

|                                                                                     |                                                                                                                                                                                                                                                                                                                            |                                        |  |                   |  |
|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|--|-------------------|--|
|  |                                                                                                                                                                                                                                                                                                                            | <b>BHARAT HEAVY ELECTRICAL LIMITED</b> |  | Enquiry No.:      |  |
| <b>BHOPAL</b>                                                                       |                                                                                                                                                                                                                                                                                                                            |                                        |  | Due Date :        |  |
|                                                                                     |                                                                                                                                                                                                                                                                                                                            |                                        |  | Supplier TN. No.: |  |
|                                                                                     |                                                                                                                                                                                                                                                                                                                            |                                        |  | Date :            |  |
| <b><u>SPECIFICATION CUM COMPLIANCE CERTIFICATE OF ON LOAD TAP CHANGER</u></b>       |                                                                                                                                                                                                                                                                                                                            |                                        |  |                   |  |
| 1                                                                                   | NOTE:-                                                                                                                                                                                                                                                                                                                     |                                        |  |                   |  |
| a                                                                                   | The "Offered" Column and where applicable, the "Deviations" & "Remarks" Column of this format shall be filled in by the Bidder and submitted along with the offer. Inadequate / incomplete, or unsustainable information against any of the clauses of the specifications/requirements shall be treated as non-compliance. |                                        |  |                   |  |
| b                                                                                   | The offer and all documents enclosed with offer should be in English/Hindi language only.                                                                                                                                                                                                                                  |                                        |  |                   |  |
| c                                                                                   | Bidder must not be under category banned/ debarred/ hold from dealing by BHEL on tender due date.                                                                                                                                                                                                                          |                                        |  |                   |  |
| d                                                                                   | BHEL reserves the right to verify the information and documents furnished by bidder. In case the information is found to be false/ incorrect, the offer shall be rejected.                                                                                                                                                 |                                        |  |                   |  |
| e                                                                                   | The vendor meeting pre qualifying criteria as per clause 4 of this specification will be evaluated further.                                                                                                                                                                                                                |                                        |  |                   |  |
| 2.a                                                                                 | NAME & ADDRESS OF THE BIDDER :                                                                                                                                                                                                                                                                                             |                                        |  |                   |  |
| 2.b                                                                                 | TELEPHONE NOS.:/ Mobile No.                                                                                                                                                                                                                                                                                                |                                        |  |                   |  |
| 2.c                                                                                 | E-MAIL ADDRESS :                                                                                                                                                                                                                                                                                                           |                                        |  |                   |  |
| 3                                                                                   | SCOPE: SUPPLY OF ON LOAD TAP CHANGER (OLTC) AS PER THIS SPECIFICATION (Total Qty : 7 Nos) and spare items as per annexure -F (7 sets)                                                                                                                                                                                      |                                        |  |                   |  |
|                                                                                     | a) QUOTED OLTC TYPE                                                                                                                                                                                                                                                                                                        |                                        |  |                   |  |
|                                                                                     | b) MOTOR DRIVE TYPE :                                                                                                                                                                                                                                                                                                      |                                        |  |                   |  |
|                                                                                     | c) MAKE OF OLTC:                                                                                                                                                                                                                                                                                                           |                                        |  |                   |  |


S BHATTACHARYA  
DGM

DILIP KUMAR  
SR.DGM


AGMHOD/SWE


SRIKRISHNA PRASAD  
DGM

| SNO | Description of requirement                                                                                                              | Bidder to specify/ Confirm                                                                                                                              | Offered Parameters | Deviations | Remarks                                                     |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|------------|-------------------------------------------------------------|
| 4   | <b>Part -A : Pre Qualifying Criteria</b>                                                                                                |                                                                                                                                                         |                    |            |                                                             |
| a   | Bidder's average annual financial turnover during the last 3 years ending 31st March of 2019-2020 should be greater than Rs. 81.75 Lacs | Bidder to provide Audited ITCC Annual report for last 3 years.<br>OR<br>Balance Sheet and profit and loss statement(Audited) for last 3 financial years |                    |            | 2017-18, 2018-19,2019-20 will be considered as last 3 years |
| b   | OLTC make should be approved in M/s Powergrid for supply of OLTC for 765kV Transformer.                                                 | Bidder to provide Powergrid Approval letter                                                                                                             |                    |            |                                                             |
| c   | Vendor should have Type Test approval from M/s Powergrid for the quoted model.                                                          | Bidder to provide Type Test approval Letter issued by Powergrid.                                                                                        |                    |            |                                                             |

