-282	DOP smoke penetration method
ASHRAE-52	Air cleaning device used in general ventilation for removing particle matter
IS:3069	Glossary of Terms, Symbols and Units Relating to Thermal Insulation Materials

CODES	TITLE
IS:4671	Expanded Polystyrene for Thermal Insulation Purposes
IS:8183	Bonded Mineral Wool
IS:3346	Evaluation of Thermal Conductivity properties by means of guarded hot plate method
ASTM-C-591-69	Standard specification for rigid preformed cellular urethane thermal insulation
IS:4894	Centrifugal Fans
BS:848	Method of Performance Test for Centrifugal Fans
IS:325	Induction motors, three-phase
IS:4722	Rotating electrical machines
IS:1231	Three phase foot mounted Induction motors, dimensions of
IS:2233	Designations of types of construction and mounting arrangements of rotating electrical machines
IS:2254	Vertical shaft motors for pumps, dimensions of
IS:7816	Guide for testing insulation resistance of rotating machines
IS:4029	Guide for testing three phase induction motors
IS: 4729	Rotating electrical machines, vibration of, Measurement and evaluation of
IS:4691	Degree of protection provided by enclosures for rotating electrical machinery
IS:7572	Guide for testing single-phase ac motors
IS:2148	Flame proof enclosure for electrical apparatus
BS:4999(Part-51)	Noise levels
Galvanizing	
IS-209	Zinc Ingot
IS-2629	Recommended Practice for Hot-Dip galvanizing on iron and steel
IS-2633	Methods for testing uniformity of coating of zinc coated articles
ASTM-A-123	Specification for zinc (Hot Galavanizing) Coatings, on products Fabricated from rolled, pressed and forged steel shapes, plates, bars and strips
ASTM-A-121-77	Zinc-coated (Galvanized) steel barbed wire
Painting	
IS-6005	Code of practice for phosphating of iron and steel
ANSI-Z551	Gray finishes for industrial apparatus and equipment
SSPEC	Steel structure painting council
Fire protection system	
--	Fire protection manual issued by tariff advisory committee (TAC) of India
HORIZONTAL CENTRIFUGAL PUMPS	
IS:1520	Horizontal centrifugal pumps for clear, cold and fresh water
IS:9137	Code for acceptance test for centrifugal & axial pumps

CODES	TITLE
IS:5120	Technical requirement – Rotodynamic special purpose pumps
API-610	Centrifugal pumps for general services Hydraulic Institutes Standards
BS:599	Methods of testing pumps
PTC-8.2	Power Test Codes - Centrifugal pumps
DIESEL ENGINES	
IS:10000	Methods of tests for internal combustion engines
IS:10002	Specification for performance requirements for constant speed compression ignition engines for general purposes (above 20 kW)
BS:5514	The performance of reciprocating compression ignition (Diesel) engines, utilizing liquid fuel only, for general purposes
ISO:3046	Reciprocating internal combustion engines performance
IS:554	Dimensions for pipe threads where pressure tight joints are required on threads
ASME Power Test Code	Internal combustion engine PTC-17
--	Codes of Diesel Engine Manufacturer's Association, USA
PIPING VALVES & SPECIALITIES	
IS:636	Non percolating flexible fire-fighting delivery hose
IS:638	Sheet rubber jointing and rubber inserting jointing
IS:778	Gun metal gate, globe and check valves for general purpose
IS:780	Sluice valves for water works purposes (50 to 300 mm)
IS:901	Couplings, double male and double female instantaneous pattern for fire fighting
IS:902	Suction hose couplings for fire-fighting purposes
IS:903	Fire hose delivery couplings branch pipe nozzles and nozzle spanner
IS:1538	Cast iron fittings for pressure pipes for water, gas and sewage
IS:1903	Ball valve (horizontal plunger type) including floats for water supply purposes
IS:2062	SP for weldable structural steel
IS:2379	Colour Code for the identification of pipelines
IS:2643	Dimensions of pipe threads for fastening purposes
IS:2685	Code of Practice for selection, installation and maintenance of sluice valves
IS:2906	Sluice valves for water-works purposes (350 to 1200 mm size)
IS:3582	Basket strainers for fire-fighting purposes (cylindrical type)
IS:3589	Electrically welded steel pipes for water, gas and sewage (150 to 2000 mm nominal diameter)
IS:4038	Foot valves for water works purposes
IS:4927	Unlined flax canvas hose for fire fighting

CODES	TITLE
IS:5290	Landing valves (internal hydrant)
IS:5312 (Part-I)	Swing check type reflex (non-return) valves
IS:5306	Code of practice for fire extinguishing installations and equipment on premises
Part-I	Hydrant systems, hose reels and foam inlets
Part-II	Sprinkler systems
BS:5150	Specification for cast iron gate valves
MOTORS & ANNUNCIATION PANELS	
IS:325	Three phase induction motors
IS:900	Code of practice for installation and maintenance of induction motors
IS:996	Single phase small AC and universal electric motors
IS:1231	Dimensions of three phase foot mounted induction motors
IS:2148	Flame proof enclosure of electrical apparatus
IS:2223	Dimensions of flange mounted AC induction motors
IS:2253	Designations for types of construction and mounting arrangements of rotating electrical machines
IS:2254	Dimensions of vertical shaft motors for pumps
IS:3202	Code of practice for climate proofing of electrical equipment
IS:4029	Guide for testing three phase induction motors
IS:4691	Degree of protection provided by enclosure for rotating electrical machinery
IS:4722	Rotating electrical machines
IS:4729	Measurement and evaluation of vibration of rotating electrical machines
IS:5572 (Part-I)	Classification of hazardous areas for electrical installations (Areas having gases and vapours)
IS:6362	Designation of methods of cooling for rotating electrical machines
IS:6381	Construction and testing of electrical apparatus with type of protection 'e'
IS:7816	Guide for testing insulation for rotating machine
IS:4064	Air break switches
IEC DOCUMENT 2 (Control Office) 432	Three Phase Induction Motor
VDE 0530 Part I/66	Three Phase Induction Motor
IS:9224 (Part-II)	HRC Fuses
IS:6875	Push Button and Control Switches
IS:694	PVC Insulated cables
IS:1248	Indicating instruments
IS:375	Auxiliary wiring & busbar markings