*Signature*

SRIKRISHNA PRASAD  
DGM

*Signature*

S BHATTACHARYA  
DGM

*Signature* 13/11/21

DILIP KUMAR  
SR.DGM

*Signature*

AGMHOD/SWE

| SNO                                                  | Description of requirement                                                                                                                                                         | Bidder to specify/ Confirm  | Offered Parameters | Deviations | Remarks |
|------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|--------------------|------------|---------|
| Part B: General Specification                        |                                                                                                                                                                                    |                             |                    |            |         |
| SPECIFICATION OF ON LOAD TAP CHANGER                 |                                                                                                                                                                                    |                             |                    |            |         |
| 5                                                    | OLTC shall meet the technical specification attached as Annexure 'A'                                                                                                               | Bidder to confirm           |                    |            |         |
| INSPECTION                                           |                                                                                                                                                                                    |                             |                    |            |         |
| 6                                                    | Inspection at Supplier's works by Customer /BHEL as per approved QAP attached as Annexure 'B'                                                                                      | Bidder to confirm           |                    |            |         |
| Documents to be furnished along with Technical offer |                                                                                                                                                                                    |                             |                    |            |         |
| a                                                    | Confirmation of specification                                                                                                                                                      | Bidder to furnish documents |                    |            |         |
| b                                                    | Connection/Phasor Diagram of OLTC                                                                                                                                                  |                             |                    |            |         |
| c                                                    | Motor Drive Standard wiring diagram/Scheme                                                                                                                                         |                             |                    |            |         |
| d                                                    | OGA Drg for all components of OLTC                                                                                                                                                 |                             |                    |            |         |
| e                                                    | Technical data book                                                                                                                                                                |                             |                    |            |         |
| f                                                    | Instruction manual                                                                                                                                                                 |                             |                    |            |         |
| g                                                    | Tie in resistor calculation sheet                                                                                                                                                  |                             |                    |            |         |
| DELIVERY                                             |                                                                                                                                                                                    |                             |                    |            |         |
|                                                      | First 3 Nos within one month from PO/LOI subsequent Qty within 2 months from date of confirmation from BHEL. Minimum 3 Nos per month                                               | Bidder to confirm           |                    |            |         |
| INSTALLATION AND SUPERVISION                         |                                                                                                                                                                                    |                             |                    |            |         |
| a                                                    | 1st Job Installation in Transformer shall be supervised by Bidder's Engineer. Engineer must be deputed during assembly and testing of OLTC/Transformer within 3 days of intimation | Bidder to confirm           |                    |            |         |
| b                                                    | For any issues then bidders will depute their Service Engineers along with necessary material within 24 hours of intimation.                                                       | Bidder to confirm           |                    |            |         |

SRIKRISHNA PRASAD  
DGMS BHATTACHARYA  
DGMDILIP KUMAR  
SR.DGM

AGM/OD/SWE

| SNO | Description of requirement                                                                                                                                                                                                                                                                                                           | Bidder to specify/ Confirm | Offered Parameters | Deviations | Remarks |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|--------------------|------------|---------|
| c   | Any major issues/Flashover in OLTC or its component faced during assembly and testing, complete tap changer will be replaced at free of cost.                                                                                                                                                                                        | Bidder to confirm          |                    |            |         |
| d   | <b>At Site:</b> If any major issues raised then within 2 days Engineers along with material shall be deputed.                                                                                                                                                                                                                        | Bidder to confirm          |                    |            |         |
| 10  | <b>Defect Liability Period:</b><br>OLTC shall be warranted for trouble free performance and against any defect in the material, workmanship, design and also any abnormal behavior for a period of 60 months from the date of commissioning of transformer at Site or 84 months from date of receipt at Bhopal whichever is earlier. | Bidder to confirm          |                    |            |         |
| ii  | Upon correction of the defects in the OLTC by repair/replacement, such repair/replacement shall have the Defect Liability Period of the said OLTC extended by a period of 2 years from the time of such repair/replacement even after expiry of 10.i.                                                                                | Bidder to confirm          |                    |            |         |
| 11  | <b>Latent defects warranty</b><br>The Bidders liability for latent defects warranty for OLTC shall be limited to period of five (05) years from the end of Defect Liability Period as per Cl 10.                                                                                                                                     | Bidder to confirm          |                    |            |         |

*S. Bhattacharya*

SRIKRISHNA PRASAD  
DGM

*S. Bhattacharya*  
S BHATTACHARYA  
DGM

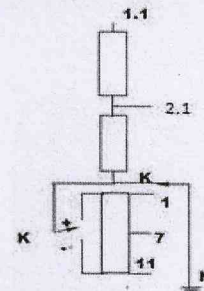
*Dilip Kumar*  
13/01/21

DILIP KUMAR  
SR.DGM

*AGM/HOD/SWE*  
AGM/HOD/SWE

Annexure - 'A'