CODES	TITLE
IS:2147	Degree of protection
IS:5	Colour Relay and timers
IS:2959	Contactors
PG Test Procedures	
NFPA-13	Standard for the installation of sprinkler system
NFPA-15	Standard for water spray fixed system for the fire protection
NFPA-12A	Standard for Halong 1301 Fire Extinguishing System
NFPA-72E	Standard on Automatic Fire Detectors
--	Fire Protection Manual by TAC (Latest Edition)
NFPA-12	Standard on Carbon dioxide extinguisher systems
IS:3034	Fire of industrial building
--	Electrical generating and distributing stations code of practice
IS:2878	CO2 (Carbon dioxide) Type Extinguisher
IS:2171	DC (Dry Chemical Powder) type
IS:940	Pressurised Water Type
D.G. SET	
IS:10002	Specification for performance requirements for constant speed compression ignition (diesel engine) for general purposes
IS:10000	Method of tests for internal combustion engines
IS:4722	Rotating electrical machines-specification
IS:12063	Degree of protection provided by enclosures
IS:12065	Permissible limit of noise levels for rotating electrical machines
--	Indian Explosive Act 1932
Steel structures	
IS-228 (1992)	Method of Chemical Analysis of pig iron, cast iron and plain carbon and low alloy steels.
IS-802 (P1 to 3)	Code of practice for use of structural steel in overhead transmission line towers
IS-806	Code of practice for use of steel tubes in general building construction
IS-808	Dimensions for hot rolled steel beam, column channel and angle sections
IS-814	Covered electrodes for manual arc welding of carbon of carbon manganese steel
IS-816	Code of Practice for use of metal arc welding for general construction in Mild steel
IS-817	Code of practice for training and testing of metal arc welders. Part 1 : Manual Metal arc welding
IS-875 (P1 to P4)	Code of practice for design loads (other than earthquake) for buildings and structures
IS-1161	Steel tubes for structural purposes

CODES	TITLE
IS-1182	Recommended practice for radiographic examination of fusion welded butt joints in steel plates
IS-1363 (P1 to P3)	Hexagonal head bolts, screws & nuts of products grade C
IS-1364	Hexagon head bolts, screws and nuts of product grades A and B
IS-1367 (P1 to P18)	Technical supply condition for threaded steel fasteners
IS-1599	Methods for bend test
IS-1608	Method for tensile testing of steel products
IS-1893	Criteria for earthquake resistant design of structures
IS-1978	Line Pipe
IS-2062	Steel for general structural purposes
IS-2595	Code of practice for Radiographic testing
IS-3063	Single coil rectangular section spring washers for bolts, nuts and screws
IS-3664	Code of practice for ultrasonic pulse echo testing by contact and immersion methods
IS-7205	Safety code for erection of structural steel work
IS-9595	Recommendations for metal arc welding of carbon and carbon manganese steels
ANSI-B18.2.1	Inch series square and Hexagonal bolts and screws
ANSI-B18.2.2	Square and hexagonal nuts
ANSI-G8.14	Round head bolts
ASTM-A6	Specification for General Requirements for rolled steel plates, shapes, sheet piling and bars of structural use
ASTM-A36	Specifications of structural steel
ASTM-A47	Specification for malleable iron castings
ASTM-A143	Practice for safeguarding against embilement of Hot Galvanized structural steel products and procedure for detaching embrilement
ASTM-A242	Specification for high strength low alloy structural steel
ASTM-A283	Specification for low and intermediate tensile strength carbon steel plates of structural quality
ASTM-A394	Specification for Galvanized steel transmission tower bolts and nuts
ASTM-441	Specification for High strength low alloy structural manganese vanadium steel
ASTM-A572	Specification for High strength low alloy colombium-Vanadium steel of structural quality
AWS D1-0	Code for welding in building construction welding inspection
AWS D1-1	Structural welding code
AISC	American institute of steel construction
NEMA-CG1	Manufactured graphite electrodes

CODES	TITLE
Piping and pressure vessels	
IS-1239 (Part 1 and 2)	Mild steel tubes, tubulars and other wrought steel fittings
IS -3589	Seamless Electrically welded steel pipes for water, gas and sewage
IS-6392	Steel pipe flanges
ASME	Boiler and pressure vessel code
ASTM-A120	Specification for pipe steel, black and hot dipped, zinc-coated (Galvanized) welded and seamless steel pipe for ordinary use
ASTM-A53	Specification for pipe, steel, black, and hot-dipped, zinc coated welded and seamless
ASTM-A106	Seamless carbon steel pipe for high temperature service
ASTM-A284	Low and intermediate tensile strength carbon-silicon steel plates for machine parts and general construction
ASTM-A234	Pipe fittings of wrought carbon steel and alloy steel for moderate and elevated temperatures
ASTM-S181	Specification for forgings, carbon steel for general purpose piping
ASTM-A105	Forgings, carbon steel for piping components
ASTM-A307	Carbon steel externally threated standard fasteners
ASTM-A193	Alloy steel and stainless steel bolting materials for high temperature service
ASTM-A345	Flat rolled electrical steel for magnetic applications
ASTM-A197	Cupola malleable iron
ANSI-B2.1	Pipe threads (Except dry seal)
ANSI-B16.1	Cast iron pipe flangesand glanged fitting. Class 25, 125, 250 and 800
ANSI-B16.1	Malleable iron threaded fittings, class 150 and 300
ANSI-B16.5	Pipe flanges and flanged fittings, steel nickel alloy and other special alloys
ANSI-B16.9	Factory-made wrought steel butt welding fittings
ANSI-B16.11	Forged steel fittings, socket-welding and threaded
ANSI-B16.14	Ferrous pipe plug, bushings and locknuts with piple threads
ANSI-B16.25	Butt welding ends
ANSI-B18.1.1	Fire hose couplings screw thread
ANSI-B18.2.1	Inch series square and hexagonal bolts and screws
ANSI-B18.2.2	Square and hexagonal nuts
NSI-B18.21.1	Lock washers
ANSI-B18.21.2	Plain washers
ANSI-B31.1	Power piping
ANSI-B36.10	Welded and seamless wrought steel pipe
ANSI-B36.9	Stainless steel pipe
Other civil works standards	

CODES	TITLE
IS-269	33 grade ordinary portland cement
IS2721	Galvanized steel chain link fence fabric
IS-278	Galvanized steel barbed wire for fencing
IS-383	Coarse and fine aggregates from natural sources for concrete
IS-432 (P1 and P2)	Mild steel and medium tensile steel bars and hard-dawn steel wire for concrete reinforcement
IS-456	Code of practice for plain and reinforced concrete
IS-516	Method of test for strength of concrete
IS-800	Code of practice for general construction in steel
IS-806	Steel tubes for structural purposes
IS-1172	Basic requirements for water supply, drainage and sanitation
IS-1199	Methods of sampling and analysis of concrete
IS-1566	Hard-dawn steel wire fabric for concrete reinforcement
IS-1742	Code of Practice for Building drainage
IS-1785	Plain hard-drawn steel wire for pre-stressed concrete
IS-1786	High strength deformed Steel Bars and wires for concrete reinforcement
IS-1811	Methods of sampling Foundry sands
IS-1893	Criteria for earthquake resistant design of structures
IS-2062	Steel for general structural purposes
IS-2064	Selection, installation and maintenance of sanitary appliances-code of practices
IS-2065	Code of practice for water supply in buildings
IS-2090	High tension steel bars used in pre-stressed concrete
IS-2140	Standard Galvanized steel wire for fencing
IS-2470 (P1 & P2)	Code of practice for installation of septic tanks
IS-2514	Concrete vibrating tables
IS-2645	Integral cement waterproofing compounds
IS-3025 (Part 1 to Part 48)	Methods of sampling and test (Physical and chemical) for water and waste water
IS-4091	Code of practice for design and construction of foundations for transmission line towers and poles
IS-4111 (Part 1 to P5)	Code of practice for ancillary structures in sewerage system
IS-4990	Plywood for concrete shuttering work
IS-5600	Sewage and drainage pumps
National building code of India 1970	
USBR E12	Earth Manual by United States Department of the interior Bureau of Reclamation
ASTM-A392-81	Zinc/Coated steel chain link fence fabric
ASTM-D1557-80	test for moisture-density relation of soils using 10-lb (4.5 kg)