|                                                        |                                      | SPECIFICATION FOR OLTC  |                                 |                  |                         | SG01005C              |                                     |                                                                |                                           |                  |                                                                                             |
|-----------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|-------------------------|---------------------------------|------------------|-------------------------|-----------------------|-------------------------------------|----------------------------------------------------------------|-------------------------------------------|------------------|---------------------------------------------------------------------------------------------|
| CUSTOMER                                                                                                                                |                                      | M/S. Powergrid          |                                 | NO.OFF           |                         | SHEET 1 OF 2          |                                     |                                                                |                                           |                  |                                                                                             |
| TENDER/W.O.                                                                                                                             |                                      | 69108                   |                                 | 21               |                         | TAPPING WINDING       |                                     |                                                                |                                           |                  |                                                                                             |
| <b>TRANSFORMER DATA: (FOR TAPPING WINDING)</b>                                                                                          |                                      |                         |                                 |                  |                         |                       |                                     |                                                                |                                           |                  |                                                                                             |
| RATED POWER                                                                                                                             | NO. OF PHASE                         | VOLTAGE RATIO           | REGULATING RANGE                |                  |                         |                       |                                     |                                                                |                                           |                  |                                                                                             |
| 500 MVA                                                                                                                                 | 1                                    | 765/400/33 KV           | + 5.5 % TO - 5.5 %<br>OF 765 KV |                  |                         |                       |                                     |                                                                |                                           |                  |                                                                                             |
| SERVICE: GENRATION/NETWORK/FURNACE/RECTIFIER                                                                                            |                                      |                         |                                 |                  |                         |                       |                                     |                                                                |                                           |                  |                                                                                             |
| TYPE: AUTO/DOUBLE WINDING                                                                                                               |                                      |                         |                                 |                  |                         |                       |                                     |                                                                |                                           |                  |                                                                                             |
| TEST VOLTAGES                                                                                                                           |                                      | PF(50HZ)                | IMPULSE(1.2/50)                 |                  |                         |                       |                                     |                                                                |                                           |                  |                                                                                             |
| LINE END                                                                                                                                |                                      | 110 KV                  | 490 KVP                         |                  |                         |                       |                                     |                                                                |                                           |                  |                                                                                             |
| T.C. TO EARTH                                                                                                                           |                                      | 110 KV                  | 490 KVP                         |                  |                         |                       |                                     |                                                                |                                           |                  |                                                                                             |
| ACROSS FINE TAP WINDING                                                                                                                 |                                      | 82 KV                   | 350 KVP                         |                  |                         |                       |                                     |                                                                |                                           |                  |                                                                                             |
| ACROSS ONE TAP                                                                                                                          |                                      | 10 KV                   | 90 KVP                          |                  |                         |                       |                                     |                                                                |                                           |                  |                                                                                             |
| FOR COARSE/FINE WINDING                                                                                                                 |                                      | ----- KV                | ----- KVP                       |                  |                         |                       |                                     |                                                                |                                           |                  |                                                                                             |
| ACROSS COARSE WINDING                                                                                                                   |                                      | ----- KV                | ----- KVP                       |                  |                         |                       |                                     |                                                                |                                           |                  |                                                                                             |
| BETWEEN PHASES                                                                                                                          |                                      | ----- KV                | ----- KVP                       |                  |                         |                       |                                     |                                                                |                                           |                  |                                                                                             |
| RECOVERY VOLTAGE APPEARING ACROSS REVERSING SWITCH<br>(IN CASE OF REVERSING SWITCH DESIGN)= -- KV                                       |                                      |                         |                                 |                  |                         |                       |                                     |                                                                |                                           |                  |                                                                                             |
| <b>ON- LOAD/OFF-CKT TAP CHANGER DATA: (THESE DATA ARE ABSOLUTELY NECESSARY FOR TAKING UP THE MANUFACTURE)</b>                           |                                      |                         |                                 |                  |                         |                       |                                     |                                                                |                                           |                  |                                                                                             |
| TAP CHANGER TYPE                                                                                                                        | NO. OF POLES                         | STANDARD CURRENT (AMPS) | CONNECTION Y/V                  | INSULATION LEVEL | TAP SELECTOR CLASS      | BASIC CIRCUIT DIAGRAM | OPERATING POSITIONS                 | ASSEMBLY AIDS FOR MOUNTING ON BELL TYPE                        | TRANSFORMER HEAD VARIANT                  | SWIVELLING RANGE | STEP VOLTAGE IN PHASE                                                                       |
| EXAMPLE M                                                                                                                               | III                                  | 500                     | Y                               | 110              | B                       | 10193W                | 17                                  | ✓                                                              | 1                                         | L                | Ust= 2765.5 VOLT<br>MAXIMUM TAP CHANGER OPERATING CURRENT<br>I <sub>max</sub> = 1092.1 AMP. |