CODES	TITLE
	rame land 18-in. (457 mm) Drop
ASTM-D1586(1967)	Penetration Test and Split-Barrel Sampling of Soils
ASTM-D2049-69	Test Method for Relative Density of Cohesionless Soils
ASTM-D2435	Test method for Unconsolidated, (1982) Undrained Strengths of Cohesive Soils in Triaxial Compression
BS-5075	Specification for accelerating Part I Admixtures, Retarding Admixtures and Water Reducing Admixtures
CPWD	Latest CPWD specifications
ACSR MOOSE CONDUCTOR	
IS:6745 BS:443-1969	Methods for Determination of Mass of zinc coating on zinc coated Iron and Steel Articles
IS:8263	Methods for Radio Interference
IEC:437-1973 NEMA:107-1964 CISPR	Test on High Voltage Insulators
IS:209, BS:3436-1961	Zinc Ingot
IS:398 Part - V IEC:209-1966	Aluminum Conductors for Overhead Transmission Purposes
BS:215(Part-II), IEC:209-1966	Aluminium Conductors galvanized steel reinforced extra high voltage (400 kV and above)
IS:1778, BS:1559-1949	Reels and Drums for Bare Conductors
IS:1521, ISO/R89-1959	Method for Tensile Testing of steel wire
IS:2629	Recommended practice for Hot dip Galvanising on Iron and Steel
IS:2633	Method for Testing Uniformity of coating of zinc Coated Articles
IS:4826/ ASTMA-472-729	Hot dip galvanised coatings on round steel wires
GALVANISED STEEL EARTHWIRE	
IS:1521, ISO/R:89-1959	Method for Tensile Testing of Steel Wire
IS:1778	Reels and Drums for Bare Conductors
IS:2629	Recommended practice for Hot Dip Galvanising on Iron and Steel
IS:2633	Methods for testing Uniformity of Coating of Zinc Coated Articles
IS:4826/ ASTM: A 475-72a BS:443-1969	Hot dip Galvanised Coatings on Round Steel Wires
IS:6745/ BS:443-1969	Method for Determination of mass of Zinc Coating on Zinc coated Iron and Steel Articles.
IS:209/ BS:3463-1961	Zinc ingot
IS:398 (Pt. I to P5:1992)/ BS:215 (Part-II	Aluminum Conductors for overhead transmission purposes

CODES	TITLE
Lighting Fixtures and Accessories	
IS:1913	General and safety requirements for electric lighting fittings
IS:3528	Water proof electric lighting fittings
IS:4012	Dust proof electric lighting fittings
IS:4013	Dust tight proof electric lighting fittings
IS:10322	Industrial lighting fittings with metal reflectors
IS:10322	Industrial lighting fittings with plastic reflectors
IS:2206	Well glass lighting fittings for use under ground in mines (non-flameproof type)
IS:10322	Specification for flood light
IS:10322	Specification for decorative lighting outfits
IS:10322	Luminaries for street lighting
IS:2418	Tubular fluorescent lamps
IS:9900	High pressure mercury vapour lamps
IS:1258	Specification for Bayonet lamp fluorescent lamp
IS:3323	Bi-pin lamp holder tubular fluorescent lamps
IS:1534	Ballasts for use in fluorescent lighting fittings. (Part-I)
IS:1569	Capacitors for use in fluorescent lighting fittings
IS:2215	Starters for fluorescent lamps
IS:3324	Holders for starters for tubular fluorescent lamps
IS:418	GLS lamps
IS:3553	Water tight electric fittings
IS:2713	Tubular steel poles
IS:280	MS wire for general engg. Purposes
Conduits, Accessories and Junction Boxes	
IS:9537	Rigid steel conduits for electrical wiring
IS:3480	Flexible steel conduits for electrical wiring
IS:2667	Fittings for rigid steel conduits for electrical wiring
IS:3837	Accessories for rigid steel conduits for electrical wiring
IS:4649	Adaptors for flexible steel conduits
IS:5133	Steel and Cast Iron Boxes
IS:2629	Hot dip galvanising of Iron & Steel
Lighting Panels	
IS:13947	LV Switchgear and Control gear(Part 1 to 5)
IS:8828	Circuit breakers for over current protection for house hold and similar installations
IS:5	Ready mix paints
IS:2551	Danger notice plates
IS:2705	Current transformers

CODES	TITLE
IS:9224	HRC Cartridge fuse links for voltage above 650V(Part-2)
IS:5082	Wrought aluminium and Al. alloys, bars, rods, tubes and sections for electrical purposes
IS:8623	Factory built Assemblies of Switchgear and Control Gear for voltages upto and including 1000V AC and 1200V DC
IS:1248	Direct Acting electrical indicating instruments
Electrical Installation	
IS:1293	3 pin plug
IS:371	Two to three ceiling roses
IS:3854	Switches for domestic and similar purposes
IS:5216	Guide for safety procedures and practices in electrical work
IS:732	Code of practice for electrical wiring installation (system voltage not exceeding 650 Volts.)
IS:3043	Code of practice for earthing
IS:3646	Code of practice of interior illumination part II & III
IS:1944	Code of practice for lighting of public through fares
IS:5571	Guide for selection of electrical equipment for hazardous areas
IS:800	Code of practice for use of structural steel in general building construction
IS:2633	Methods of Testing uniformity of coating on zinc coated articles
IS:6005	Code of practice for phosphating iron and steel
	INDIAN ELECTRICITY ACT
	INDIAN ELECTRICITY RULES
LT SWITCHGEAR	
IS:8623 (Part-I)	Specification for low voltage switchgear and control gear assemblies
IS:13947 (Part-I)	Specification for low voltage switchgear and control gear, Part 1 General Rules
IS:13947 (part-2)	Specification for low voltage switchgear and control gear, Part 2 circuit breakers
IS:13947 (part-3)	Specification for low voltage switchgear and control gear. Part 3 Switches, Disconnectors, Switch-disconnectors and fuse combination units
IS:13947 (part-4)	Specification for low voltage switchgear and control gear. Part 4 Contactors and motors starters
IS:13947 (part-5)	Specification for low voltage switchgear and control gear. Part 5 Control-circuit devices and switching elements
IS:13947 (part-6)	Specification for low voltage switchgear and control gear. Part 6 Multiple function switching devices
IS:13947 (part-7)	Specification for low voltage switchgear and control gear. Part 7 Ancillary equipments
IS:12063	Degree of protection provided by enclosures