| <b>MOTOR DRIVE DATA :</b>                                                                                                               |                                      |                         |                                 |                  |                         |                       |                                     |                                                                |                                           |                  |                                                                                             |
| MOTOR DRIVE TYPE                                                                                                                        | MOTOR CIRCUIT POWER SUPPLY           |                         | CONTROL CKT POWER SUPPLY        |                  | HEATER CKT POWER SUPPLY |                       | POTENTIO METER CONTACT RANGE NO.X Ω | CABINET HINGE #                                                | ON LOAD TAP CHANGER SCHEMATIC DIAGRAM NO. |                  |                                                                                             |
|                                                                                                                                         | V                                    | NO. OF PHASES           | FREQ                            | V                | a.c d.c                 | VOLT                  | a.c d.c                             |                                                                | LEFT                                      | RIGHT            |                                                                                             |
| EXAMPLE MA7                                                                                                                             | 415V                                 | 3 N □                   | 50 HZ                           | 110V             | a.c                     | 240 V                 | a.c                                 | 16X1KΩ                                                         | ✓                                         |                  |                                                                                             |
|                                                                                                                                         | 415V                                 | 3 N □                   | 50 HZ                           | 110V             | a.c                     | 240                   | a.c                                 | 22X1KΩ                                                         |                                           |                  | 34954200001                                                                                 |
| <b>DESIGNATION OF OPERATING POSITIONS :</b>                                                                                             |                                      |                         |                                 |                  |                         |                       |                                     |                                                                |                                           |                  |                                                                                             |
| SELECTOR CONNECTION                                                                                                                     |                                      | FINE                    |                                 | CHANGE-OVER      |                         | RAISE MEANS CONTROL   |                                     |                                                                |                                           |                  |                                                                                             |
| AT POSITION -1                                                                                                                          |                                      | SELECTOR                |                                 | K - +            |                         | SELECTOR              |                                     | 11 - N                                                         |                                           | TOWARDS POS. 23  |                                                                                             |
| <b>DRIVE SHAFT DIMENSIONS :(REFER DRG. 24950000020 &amp; 24950000021)</b>                                                               |                                      |                         |                                 |                  |                         |                       |                                     |                                                                |                                           |                  |                                                                                             |
| H1 =                                                                                                                                    | MM                                   | H1 =                    | MM                              | V1 =             |                         | MM                    |                                     | ARRANGEMENT FOR                                                |                                           | #                |                                                                                             |
| H2 =                                                                                                                                    | MM                                   | H2 =                    | MM                              |                  |                         |                       |                                     | 3 X MI : G11/G12                                               |                                           |                  |                                                                                             |
|                                                                                                                                         |                                      |                         |                                 |                  |                         |                       |                                     | HEAD VARIANT : 1/2/3                                           |                                           |                  |                                                                                             |
| <b>REQUIRMENT OF SPECIAL FEATURES/DEVIATIONS :</b>                                                                                      |                                      |                         |                                 |                  |                         |                       |                                     |                                                                |                                           |                  |                                                                                             |
| i) IN MOTOR DRIVE<br>ii) SPECIAL BEVEL GEAR<br>iii) INTERMEDIATE BEVEL GEAR<br>iv) TIE-IN- RESISTORS- NO<br>IF YES CALCULATION ENCLOSED |                                      |                         |                                 |                  |                         |                       |                                     | NOTES:- INFORMATION MARKED THUS #<br>SHALL BE FURNISHED LATER. |                                           |                  |                                                                                             |
| REV.                                                                                                                                    | OLTC INSULATION LEVEL & STEP VOLTAGE |                         |                                 |                  |                         | PRINTS TO             |                                     | PREPARED BY                                                    |                                           | APPROVED BY      |                                                                                             |
| 1                                                                                                                                       | CHANGED.                             |                         |                                 |                  |                         |                       |                                     | P Mishra                                                       |                                           | U.R Sidar        |                                                                                             |
| DATE                                                                                                                                    |                                      |                         |                                 |                  |                         | SWE                   |                                     | 1                                                              |                                           |                  |                                                                                             |
| 05.09.20                                                                                                                                |                                      |                         |                                 |                  |                         |                       |                                     |                                                                |                                           |                  |                                                                                             |
| REF. DWISCR/SWE/008                                                                                                                     |                                      |                         |                                 |                  |                         | GEN.FILE              |                                     | 1                                                              |                                           | DATE 15.01.2020  |                                                                                             |
|                                                                                                                                         |                                      |                         |                                 |                  |                         |                       |                                     |                                                                |                                           | DATE 15.01.2020  |                                                                                             |



FORMAT NO. SG01005C SHT 2 OF 2

**(b) ENVIRONMENTAL & OPERATING CONDITION**

**1.0 AMBIENT CONDITION**

1.1 TEMP. OF TAP CHANGER ENVIRONMENT : MIN 0 °C

MAX 90 °C

1.2 TEMP. OF MOTOR DRIVE ENVIRONMENT : MIN 0 °C

MAX 50 °C

**2.0 OVERLOADING CONDITIONS :**

IF OTHER THAN CL. 2.3.2 OF IEC: 542 / IS: 8478

NO

**3.0 DEGREE OF PROTECTION OF MOTOR DRIVE UNIT :**

IP: 55 AS PER IS: 13947

**(c) SAFETY REQUIREMENTS :**

FOLLOWING SAFETY FEATURES ARE IN-BUILT IN THE STANDARD DESIGN.

1.0 PROVISION FOR EARTHING AT T.C.HEAD & MOTOR DRIVE UNIT.

2.0 OIL SURGE RELAY.

3.0 SAFETY DIAPHRAM FOR OVER PRESSURE RELAY IN DIVERTER SWITCH.

4.0 SPARK GAP FOR PROTECTION AGAINST TRANSIENT OVER VOLTAGES  
BETWEEN DIVERTER SWITCH CONTACTS.

5.0 ADDITIONAL SAFETY FEATURES, IF REQUIRED SHALL BE SPECIFIED

NO

**(d) STATUTORY & REGULATORY REQUIREMENTS**

1.0 REQUIREMENT IN RESPECT OF EARTHING ARRANGEMENTS, PRESSURE  
RELIEF DEVICE, OIL SURGE RELAY AS PER INDIAN ELECTRICITY RULES ARE  
IN-BUILT IN THE STANDARD DESIGN.

2.0 OTHER SPECIFIC REQUIREMENTS SHALL BE SPECIFIED -----

2.1 TYPE & FINISH OF HARDWARE: --- HDG

2.2 PAINT FINISH :-- SHADE NO.RAL 7035

| List of spare items for Tap Changer Motor Drive unit |                                                               |                  |
|------------------------------------------------------|---------------------------------------------------------------|------------------|
| S No                                                 | Description                                                   | Quantity per set |
| 1                                                    | Tap changer motor Raise contactor                             | 1                |
| 2                                                    | Tap changer motor lower contactor                             | 1                |
| 3                                                    | Brake contactor                                               | 1                |
| 4                                                    | Step by step contactor                                        | 1                |
| 5                                                    | Aux contactor                                                 | 1                |
| 6                                                    | Motor protective relay                                        | 1                |
| 7                                                    | Control selector switch Lower/Raise 2 way no off 2Pole        | 1                |
| 8                                                    | Time delay relay(1-30sec) on delay with 2 changeover contacts | 1                |

QAP-Annexure



पावर ग्रिड कॉर्पोरेशन ऑफ इंडिया लिमिटेड  
(भारत सरकार का उद्यम)  
POWER GRID CORPORATION OF INDIA LIMITED  
(A Government of India Enterprise)

Ref: C/QA&I/MQP/BHEL/Power-Xmer/765KV

Date: 31.10.2019

M/s Bharat Heavy Electricals Limited  
Piplani, Raison Road, BHEL,  
Bhopal-462022

Kind Attn.: Sh. M K Sharma, Addl. G.M. (QTR)

विषय : मैन्यूफैक्चरिंग क्वालिटी प्लान (Manufacturing Quality Plan) का अनुमोदन

महोदय,

यह पत्र आपके द्वारा प्रस्तुत मैन्यूफैक्चरिंग क्वालिटी प्लान (एम.क्यू.पी.) (निम्नलिखित विवरणानुसार) से संबंधित है जिसे समीक्षा करने के उपरांत, अनुमोदित किया जाता है।

|                                                                         |                                      |                                         |
|-------------------------------------------------------------------------|--------------------------------------|-----------------------------------------|
| उत्पाद विवरण: Power Transformer up to 765 KV class<br>वोर्क्स- As above | एम.क्यू.पी. संख्या: TXB 112 / Rev P0 | वैधता: From 28.10.2019<br>To 27.10.2020 |
|-------------------------------------------------------------------------|--------------------------------------|-----------------------------------------|