CODES	TITLE
IS:2705	Current Transformers
IS:3156	Voltage Transformers
IS:3231	Electrical relays for power system protection
IS:1248	Electrical indicating instruments
IS:722	AC Electricity meters
IS:5578	Guide for Marking of insulated conductors of apparatus terminals
IS:13703 (part 1)	Low voltage fuses for voltage not exceeding 1000V AC or 1500V DC Part 1 General Requirements
IS:13703 (part 2)	Low voltage fuses for voltage not exceeding 1000V AC or 1500V DC Part 2 Fuses for use of authorized persons
IS:6005	Code of practice of phosphating iron and steel
IS:5082	Wrought Aluminum and Aluminum alloys for electrical purposes
IS:2633	Hot dip galvanising

Note: If any standard is expired or does not exist anymore than other standard which has substituted it, shall be applicable.

Annexure-G

MQP & INSPECTION LEVEL REQUIREMENT

Sl. No	Item / Equipment	Reference document for inspection	Inspection Level
A.01	LT Transformer /Power Transformer/ Reactor/ Converter Transformer/ Filter Reactor	MQP/ITP	IV
A.02	Bushing	MQP	IV
A.03	Insulating Oil	POWERGRID TS	III
A.04	Oil storage tank for transformers	MQP	III
A.05	Nitrogen injection based explosion prevention system	FAT/ITP	III
A.06	On Line oil drying system for transformers	POWERGRID TS	II**
A.07	On Line DGA and moisture monitoring system	POWERGRID TS	II**
A.08	Flow sensitive conservator isolation valve	POWERGRID TS	II**
A.09	Oil Filtration Machine	MQP	III
B.01	Circuit Breakers	MQP	IV
B.02	Current Transformers	MQP/ITP	IV
B.03	CVT/PT/IVT	MQP	IV
B.04	Isolators	MQP/ITP	IV
B.05	Surge Arrestors	MQP/ITP	III
B.06	Line Trap & Air Core Reactor	MQP/ITP	III
B.07	Point On switching device (CSD) for Circuit Breaker (wherever required)	FAT/ITP	IV
C.01	STATCOM including Valve, valve base electronics, DC capacitor, series reactor and all accessories	ITP	IV
C.02	Mechanically switched Reactor bank (3-ph) including all accessories (MSR Branches)	ITP	IV
C.03	Mechanically switched Capacitor bank (3-ph) including all accessories (MSC Branches)	ITP	IV
C.04	Harmonic Pass filters	ITP	IV
C.05	HT Capacitor	MQP	IV
D.01	Thyristor Valve	FAT/ITP	III
D.02	PLC Capacitors for HVDC	FAT/ITP	III
D.03	Valve Cooling system for	FAT/ITP	III

Annexure-G

Sl. No	Item / Equipment	Reference document for inspection	Inspection Level
	HVDC		
D.04	AC/DC Filter Resistors	ITP	III
D.05	DC Current and Voltage measuring device for HVDC	FAT/ITP	III
D.06	Maintenance platform for valve hall	POWERGRID TS	II
D.07	Optical signal column for FSC	FAT/ITP	II
E.01	GIS including spares	MQP/ITP	IV
E.02	Dew Point Meter for GIS	POWERGRID TS	I*
E.03	Portable Partial Discharge monitoring system for GIS	POWERGRID TS	I*
E.04	Partial Discharge Monitoring System (Online) for GIS	ITP	III
E.05	PEB Structure and Puf Panels	MQP	III
F.01	Substation Automation system	FAT/MQP	III
F.02	Event Logger	POWERGRID TS	III
F.03	PLCC equipment Viz PLCC Terminal ,Carrier equipment, Protection Coupler , Coupling Device but excluding EPAX / HF Cable	MQP	III
F.04	Control & Relay Panels	MQP	III
G.01	EHV Cables	MQP/ITP	III
G.02	Power Cables & Control Cables	MQP	III
G.03	Cable Joints (11 kV and above)	POWERGRID TS	II
G.04	Cable Lugs & Glands / Clamps/Terminations	POWERGRID TS	I
H.01	LT Switchgear & ACDB/DCDB/MLDB/ELDB	MQP	III
H.02	Battery	POWERGRID TS	II
H.03	Battery Charger	MQP	III
H.04	UPS & Voltage Stablizer	MQP/FAT	III
H.05	D. G. Set	FAT/ITP	III
H.06	Lighting Panel	POWERGRID TS	II
H.07	Lighting Poles	POWERGRID TS	II
H.08.1	Lighting Fixtures, Lighting Earthwire, Switches / sockets, Conduits, Lamps & fans including exhaust fans	POWERGRID TS	I
H.8.2	Solar based LEDs System including street light/pole solar panel, Inverter controller/LED fixture	FAT	III
H.09	MS/GI /PVC Pipes for cable	POWERGRID TS	I

Annexure-G

Sl. No	Item / Equipment	Reference document for inspection	Inspection Level
	trenches and lighting		
H.10	Outdoor Receptacle	POWERGRID TS	I
H.11	Split A.C/window A.C./ precision AC/ Kiosk AC/ Cascade AC/ Tower AC	POWERGRID TS	I
H.12	Occupancy sensors for control of lighting	POWERGRID TS	I
H.13	Solar based street lighting pole including Solar Panel, Inverter, Controller, etc.	POWERGRID TS	III
H.14	Junction Box / Lighting Switch Boards / Bay MB / Portable Flood Light Panel	POWERGRID TS	II
H.15	Lighting transformer	POWERGRID TS	II
I.01	SF6 gas processing unit, SF6 gas Leakage detector, SF6 gas Analyzer	POWERGRID TS	I*
I.02	SF6 Gas	POWERGRID TS	I
I.03	Spark Gap	FAT/ITP	III
I.04	Time synchronizing Equipment (GPS Clock)	POWERGRID TS	I
I.05	Galvanized Cable trays	POWERGRID TS	II
I.06	Video Monitoring System	FAT/ITP	I
I.07	Public Address System (All Components)	POWERGRID TS	I
I.08	Building Management System (All components)	POWERGRID TS	I
I.09	Access Control System (All Components)	POWERGRID TS	I
I.10	Video Display system/ Video Projection system	POWERGRID TS	I
I.11	VESDA (smoke detector)	POWERGRID TS	I
I.12	High Mast Pole	MQP	III
J.01	Aluminium ladder	POWERGRID TS	I
J.02	Hume Pipes	POWERGRID TS	I
J.03	Castle Key	POWERGRID TS	I
J.04	Water Treatment plant (All components).	POWERGRID TS	I
J.05	Furniture	POWERGRID TS	I
J.06	DOL Starter	POWERGRID TS	I
J.07	Oil Sample Bottles and Syringe	POWERGRID TS	I
J.08	Test & Measuring Equipment, T&P	POWERGRID TS	I*
K.01	EOT Crane	POWERGRID TS	II