यह एम.क्यू.पी. समय - समय पर पावरग्रिड द्वारा की गई टिप्पणियों के आधार पर संशोधित किया जाएगा। यह एम.क्यू.पी. वर्तमान एवं भविष्य की परियोजनाओं के लिए लागू होगी और इसे विशिष्ट कान्ट्रैक्ट/तकनीकी ब्यौरों, अनुमोदित बीओएम तथा ड्राइंग (Technical Specification, Approved BOM and Drawings) के साथ जोड़कर पढ़ा जाए। आप यह सुनिश्चित करें कि उपरोक्त कागजात आपके एवं आपके सबवेंडर्स के कार्यस्थलों पर उपलब्ध रहें ताकि निरीक्षण (बिना किसी देरी के) उचित रूप से हो सके।

इसी विषय पर हम यह भी स्पष्ट करना चाहते हैं कि निरीक्षण के दौरान पावरग्रिड की प्रतिभागिता का उत्तरोत्तर कम होना आपके द्वारा एम.क्यू.पी. की लगातार अनुपालन व गुणवत्ता के प्रति कटिबद्धता पर निर्भर होगा। प्रोसेस/प्रोसेस पैमानों के निरंतर व गंभीर उल्लंघन के मामले में पावरग्रिड को किसी भी चरण पर पूर्ण अधिकार होगा कि वह अपनी प्रतिभागिता को ग्राहक निरीक्षण प्वाइंट (सीआईपी) द्वारा, अतिरिक्त संख्या से निरीक्षण बढ़ाए तथा/या इस एम.क्यू.पी. को खारिज करे।

धन्यवाद

(पी सक्सेना)

उपमहाप्रबन्धक (गु. आ. एवं नि.)

प्रति : उपमहाप्रबन्धक, आई. ओ. भोपाल

केंद्रीय कार्यालय : "सौदाशिक", प्लॉट नं. 2, सेक्टर-29, गुरुग्राम-122001, (हरियाणा), दूरभाष 0124-2571700-719

Corporate Office : "Saudashik", Plot No. 2, Sector-29, Gurgaon-122001, (Haryana) Tel.: 0124-2571700-719

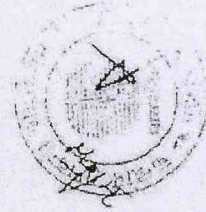
पंजीकृत कार्यालय : बी-9, कुतुब इंस्टीट्यूशनल एरिया, कटवारिया सारंग, नई दिल्ली - 110 016 दूरभाष : 011-26560112, 26560121, 26560122, 26560123, 26560124, 26560125, 26560126, 26560127, 26560128, 26560129, 26560130, 26560131, 26560132, 26560133, 26560134, 26560135, 26560136, 26560137, 26560138, 26560139, 26560140, 26560141, 26560142, 26560143, 26560144, 26560145, 26560146, 26560147, 26560148, 26560149, 26560150, 26560151, 26560152, 26560153, 26560154, 26560155, 26560156, 26560157, 26560158, 26560159, 26560160, 26560161, 26560162, 26560163, 26560164, 26560165, 26560166, 26560167, 26560168, 26560169, 26560170, 26560171, 26560172, 26560173, 26560174, 26560175, 26560176, 26560177, 26560178, 26560179, 26560180, 26560181, 26560182, 26560183, 26560184, 26560185, 26560186, 26560187, 26560188, 26560189, 26560190, 26560191, 26560192, 26560193, 26560194, 26560195, 26560196, 26560197, 26560198, 26560199, 26560200, 26560201, 26560202, 26560203, 26560204, 26560205, 26560206, 26560207, 26560208, 26560209, 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## Standard Manufacturing Quality Plan- Power Transformer ( 765 kV Class)

QAP No. : TQT 112 - Rev. P0

| Notes and codes |                                                                                   |                                                                                                       |
|-----------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|
| Code 1          | Indicates place where testing is planned to be performed i.e. Inspection location | Code 2 Indicates who has to perform the tests i.e. Testing Agency                                     |
| A               | At Equipment Manufacturer's works                                                 | J The Equipment Manufacturer                                                                          |
| B               | At Component Manufacturer's works                                                 | K The Component Manufacturer                                                                          |
| C               | At Authorised Distributor's place                                                 | L The Third Party                                                                                     |
| D               | At Independent Lab                                                                | M The Turnkey Contractor                                                                              |
| E               | At Turn Key Contractor's location                                                 |                                                                                                       |
| F               | Not specified                                                                     |                                                                                                       |
| Code 3          | Indicates who shall witness the tests i.e. Witnessing Agency                      | Code 4 Review of Test Reports/Certificates                                                            |
| P               | Component Manufacturer itself                                                     | W By Equipment manufacturer                                                                           |
| Q               | Component Manufacturer and Equipment Manufacturer                                 | X By Contractor during product/process inspection                                                     |
| R               | Component Manufacturer, Equipment Manufacturer and Contractor                     | Y By POWERGRID during product/process inspection                                                      |
| S               | Equipment Manufacturer itself                                                     | Z By Contractor and/or POWERGRID during product/process inspection                                    |
| T               | Equipment Manufacturer and Contractor                                             |                                                                                                       |
| U               | Equipment Manufacturer, Contractor and POWERGRID                                  |                                                                                                       |
| V               | Third Party itself                                                                |                                                                                                       |
| Code 5          | Whether specific approval of sub-vendor / Component make is envisaged?            | Code 6 Whether test records required to be submitted after final inspection for issuance of CIP/MICC? |
| E               | Envisaged                                                                         | Y Yes                                                                                                 |
| N               | Not Envisaged                                                                     | N No                                                                                                  |