Annexure-G

Sl. No	Item / Equipment	Reference document for inspection	Inspection Level
K.02	Boom Crane/Golf Cart/Platform Truck/Man Lift/ Fork Lift/ Lifts	POWERGRID TS	II
L.00	Fire Protection System		
L.001	Panels, Hydro pneumatic tank for fire protection system.	POWERGRID TS	III
L.002	Deluge valve, Strainers, MS/GI pipes, Pumps, motors, air compressor, and other valves, Diesel Engines	POWERGRID TS	II
L.003	Others	POWERGRID TS	I
M.00	HVAC SYSTEM		
M.001	Air Cooled Chiller	POWERGRID TS	III
M.002	Pump	POWERGRID TS	II
M.003	Air Handling Unit	POWERGRID TS	II
M.004	Fan Filter Unit With Centrifugal Blower	POWERGRID TS	II
M.005	Axial Flow Fan	POWERGRID TS	II
M.006	Main Climate Control Unit (Dehumidifier)	POWERGRID TS	I
M.007	Dampers	POWERGRID TS	II
M.008	Fire Dampers	POWERGRID TS	II
M.009	Pressure Gauge, Thermometers, Other Instruments / Sensors	POWERGRID TS	I
M.010	Grill, Diffuser, Jet Nozzle, Louvers etc	POWERGRID TS	I
M.011	Ducting	POWERGRID TS	III
M.012	M S Pipe	POWERGRID TS	II
M.013	Pipe Insulation Material	POWERGRID TS	I
M.014	Duct Insulation Material	POWERGRID TS	I
M.015	Underdeck Insulation Material	POWERGRID TS	I
M.016	Gate Valve & Non Return valve	POWERGRID TS	I
M.017	Y Strainer	POWERGRID TS	II
M.018	Ball Valve/ Motorised Butterfly Valve/ Balancing Valve	POWERGRID TS	I
M.019	Closed Expansion Tank	POWERGRID TS	II
M.020	Air Separator	POWERGRID TS	I
M.021	MCC /PLC /Electrical Panels	POWERGRID TS	III
M.022	Propeller Fan/ Conduit	POWERGRID TS	II
M.023	Air Filter/ Mixing Valve with Thermostat	POWERGRID TS	I

Annexure-G

Sl. No	Item / Equipment	Reference document for inspection	Inspection Level
N.01	SDH Equipment	FAT/ITP	IV
N.02	Termination Equipment Primary/ DI Multiplexer	FAT/ITP	IV
N.03	DACS	FAT/ITP	IV
N.04	Optical Amplifier	FAT/ITP	IV
N.05	FODP including pigtail, Joint Box, FDMS	FAT/ITP	II
N.06	IMPS	FAT/ITP	IV
N.07	Optical bypass switch	FAT/ITP	IV
N.08	Air Purifier	FAT/ITP	I
N.09	Patch cord & connector	FAT/ITP	I
N.10	NMS	FAT/ITP	IV
N.11	OPGW Cable	MQP/ITP/FAT	III
N.12	Hardware Fittings for OPGW cable	MQP/ITP	III
N.13	DCPS	FAT/ITP	III
N.14	Radio Links	FAT/ITP	III
N.15	SMPS based DC Power Supply (DCPS) system	FAT/ITP	III
N.16	WAMS (PMU & Accessories)	FAT/ITP	III
N.17	PUF Shelter	FAT/ITP	III
N.18	Aerial OFC/UGOFC/ADSS/FO Cable	FAT/ITP	III
N.19	DWDM	FAT/ITP	III
N.20	OTN	FAT/ITP	III
N.21	MPLS-TP Equipment	FAT/ITP	III
N.22	L2 Switch	FAT/ITP	III
N.23	IP-MPLS Router	FAT/ITP	III
N.24	HDPE Pipes	POWERGRID TS	II
N.25	Equipment Cabinets	POWERGRID TS	II
N.26	Main Distribution Frame	POWERGRID TS	I
N.27	Telephone system, EPAX, Telephone wires, Telephone sockets	POWERGRID TS	I
N.28	Fibre Optic Cable	MQP	III
N.29	Hardware Fittings for Fibre Optic cable	MQP	III
O.01	Re-rollers of MS/HT Angle Section and galvanized tower parts.	MQP	IV
O.02	Conductor	MQP	IV
O.03	Hardware fittings and Conductor & Earthwire Accessories	MQP	IV
O.04	Earth wire	MQP	IV

Annexure-G

Sl. No	Item / Equipment	Reference document for inspection	Inspection Level
O.05	Insulator	MQP	IV
O.06	Bolts & Nuts of Gr 8.8 / 8	MQP	IV
O.07	Mono Pole	MQP	IV
O.08	Foundation Bolts & Anchor Bolts	POWERGRID TS	III
O.09	D-shackle/ Hanger / Links and associated Special bolt/nuts	MQP	III
O.10	Span Marker, Obstruction lights and Wind Measuring Equipment	POWERGRID TS	III
O.11	MS ROD rolled by Approved Re-roller of POWERGRID	MQP	III
O.12	MS ROD rolled by Approved steel producers of POWERGRID	POWERGRID TS	I
O.13	Spring Washers & Pack washers	POWERGRID TS	II
O.14	Bolts & Nuts Gr up to 5.6/5	POWERGRID TS	II
O.15	ACD & Barbed wire for ACD/Bird guard	POWERGRID TS	II
O.16	Danger Plate /Phase Plate / Number Plate / Circuit plate	POWERGRID TS	I
O.17	Sub Station Structure (lattice/pipe type)	MQP	III
O.18	Clamps & Connecters (including equipment connectors)	MQP	III
O.19	MS/ GI Flat, rod type, pipe type and other earthing material.	POWERGRID TS	II
O.20	Aluminium Tube & Busbar materials	POWERGRID TS	II
O.21	Pipe Type & Counter Poise Earthing	POWERGRID TS	II
O.22	DTS System	POWERGRID TS	II

For Equipment where requirement of MQP is envisaged, ITP/FAT will be followed If sourced from off shore. For items required in S/S or T/L or TELECOM/LD&C , same inspection level as specified shall be followed for all the cases.