EM : Equipment Manufacturer, CM: Component Manufacturer, TC: Test Certificate  
CIP : Customer Inspection Point, MICC: Material Inspection Clearance Certificate.



| Manufacturing Quality Plan- Power Transformer (765 KV Class) |                                                                                                                                                                                                                                                                                                                                                                                          |                      |                                        |                                |                  |                         |                  |   |   |         |   |   |
|--------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------------------------------|--------------------------------|------------------|-------------------------|------------------|---|---|---------|---|---|
| BHARAT HEAVY ELECTRICALS LIMITED - PIPLANI BHOPAL            |                                                                                                                                                                                                                                                                                                                                                                                          |                      |                                        |                                |                  |                         |                  |   |   |         |   |   |
| Customer: Power Grid Corporation of India LTD.               |                                                                                                                                                                                                                                                                                                                                                                                          | VENDOR CODE : 23E2D2 |                                        | MQP No. : TXT 112              |                  | Valid from : 28.10.2019 |                  |   |   |         |   |   |
| ITEM :                                                       |                                                                                                                                                                                                                                                                                                                                                                                          | Power Transformer    |                                        | Rev.No. : P0                   |                  | Valid upto : 27.10.2020 |                  |   |   |         |   |   |
|                                                              |                                                                                                                                                                                                                                                                                                                                                                                          | 765 KV CLASS         |                                        | Date : 26.10.2019              |                  |                         |                  |   |   |         |   |   |
| S.No.                                                        | Components / Operations & Description of Test                                                                                                                                                                                                                                                                                                                                            | Type of Check        | Quantum of Check / Sampling with basis | Reference Document for Testing | Acceptance Norms | Format of Record        | Applicable Codes |   |   | Remarks |   |   |
|                                                              |                                                                                                                                                                                                                                                                                                                                                                                          |                      |                                        |                                |                  |                         | 1                | 2 | 3 | 4       | 5 | 6 |
| 1                                                            | This MQP shall be read in conjunction with POWERGRID specification and shall deem to include additional test, if any, required as per the contract.                                                                                                                                                                                                                                      |                      |                                        |                                |                  |                         |                  |   |   |         |   |   |
| 2                                                            | POWERGRID specification shall include provisions of Letter of Award (LOA), POWERGRID approved - drawings / technical data sheet / Bill of Material (BOM) / test procedure applicable to the specific contract.                                                                                                                                                                           |                      |                                        |                                |                  |                         |                  |   |   |         |   |   |
| 3                                                            | In case of any contradiction between BHEL's plant standards, this MQP and POWERGRID specification, following precedence shall be followed.<br>a). POWERGRID Specs.<br>b). This MQP<br>c). Manufacturers plant standards                                                                                                                                                                  |                      |                                        |                                |                  |                         |                  |   |   |         |   |   |
| 4                                                            | Where Indian / International Technical Standard are referred, their last amendments shall be included. The same is applicable in case of BHEL specification also, so long as these changes are made with the approval of competent authority of BHEL.                                                                                                                                    |                      |                                        |                                |                  |                         |                  |   |   |         |   |   |
| 5                                                            | It is responsibility of BHEL to ensure that this document is readily available at their works, as well as the works of their sub-vendors in order to avoid any delay at the time of inspection.                                                                                                                                                                                          |                      |                                        |                                |                  |                         |                  |   |   |         |   |   |
| 6                                                            | BHEL & BHEL's sub-vendor shall ensure that control, Measuring and Testing instruments are duly calibrated and should have calibration certificates traceable to Indian/ International Standards. Calibration records shall be available during inspection by POWERGRID. Key testing instruments shall be calibrated by an agency having full membership & MRA of ILAC/APLAC              |                      |                                        |                                |                  |                         |                  |   |   |         |   |   |
| 7                                                            | In case of any tests being carried out at the third party lab, such lab/ facility should be an agency having full membership & MRA of ILAC/APLAC                                                                                                                                                                                                                                         |                      |                                        |                                |                  |                         |                  |   |   |         |   |   |
| 8                                                            | All raw material / bought-out items for which approval has been envisaged shall be procured from POWERGRID approved sub-vendors only.                                                                                                                                                                                                                                                    |                      |                                        |                                |                  |                         |                  |   |   |         |   |   |
| 9                                                            | Co-related supplier TC for items (for other than stock item & raw material) with unique sl. no. shall be maintain by BHEL for verification by PGCIL. In absence of above test / check will be done by BHEL.                                                                                                                                                                              |                      |                                        |                                |                  |                         |                  |   |   |         |   |   |
| 10                                                           | BHEL to get clearance/approval from POWERGRID Engrg. Dept. for the type test on list Transformer of each rating against each contract including Bushing, Buchholz relay, OTI & WTI, Cooler control cabinet, PRD, MCG etc, as applicable.                                                                                                                                                 |                      |                                        |                                |                  |                         |                  |   |   |         |   |   |
| 11                                                           | Inspection of spare items ordered by POWERGRID shall also be governed by the provisions of this MQP. Items if not covered under this MQP shall be offered for inspection as per POWERGRID approved specification and drawing / relevant Indian/ International Standards.                                                                                                                 |                      |                                        |                                |                  |                         |                  |   |   |         |   |   |
| 12                                                           | Any material rejected during POWERGRID inspection shall be disposed off with intimation to POWERGRID. For destructive disposal POWERGRID may depute its representative for witnessing. In case the material is to be returned to sub-vendor, all such items shall be indelibly identified (to prevent mixing) at the works of BHEL and offered to POWERGRID for verification of marking. |                      |                                        |                                |                  |                         |                  |   |   |         |   |   |
| 13                                                           | POWERGRID agreed Welding Procedure specification, Brazing Procedure specification, FRA Test procedure (wherever applicable) and Painting Procedure shall be followed.                                                                                                                                                                                                                    |                      |                                        |                                |                  |                         |                  |   |   |         |   |   |
| 14                                                           | This MQP is standard MQP for Power Transformer of 765 KV class to be manufactured at the works of BHEL Bhopal.                                                                                                                                                                                                                                                                           |                      |                                        |                                |                  |                         |                  |   |   |         |   |   |
| 15                                                           | All our source services shall be from approved sources only.                                                                                                                                                                                                                                                                                                                             |                      |                                        |                                |                  |                         |                  |   |   |         |   |   |
| 16                                                           | All the packing cases shall be marked with POWERGRID LOA details, name of project, item description and CIP / MRO number by which material has been cleared for dispatch, one copy of CIP/ MRO shall                                                                                                                                                                                     |                      |                                        |                                |                  |                         |                  |   |   |         |   |   |
| 17                                                           | BHEL shall align Quality system of their sub-vendor to the requirement of latest ISO: 9001 quality standards in a time bound manner.                                                                                                                                                                                                                                                     |                      |                                        |                                |                  |                         |                  |   |   |         |   |   |
| 18                                                           | Any additional/Change in new sub-vendor / Process shall call for review by POWERGRID for MQP amendment if necessary.                                                                                                                                                                                                                                                                     |                      |                                        |                                |                  |                         |                  |   |   |         |   |   |
| 19                                                           | Powergrid may review effective implementation of the process through period audit during the Product / Process inspection. In case of notice of discrepancy w. r. t. process / process parameter, the reason along                                                                                                                                                                       |                      |                                        |                                |                  |                         |                  |   |   |         |   |   |
| 20                                                           | No inspection call shall be raised unless and until GTP/Drawing/Design reviews Type test approval by POWERGRID Engineering                                                                                                                                                                                                                                                               |                      |                                        |                                |                  |                         |                  |   |   |         |   |   |
| 21                                                           | POWERGRID Spec is General Technical specification of POWERGRID contracts.                                                                                                                                                                                                                                                                                                                |                      |                                        |                                |                  |                         |                  |   |   |         |   |   |
| 22                                                           | BHEL shall show the approval of POWERGRID engineering for all contract specific type test, including specific type tests if any as per the POWERGRID specifications at the time of final inspection.                                                                                                                                                                                     |                      |                                        |                                |                  |                         |                  |   |   |         |   |   |
| 23                                                           | M/s BHEL Bhopal Shall ensure that all test mentioned in applicable Technical Specification of subject contract need to be carried out strictly, without fail.                                                                                                                                                                                                                            |                      |                                        |                                |                  |                         |                  |   |   |         |   |   |