*MICC for test and measuring equipment (inspection level I or II) shall be issued only after actual verification/ demonstration of satisfactory performance at site.

** Though level-2 items, CIP/MICC can be issued also on review of TCs and visual inspection of these item.

Sl. No.	Power System Equipment	Minimum Local Content (%)
1	Power Transformers (up to 765 kV, including Generator Transformers)	60
2	Instrument Transformer (up to 765 kV)	60
3	Transformer Oil Dry Out System (TODOS)	60
4	Reactors up to 765 kV	60
5	Oil Impregnated Bushing (Up to 400kV)	60
6	Resin Insulated Paper (RIP) bushings (up to 145 kV)	50
7	Circuit Breakers (up to 765kV AC-Alternating Current)	60
8	Disconnectors/ Isolators (up to 765kV AC)	60
9	Wave Trap (up to 765kV AC)	60
10	Oil Filled Distribution Transformers up to & including 33kV [Cold Rolled Grain Oriented (CRGO)/Amorphous, Aluminium/Copper wound]	60
11	Dry type Distribution Transformers up to & including 33kV (CRGO/Amorphous, Aluminium/Copper wound)	60
12	Conventional conductor	60
13	Accessories for conventional conductors	60
14	High Temperature/High Temperature Low Sag (HTLS) conductors (such as Composite core, GAP, ACSS, INVAR, AL59) and accessories	60
15	Optical ground wire (OPGW)- all designs	60
16	Fiber Optic Terminal Equipment (FOTE) for OPGW	50
17	OPGW related Hardware and accessories	60
18	Remote Terminal Unit (RTU)	50
19	Power Cables and accessories up to 33kV	60
20	Control cables including accessories	60
21	XLPE cables up to 220kV	60
22	Substation Structures	60
23	Transmission Line Towers	60
24	Porcelain (Disc/Long Rod) Insulators	60
25	Bus Post Insulators (Porcelain)	60
26	Porcelain Disc Insulators with Room Temperature Vulcanisation (RTV) coating	50
27	Porcelain Long Rod Insulators with Room temperature Vulcanisation (RTV) coating	50
28	Hardware Fittings for porcelain Insulators	60
29	Composite/Polymeric Long Rod Insulators	60
30	Hardware Fittings for Polymer Insulators	60
31	Bird Flight Diverter (BFD)	60
32	Power Line Carrier Communication (PLCC) system (up to 800kV)	60
33	Gas Insulated Switchgear (up to 400kV AC)	60
34	Gas Insulated Switchgear (above 400kV AC)	50
35	Surge/Lightning Arrester (up to 765kV AC)	60
36	Power Capacitors	60
37	Packaged Sub-station (6.6kV to 33kV)	60
38	Ring Main Unit (RMU) (up to 33kV)	60

39	Medium Voltage (MV) GIS panels (up to 33kV)	60
40	Automation and Control system/Supervisory Control and Data Acquisition (SCADA) system in Power system	50
41	Control and Relay panel (including Digital/Numerical relays)	50
42	Electrical motors 0.37kW to 1MW	60
43	Energy meters excluding smart meters	50
44	Control and Power cables and accessories (up to 1.1kV)	60
45	Diesel Generating (DG) set	60
46	DC system (DC Battery & Battery Charger)	60
47	AC and DC Distribution board	60
48	Indoor Air Insulated Switchgear (AIS) up to 33kV	60
49	Poles (PCC, PSCC, Rolled Steel Joist, Rail Pole, Spun, Steel Tubular)	60
50	Material for Grounding/earthing system	60
51	Illumination system	60
52	Overhead Fault Sensing Indicator (FSI)	50
53	Power Quality Meters	50
54	Auxiliary Relays	50
55	Load Break Switch	50
56	Cranes, EOT cranes, gantry crane & chain pulley blocks, etc	60
57	Elevator	60
Fire Protection and Detection system		
58	Motor driven fire water pumps	60
59	Diesel engine driven fire water pumps	60
60	Hydrant system	60
61	High velocity water spray system	60
62	Medium velocity water spray system	60
63	Foam Protection system	60
64	Inert gas flooding system	60
65	Fire tenders	60
66	Portable fire-extinguishers	60

SECTION 4

GUARANTEED AND TECHNICAL PARTICULARS FOR CIRCUIT BREAKER

Bidder shall furnish the technical parameters for offered circuit breaker in the below mentioned format **after award of contract.**

1. GENERAL

a)	Name of the Manufacturer	.....	.....
b)	Country of Manufacturer	.....	.....
c)	Type of Circuit Breaker	.....	.....
d)	Manufacturer's type designation	.....	.....
e)	Standard Applicable	.....	.....
f)	Rated Voltage (kV rms)	.....	.....
g)	Rated Current	.....	.....
	i. Under normal condition (A)	.....	.....
	ii. Under site condition (A)	.....	.....
h)	Rated frequency (Hz)	.....	.....
i)	Number of poles	.....	.....
j)	Whether 3 pole or single pole unit	.....	.....
k)	Whether All The 3 poles ganged electrically or mechanically	.....	.....

l)	Whether dead tank or live tank design	…….	…….
m)	Type of installation	…….	…….
n)	No. of break per pole	…….	…….
		…….	…….
o)	Latching Current		

2. GUARANTEED RATINGS

a)	Rated short circuit breaking current	…….	…….
	i. Symmetrical component at highest system voltage (kA)	…….	…….
	ii. DC Component (%)	…….	…….
	iii. Asymmetrical breaking current at highest system voltage (kA)	…….	…….
b)	Rated Making Capacity	…….	…….
	i. At higher rated voltage (kAp)	…….	…….
	ii. At lower rated voltage (kAp)	…….	…….
		…….	…….
c)	(i) Maximum Total break time under any duty condition for any current upto rated breaking current with limiting conditions of voltage and pressure (ms)		

	ii. Rated break time	.....	.....
d)	Closing time (ms)	.....	.....
e)	Minimum opening time under any condition with limiting voltage and pressure (ms)	.....	.....
f)	Maximum opening time under any condition with limiting voltage and pressure (ms)	.....	.....
g)	Maximum close open time under any condition with limiting voltages and pressures (ms)	.....	.....
h)	First pole to clear factor	.....	.....
i)	Short time current rating (kA) for 1s	.....	.....
j)	Rated operating duty	.....	.....
k)	Maximum braking capacity under kilometric faults and rated TRV characteristic (kAp)	.....	.....
l)	Maximum breaking capacity under phase opposition (kAp)	.....	.....
m)	Maximum line charging breaking current with temporary over voltage upto 1.4 p.u. (A)	.....	.....
n)	Maximum over voltage (p.u.) on switching transformer on no load and corresponding charging current	.....	.....
o)	Maximum period between closing of first contact & last contact in a pole (ms)	.....	.....

p) Maximum pole discrepancy (ms) ....

q) Maximum arc duration and corresponding current under lockout pressure ....

r) Pre-insertion resistor .....

i. Value/ pole (ohms) / with tolerance ....

ii. Minimum and maximum duration of insertion per pole (ms) ....

iii. Thermal rating for the C-1m-O-CO-2m-C-1m-O-CO for terminal fault considering maximum resistance and ....

iv. Thermal rating for the same duty as (iii) above for reclosing against trapped charges ....

s) Small fault current breaking capacity (kAp) ....

t) Maximum temperature rise for main contacts over design ambient temperature of 50°C ....

u) Rated voltage & pick up range for trip coil (V) ....

v) Rated voltage & pick up range for closing coil (V) ....

w) Rated pressure and limits of pressure of operating mechanism ....

x) Rated pressure and limits of pressure of extinguishing medium ....

y) Minimum dead time for

i. Three phase reclosing (ms) ....

ii. Single phase reclosing (ms) ....

3. DIELECTRIC WITHSTAND OF COMPLETE BREAKER

a) One minute dry & wet power frequency withstand voltage

i. Between live terminal and ground (kVrms) …… ……

ii. Between terminals with breaker contacts open (kV rms) …… ……

b) 1.2/50- micro second impulse withstand test voltage

i. Between live terminals and ground(kVp) …… ……

ii. Between terminals with breaker contacts open (kVp) …… ……

c) 250/2500 micro second switching surge withstand test voltage

i. Between live terminals and ground (kVp) …… ……

ii. Between terminals with breaker contacts open (kVp) …… ……

d) Corona extinction voltage (kV rms) …… ……

e) Maximum radio interference voltage (micro V) at 1.1 Ur/_/3 …… ……

f) Total creepage distance

i. To ground (mm) …… ……

ii. Between terminals (mm) ……

4. OPERATING MECHANISM

a) Type of operating mechanism for

i. Closing …… ……

ii. Opening …… ……

b) Manufacturer's type designation …… ……

c) Normal power consumption (W) at rated voltage of …… ……

i. Trip coil …… ……

ii. Closing coil ……. …….

4.1 Spring charged mechanism

a) Number of close open operations possible after failure of AC supply to motor ……. …….

b) Time required for motor to charge the closing spring (min) ……. …….

c) Whether indication of spring charged condition provided in central control cabinet ……. …….

5. TYPE OF BREAKERS

5.1 SF6 Circuit Breakers

a) Quantity of SF6 per pole (m3) at rated pressure ……. …….

b) Guaranteed max. leakage rate per year ……. …….

c) Rated pressure of SF6 in operating chamber ……. …….

d) Limit of pressure at which breaker operates correctly (kg/ cm2) ……. …….

e) Standard to which SF6 gas complies ……. …….

f) Whether 20% spare SF6 gas stores in unused gas cylinder, included in proposal ……. …….

g) Compacity & filling ration of containers in which SF6 gas would be shipped (m3) ……. …….

h) Whether breakers are dispatched filled with SF6 or required to be filled at site ……. …….

i) Type and make of SF6 pipe coupling used ……. …….

j) Type and make of mandatory maintenance equipment

i. SF6 gas filling and evacuation trolley (portable) ……. …….

ii. SF6 gas drying, filling, evacuating equipment and its capacity ……. …….

iii. Operating analyzer type and make ……. …….

	iv. SF6 gas leak detector	…….	…….
k)	Parameters of SF6 gas for initial filling & satisfactory operation		
	i. Density	…….	…….
	ii. Dielectric strength/ kVmm	…….	…….
	iii. Acidity (ppm)	…….	…….
	iv. Water content (ppm)	…….	…….
	v. Oil content (ppm)	…….	…….
	vi. Condensation temperature ºC)	…….	…….
	vii. Resistivity (Ohm-cm)	…….	…….
l)	Whether details of SF6 gas viz test methods, handling etc. enclosed	…….	…….
m)	Type and material of gasket used to ensure gas tight joints for		
	i. Metal to metal joints	…….	…….
	ii. Metal to porcelain joints	…….	…….
n)	Method of housing SF6 gas compressors and equipment		
	i. At circuit breaker	…….	…….
	ii. In control cubicle	…….	…….
o)	Type and make of		
	i. Densimeter	…….	…….
	ii. Pressure gauge	…….	…….
p)	Densimeter Settings		
	i. Lockout	…….	…….
	ii. Alarm	…….	…….
q)	Minimum time interval between each make/ break operation (ms)	…….	…….

5.2 GENERAL

a)	Whether OGA drawing enclosed	…….	…….
b)	Weight of complete 3 phase breaker for foundation design (kg)	…….	…….
c)	Weight of heaviest part of breaker (kg)	…….	…….
d)	Impact loading for foundation design	…….	…….
e)	Seismic level for which breaker is designed	…….	…….
f)	Minimum safety clearance from earthed objects	…….	…….
g)	Noise level in (dB) at base of the breaker	…….	…….
h)	Minimum clearance in air		
	i. Between live parts (mm)	…….	…….
	ii. Live parts to earth (mm)	…….	…….
	iii. Live parts to ground level (mm)	…….	…….

6. CONSTRUCTIONAL DETAILS

a)	Whether arcing contacts provided	…….	…….
b)	Type and material of main contacts and arcing contacts	…….	…….
c)	Contact pressure on main contacts (kg/cm2)	…….	…….
d)	Contact separation in arcing position (mm)	…….	…….
e)	Contact separation in open position (mm)		
	i. Main contacts	…….	…….
	ii. PIR contacts	…….	…….
f)	Whether pressure relief device for each of the gas chamber of SF6 CB provided	…….	…….
g)	Rate of contact travel		
	i. Opening (m/sec)	…….	…….
	ii. Closing (m/sec)	…….	…….
h)	Whether the making & breaking contacts are	…….	…….

hermetically sealed

i)	Type and capacity of device used to obtain uniform voltage distribution between breaks	.....	.....
j)	Overvoltage withstand capability of grading components (kV/mms)		
	i. Continuous	.....	.....
	ii. 10 minutes	.....	.....
	iii. 1 minute	.....	.....
	iv. 5 seconds	.....	.....
k)	Number of auxiliary contacts per pole provided for Owner's use	.....	.....
l)	Rated voltage of auxiliary contacts (V)	.....	.....
m)	Current rating of auxiliary contacts		
	i. Continuous (A)	.....	.....
	ii. DC breaking with 20 ms time constant (A)	.....	.....
n)	Whether auxiliary contacts silver plated	.....	.....
o)	Whether support structure included in supply	.....	.....
p)	Height of support structure	.....	.....
q)	Material of support structure	.....	.....
r)	Standard to which the design of support structure conforms	.....	.....
s)	Whether foundation bolts for breakers and cabinets included in scope of supply	.....	.....