Note:- CIP requirement as mentioned in QIN letter issued to various OEMs regarding Grading (A, B and C) shall supercede the CIP requirement mentioned in this MQP

| Manufacturing Quality Plan- Power Transformer (765 kV Class) |                                                                                                                                      |                                   |                                        |                                                                          |                                                    |                  |                   |   |                         |     |   |   |                                                                                                                     |
|--------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|----------------------------------------|--------------------------------------------------------------------------|----------------------------------------------------|------------------|-------------------|---|-------------------------|-----|---|---|---------------------------------------------------------------------------------------------------------------------|
| BHARAT HEAVY ELECTRICALS LIMITED - PIPLANI BHOPAL            |                                                                                                                                      |                                   |                                        |                                                                          |                                                    |                  |                   |   |                         |     |   |   |                                                                                                                     |
| Customer: Power Grid Corporation of India LTD.               |                                                                                                                                      |                                   | VENDOR CODE                            |                                                                          | 23E2D2                                             |                  | MQP No. : TXT 112 |   | Valid from : 28-10-2019 |     |   |   |                                                                                                                     |
|                                                              |                                                                                                                                      |                                   | ITEM :                                 |                                                                          | Power Transformer                                  |                  | Rev.No. : P0      |   | Valid upto : 27-10-2020 |     |   |   |                                                                                                                     |
| Section: RAW MATERIAL INSPECTION                             |                                                                                                                                      |                                   |                                        |                                                                          | 765 KV CLASS                                       |                  | Date : 28-10-2019 |   |                         |     |   |   |                                                                                                                     |
|                                                              |                                                                                                                                      |                                   |                                        |                                                                          |                                                    |                  |                   |   |                         |     |   |   |                                                                                                                     |
| S.No.                                                        | Components / Operations & Description of Test                                                                                        | Type of Check                     | Quantum of Check / Sampling with basis | Reference Document for Testing                                           | Acceptance Norms                                   | Format of Record | Applicable Codes  |   |                         |     |   |   | Remarks                                                                                                             |
|                                                              |                                                                                                                                      |                                   |                                        |                                                                          |                                                    |                  | 1                 | 2 | 3                       | 4   | 5 | 6 |                                                                                                                     |
| 1.33.5                                                       | Check for Denunciation                                                                                                               | Verification                      | 100%                                   | DO                                                                       | DO                                                 | CMTC             | B                 | K | P                       | W/Z | N |   | DO                                                                                                                  |
| 1.33.6                                                       | Check for paint shade, paint film thickness & paint adhesion test                                                                    | Visual & Measurement              | 100%                                   | DO                                                                       | DO                                                 | CMTC             | B                 | K | Q                       | W/Z | N |   | DO                                                                                                                  |
| 1.33.7                                                       | Motor routine test                                                                                                                   | Electrical                        | 100%                                   | DO                                                                       | DO                                                 | CMTC             | B                 | K | Q                       | W/Z | N |   | DO                                                                                                                  |
| 1.33.8                                                       | AP velocity measurement                                                                                                              | Electrical                        | 100%                                   | DO                                                                       | DO                                                 | CMTC             | B                 | K | Q                       | W/Z | N |   | DO                                                                                                                  |
| 1.33.9                                                       | Noise level measurement                                                                                                              | Electrical                        | 100%                                   | DO                                                                       | DO                                                 | CMTC             | B                 | K | Q                       | W/Z | N |   | DO                                                                                                                  |
| 1.33.10                                                      | Vibration measurement                                                                                                                | Electrical                        | 100%                                   | DO                                                                       | DO                                                 | CMTC             | B                 | K | Q                       | W/Z | N |   | DO                                                                                                                  |
| 1.33.11                                                      | Hydraulic pressure test                                                                                                              | Leakage Verification              | 100%                                   | DO                                                                       | No leakage                                         | CMTC             | B                 | K | Q                       | W/Z | N |   | DO                                                                                                                  |
| 1.34                                                         | ON LOAD TAPCHANGER (for Power X-meters)                                                                                              |                                   |                                        |                                                                          |                                                    |                  |                   |   |                         |     |   |   |                                                                                                                     |
| 1.34.1                                                       | Mechanical operation test of diverter switch (Endurance test)                                                                        | Electrical / Mechanical           | Each OLTC                              | BHEL Std. TR 10005 P & TR 10257 P POWERGRID Specn.                       | BHEL Std. TR 10005 P & TR 10257 P POWERGRID Specn. | CMTC             | B                 | K | Q/U                     | W/Z | Y |   | CIP on one unit of each type & size against each contract. Record review on surveillance basis for subsequent units |
| 1.34.2                                                       | Sequence Test                                                                                                                        | Electrical                        | Each OLTC                              | DO                                                                       | DO                                                 | CMTC             | B                 | K | Q/U                     | W/Z | Y |   | DO                                                                                                                  |
| 1.34.3                                                       | Pressure leak test of diverter switch component                                                                                      | Mechanical                        | Each OLTC                              | DO                                                                       | DO                                                 | CMTC             | B                 | K | Q/U                     | W/Z | Y |   | DO                                                                                                                  |
| 1.34.4                                                       | Mechanical test of tap selector with motor drive                                                                                     | Electrical / Mechanical           | Each OLTC                              | DO                                                                       | DO                                                 | CMTC             | B                 | K | Q/U                     | W/Z | Y |   | DO                                                                                                                  |
| 1.34.5                                                       | Operation test of complete OLTC including functional check of driving mechanism                                                      | Electrical                        | Each OLTC                              | DO                                                                       | DO                                                 | CMTC             | B                 | K | Q/U                     | W/Z | Y |   | DO                                                                                                                  |
| 1.34.6                                                       | HV test on auxiliary circuit                                                                                                         | Electrical                        | Each OLTC                              | BHEL Std. TR 10005 P & TR 10257 P POWERGRID Specn.                       | Withstood 2 kv (r.m.s) for 1 min@1b                | CMTC             | B                 | K | Q/U                     | W/Z | Y |   | DO                                                                                                                  |
| 1.34.7                                                       | Physical & Dimension check as per drawing including verification of fibre glass bar used in diverter switch                          | Visual Verification & measurement | Each OLTC                              | Manufacturers Drawing                                                    | Manufacturers Drawing                              | CMTC             | B                 | K | Q/U                     | W/Z | Y |   | DO                                                                                                                  |
| 1.34.8                                                       | Visual check of paint shade, paint thickness and adhesion test on motor drive panel                                                  | Visual & Verification             | Each OLTC                              | BHEL Std. TR 10005 P & TR 10257 P POWERGRID Specn.                       | BHEL Std. TR 10005 P & TR 10257 P POWERGRID Specn. | CMTC             | B                 | K | Q/U                     | W/Z | Y |   | DO                                                                                                                  |
| 1.34.9                                                       | TYPE TEST : (All type tests required as per the contract in question need to be conducted / approval from POWERGRID Engrg. obtained) |                                   |                                        |                                                                          |                                                    |                  |                   |   |                         |     |   |   |                                                                                                                     |
| 1.35                                                         | Onsite Dissolved Hydrogen Gas & Moisture Monitor (if applicable)                                                                     |                                   |                                        |                                                                          |                                                    |                  |                   |   |                         |     |   |   |                                                                                                                     |
| 1.35.1                                                       | Verification of Make & Model                                                                                                         |                                   | 100%                                   | PGCIL approved make & Model (as per COV list)                            | As per supplier's TC                               |                  |                   |   |                         |     |   |   | Record review on first unit of each contract & rest on surveillance basis                                           |
| 1.35.2                                                       | Visual & Dimension check                                                                                                             | Visual & Measurement              | 100%                                   | PGCIL Technical Specification of subject Contract / As per CM data sheet | As per manufacturers certificate                   | CMTC             | B                 | K | P                       | W/Z | N |   | DO                                                                                                                  |
| 1.35.3                                                       | Dissolved Hydrogen sensor                                                                                                            | Measurement                       | DO                                     | DO                                                                       | DO                                                 | CMTC             | B                 | K | P                       | W/Z | N |   | DO                                                                                                                  |