7. DETAILED LITERATURE

	i. Type test reports as per IEC-56	.....	.....
	ii. Factory test report & / or filed test report in case of reactor switching duty	.....	.....
	iii. Details of operating mechanism	.....	.....

iv.	Drawing of breaker of support structure	.....	.....
v.	Calculations for compressed	.....	.....
vi.	Details of SF6 gas filling	.....	.....
vii.	Details of SF6 gas leak detector	.....	.....
viii.	Precautions in use of SF6 gas	.....	.....
ix.	Leaflets & literature bringing out salient features of equipment offered	.....	.....
x.	Schematic diagrams of switching mechanism for closing resistor showing the duration of insertion alongwith calculation for thermal rating of closing resistors	.....	.....
xi.	Whether drawings/data data furnished as per cl.12 of chapter switchgear (CB)	.....	.....
xii.	Method of checking of voltage distribution devices at site enclosed	.....	.....
xiii.	Details alongwith a complete catalogue of operation analyzer enclosed	.....	.....
xiv.	Data on capabilities of circuit breaker in terms of time and number of operations at duties ranging from 100% fault currents to load currents of the lowest possible value without requiring any maintenance or checks	.....	.....
xv.	Effect of non simultaneity between contact within a pole or between poles and also show how it is covered in the guaranteed rated break time.	.....	.....
xvi.	Details and type of filters used in interrupter assembly and also the operating experience with such filters	.....	.....
xvii.	Curves supported by test data indicating the opening time under close open operation with combined variation of trip coil voltage & pneumatic/ hydraulic pressure	.....	.....
xviii.	All duty requirements specified alongwith	.....	.....

adequate test reports

CONTROL CABINETS

1. Manufacturer's Name	.....	.....
2. Indoor/ Outdoor application	.....	.....
3. Design ambient air temperature (deg. C)	.....	.....
4. Standards applicable	.....	.....
5. Thickness of sheet steel (mm) and whether cold rolled or hot rolled	.....	.....
6. Degree of protection provided	.....	.....
7. Bill of material for all the equipment mounted on control cabinet giving the following details	.....	.....
a) Make and type	.....	.....
b) Applicable Standard	.....	.....
c) Voltage rating	.....	.....
d) Current rating	.....	.....
e) Duty class, if applicable	.....	.....
f) Manufacturers catalogue No.	.....	.....
g) Total heat load of cabinet (for purpose of ventilation requirement)	.....	.....
8. Colour of finish paint IS:5	.....	.....
a) Outside	.....	.....
b) Inside	.....	.....
9. Control Wiring	.....	.....
(a) Size of conductor	.....	.....
i. For CT circuits	.....	.....
ii. For other circuits	.....	.....
b) Conductor Solid/ Standard	.....	.....
c) Number of Strands/ conductor	.....	.....
10. Terminal Blocks	.....	.....
(a) Make & type	.....	.....
b) Current rating	.....	.....

i) Power terminals (A)	.....	.....
ii) Other terminals (A)		
11. Space Heater Rating at 240 V AC	.....	.....
12. Control cabinet drawing showing the following		
a) Outline dimensions, floor openings, floor/wall/ pedestal fixing arrangements, weights etc.	.....	.....
b) Front view, inside view showing the mounting arrangement of various equipment	.....	.....
13. Schematic/ Wiring diagram of control cabinet enclosed	.....	.....
14. Interconnection drawing showing cable, connections to the control cabinet enclosed	.....	.....
15. Type test report to verify design of protection enclosed	.....	.....
16. Details of terminal rows:		
i) Whether aranged vertical or horizontal	.....	.....
ii) Clearance from adjacent components	.....	.....
iii) Distance between rows	.....	.....
iv) Whether transparent protection cover provided	.....	.....

BUSHING/SUPPORT INSULATOR

1.Manufacturer's Name	.....	.....
2.Type	.....	.....
3.Applicable Standards		
i) Height	.....	.....
ii. Diameter (Top)	.....	.....
iii. Diameter (Bottom)	.....	.....
4.Total Creepage distance (mm)	.....	.....
5.Rated voltage (kV)	.....	.....
6.Power frequency withstand voltage for 1 Min.	.....	.....

(kVrms) dry and wet		
7. 1.2/50 micro sec. Impulse withstand voltage (kVp)	……	…….
8. 250/2500 micro sec. Switching impulse withstand voltage (kVp) dry and wet	……	…….
9.Corona Extinction voltage (kV)	……	…….
10.Weight (kg)	……	…….
11. Max. Allowable span (mm)	……	…….
12. Cantilever Strength (kg)	……	…….
13. OGA drawing enclosed	……	…….

SECTION-5

ANNEXURE - A

Checklist

1	**Technical Qualifying Requirement**		
1.1	The bidder to furnish relevant documents for meeting the qualifying requirement. Performance certificates shall be submitted in English. Translated pages should be attested by the ultimate customer, if attested only by the bidder it shall be notarized.	Confirmed	Yes/No
1.2	The bidder's scope includes supply and services such as Supervision of installation, Testing and commissioning.	Confirmed	Yes/No
2	**Un-priced BOQ**		
2.1	Confirm that all items have been quoted separately. (If any item has not been quoted, the same shall be specifically brought out with technical reasons thereof) Record the same in schedule of technical deviations.	Confirmed	Yes/No
3	**Technical**		
3.1	Minimum Number of auxiliary contacts on each Circuit Breaker - Besides requirement of technical specification, the manufacturer shall wire up 10 NO + 10 NC contacts of each phase/ pole exclusively for purchaser's use and shall be wired up to common marshalling box of 765kV CB.	Confirmed	Yes/No
3.2	Catalogues, indicative OGA of the offered equipment is attached.	Enclosed with bid	Yes/No
4	**Technical Deviations**		
4.1	Confirm that the Complete systems have been offered as per the requirements of Technical Specification and Technical Deviation sheet has been submitted. Deviations mentioned elsewhere in the bid will not be considered.	Confirmed	Yes/No
5	**GTP**		
5.1	All equipment being supplied shall conform to Guaranteed Technical Particulars as per technical specification and applicable IS / IEC	Confirmed	Yes/No

6	**TYPE TESTS REQUIREMENTS**		
6.1	All equipment being supplied shall conform to type tests as per technical specification and shall be subject to routine tests in accordance with requirements stipulated under respective sections.	Confirmed	Yes/No
6.2	In case the test reports are not found technically valid during contract stage by BHEL/Customer, the bidder shall repeat these test(s) at no extra cost to the purchaser and no delivery implication. **Technical valid** - Any error or incompleteness (any/all additional type tests not carried out) or discrepancy in the test reports vis-à-vis offered equipment due to any design / manufacturing changes (including substitution of components) or non-compliance with the requirement stipulated in the Technical Specification.	Confirmed	Yes/No

Date:

Bidder's Stamp & Signature

Contact Details: