





USSC-CPG1

PPG-QA




| Standardised Quality Plan | |
|---------------------------|---|
| Item | Oil Filled Power Transformer upto 765KV |
| SQP No. | CPG-QA-SQP- E-053 |
| Rev | 00 |

| | | | MANUFACTURING QUALITY PLAN | | | | |  | | | | | | | |
|---|--|---|--|---|---|--|--------------------|---|------------------|--|------|---------|----|--|--|
| | | | ITEM : POWER TRANSFORMER <div></div> | | | | | | Page : 1 of 15 | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| SL NO | COMPONENT & OPERATIONS | CHARACTERSTICS | CLASS | TYPE OF CHECK | QUANTUM OF CHECK | | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | AGENCY | | REMARKS | | | |
| | | | | | M | C/N | | | | M | | N | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | | 7 | 8 | 9 | D* | 10** | | 11 | | |
| RAW MATERIAL & BOUGHT OUT ITEMS: | | | | | | | | | | | | | | | |
| 1.00 a) Correlated supplier's TC for items with unique identification no. / lot no. shall be maintained by Mfrr for NTPC verification at any time. In absence of the TC, test / check will be done by Mfrr. | | | | | | | | | | | | | | | |
| 1.01 | MS Steel Plates & Pipes | a) Thickness b) Surafce defects c) Chemical composition d) Mechanical Properties e) Hydraulic Test of Pipes | Major | Measure Visual Test -do- -do- | 1sample / thick / lot -do- -do- -do- -do- | 1sample / thick / lot - - 1 sample/ lot -do- -do- | Bidder to indicate | Bidder to indicate | TC/TR | | P | | V | In case Tank & accessories are off-loaded to sub-vendor, Raw material TC review shall be be Verification | |
| | | | | | | | | | | | P | | - | | |
| | | | | | | | | | | | V | | V | | |
| | | | | | | | | | | | V | | V | | |
| 1.02 | Austentic Stainless Steel Plates (if used) | a) Thickness b) Surface defects c) Chemical Composition d) Mechanical Properties | Major | Measure Visual Test -do- -do- | 1sample / thick / lot -do- -do- -do- -do- | - - 1 sample/ lot -do- -do- | Bidder to indicate | Bidder to indicate | TC/TR | | P | | - | In case Tank & accessories are off-loaded to sub-vendor, Raw material TC review shall be be Verification | |
| | | | | | | | | | | | P | | - | | |
| | | | | | | | | | | | V | | V | | |
| | | | | | | | | | | | V | | V | | |
| 1.03 | Radiator - Pipe Material & Cold rolled steel sheet | a) Mechanical Properties b) Chemical composition c) Pressure test | Major | Visual Test -do- -do- | 100% -do- -do- -do- | - - 1sample / lot -do- | Bidder to indicate | Bidder to indicate | TC/TR | | P | | - | | |
| | | | | | | | | | | | V | | - | | |
| | | | | | | | | | | | V | | V | | |
| | | | | | | | | | | | | | | | |
| 1.04 | CRGO Steel | a) Dimensions & finish b) Grade of CRGO c) Edge camber d) Specific core loss e) Surface resistivity f) Stacking factor g) Permeability at 800A/m h) Bend Test / Ductility i) Aging Property j) Edge Burr Level | Major | Measure Verify Test -do- -do- -do- -do- -do- -do- -do- -do- -do- | 1 sample/ lot recd. -do- -do- -do- -do- -do- -do- -do- -do- -do- -do- -do- | 1sample / lot - 1sample / lot -do- - - - - - 1 sample / lot -do- | | | TC/TR | | P | | - | | |
| | | | | | | | | | | | V | | V | | |
| | | | | | | | | | | | V | | - | | |
| | | | | | | | | | | | V | | V | | |
| | | | | | | | | | -do- | | V | | V | | |
| | | | | | | | | | -do- | | V | | - | | |
| | | | | | | | | | -do- | | V | | V | | |
| | | | | | | | | | -do- | | V | | - | | |
| | | | | | | | | | -do- | | V | | - | | |
| | | | | | | | | | -do- | | V | | V | | |
| | | | | | | | | | -do- | | P | | V | | |
| LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. | | | | | | | | | | Notes: # NTPC Inspection Engineer to check, approval date/revison no. of reference documents at the time of Inspection | | | | | |
| **M: MANUFACTURER/SUB-SUPPLIER, C: MAIN SUPPLIER, N: NTPC, P: Perform, W: Witness and V: Verification as appropriate, CHP: NTPC shall identify in column "N" as W | | | | | | | | | | | | | | | |

| | | MANUFACTURING QUALITY PLAN | | | | | |  | | | | | | |
|-------|---|--|-------|---------------|------------------|-----|--------------------|---|------------------|----|--------|---|---|---------|
| | | ITEM : | | | | | | SIGN OF MFR. | | : | | | | |
| | | POWER TRANSFORMER | | | | | | | | | | | | |
| | | | | | | | | Page : 2 of 15 | | | | | | |
| SL NO | COMPONENT & OPERATIONS | CHARACTERSTICS | CLASS | TYPE OF CHECK | QUANTUM OF CHECK | | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | | AGENCY | | | REMARKS |
| 1 | 2 | 3 | 4 | 5 | M | C/N | 7 | 8 | 9 | D* | 10** | | | 11 |
| 1.05 | Press Board Insulation & Press Board Moulding | a) Thickness b) Width / Dia & Length c) Density d) Compressive Strength e) Elongation f) Tensile strength g) Moisture content h) Shrinkage in air i) pH value j) Ash content k) Electric strength in oil l) Oil absorption m) Cohesion between plies | Major | Measure | 5pc / lot | - | Bidder to indicate | Bidder to indicate | TC/TR | | P | - | - | |
| | | | -do- | -do- | -do- | - | -do- | -do- | -do- | | P | - | - | |
| | | | -do- | Test | 1pc/lot/type | - | -do- | -do- | -do- | | V | - | - | |
| | | | -do- | -do- | -do- | - | -do- | -do- | -do- | | V | - | - | |
| | | | -do- | -do- | -do- | - | -do- | -do- | -do- | | V | - | - | |
| | | | -do- | -do- | -do- | - | -do- | -do- | -do- | | V | - | - | |
| | | | -do- | -do- | -do- | - | -do- | -do- | -do- | | V | - | - | |
| | | | -do- | -do- | -do- | - | -do- | -do- | -do- | | V | - | - | |
| | | | -do- | -do- | -do- | - | -do- | -do- | -do- | | V | - | - | |
| | | | -do- | -do- | -do- | - | -do- | -do- | -do- | | V | - | - | |
| | | | -do- | -do- | -do- | - | -do- | -do- | -do- | | V | - | - | |
| | | | -do- | -do- | -do- | - | -do- | -do- | -do- | | V | - | - | |
| 1.06 | Synthetic rubber bonded cork sheet | a) Dimension b) Hardness c) Tensile strength d) Compressibility e) Recovery f) Compression set g) Flexibility h) Ageing in Oil i) Side flow j) Density | Major | Measure | 1pc/lot/th | - | Bidder to indicate | Bidder to indicate | TC/TR | | P | - | - | |
| | | | -do- | Test | -do- | - | -do- | -do- | -do- | | V | - | - | |
| | | | -do- | -do- | -do- | - | -do- | -do- | -do- | | V | - | - | |
| | | | -do- | -do- | -do- | - | -do- | -do- | -do- | | V | - | - | |
| | | | -do- | -do- | -do- | - | -do- | -do- | -do- | | V | - | - | |
| | | | -do- | -do- | -do- | - | -do- | -do- | -do- | | V | - | - | |
| | | | -do- | -do- | -do- | - | -do- | -do- | -do- | | V | - | - | |
| | | | -do- | -do- | -do- | - | -do- | -do- | -do- | | V | - | - | |
| | | | -do- | -do- | -do- | - | -do- | -do- | -do- | | V | - | - | |
| | | | -do- | -do- | -do- | - | -do- | -do- | -do- | | V | - | - | |
| 1.07 | Viton/ Nitrile Gasket | a) Dimension b) Hardness c) Tensile strength d) Compression set e) Ageing in Oil (Type test for Nitrile Gasket) | Major | Measure | 1 pc/lot | - | Bidder to indicate | Bidder to indicate | -do- | | V | - | - | |
| | | | -do- | -do- | -do- | - | -do- | -do- | -do- | | V | - | - | |
| | | | -do- | -do- | -do- | - | -do- | -do- | -do- | | V | - | - | |
| | | | -do- | -do- | -do- | - | -do- | -do- | -do- | | V | - | - | |
| | | | -do- | -do- | -do- | - | -do- | -do- | -do- | | V | - | - | |


LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (✓) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.
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| | | MANUFACTURING QUALITY PLAN | | | | | |  | | | | | | |
|-------|--|---|-------|---------------|--------------------------------|--------------------------------|-----------------------------------|---|------------------|----|--------|---|---|---|
| | | ITEM : | | | | | | | | | | | | |
| | | POWER TRANSFORMER | | | | | | | | | | | | |
| | | | | | | | | | Page : 3 of 15 | | | | | |
| SL NO | COMPONENT & OPERATIONS | CHARACTERSTICS | CLASS | TYPE OF CHECK | QUANTUM OF CHECK | | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | D* | AGENCY | | | REMARKS |
| 1 | 2 | 3 | 4 | 5 | M | C/N | 7 | 8 | 9 | | 10** | | | 11 |
| 1.08 | Unimprgnated densified laminated wood - Bottom Support / Wooden Ring | a) Dimensions b) Surface finish c) Electrical Strength d) Oil absorption f) Moisture content g) Compression strength h) Crossbreaking strength i) Tensile strength | Major | Test | 1sample/ thick/lot | - | Bidder to indicate | Bidder to indicate | TC/TR | | P | - | - | |
| | | | -do- | Visual | -do- | - | -do- | -do- | -do- | | P | - | - | |
| | | | -do- | Test | -do- | - | -do- | -do- | -do- | | V | - | - | |
| | | | -do- | -do- | -do- | - | -do- | -do- | -do- | | V | - | - | |
| | | | -do- | -do- | -do- | - | -do- | -do- | -do- | | V | - | - | |
| | | | -do- | -do- | -do- | - | -do- | -do- | -do- | | V | - | - | |
| | | | -do- | -do- | -do- | - | -do- | -do- | -do- | | V | - | - | |
| | | | -do- | -do- | -do- | - | -do- | -do- | -do- | | V | - | - | |
| 1.09 | Kraft Insulating Paper for PICC / CTC / Thermally Upgraded paper | a) Dimensions b) Density & substance c) Tensile Strength d) Water Absorption e) Moisture Content f) pH Value g) Ash Content h) Electrical Strength i) Air Permeability j) Tear Index | Major | Measure | As per purchase spec | - | Mfr Drgs. & Bidder to indicate | Mfr Drgs. & Bidder to indicate | TC/TR | | P | - | - | |
| | | | -do- | Test | -do- | 1sample / lot | -do- | -do- | -do- | | V | | V | |
| | | | -do- | -do- | -do- | -do- | -do- | -do- | -do- | | V | | V | |
| | | | -do- | -do- | -do- | - | -do- | -do- | -do- | | V | | - | |
| | | | -do- | -do- | -do- | - | -do- | -do- | -do- | | V | | - | |
| | | | -do- | -do- | -do- | - | -do- | -do- | -do- | | V | | - | |
| | | | -do- | -do- | -do- | 1sample / lot | Bidder to indicate | Bidder to indicate | -do- | | V | | V | |
| | | | -do- | -do- | -do- | - | -do- | -do- | -do- | | V | | - | |
| | | | -do- | -do- | -do- | - | -do- | -do- | -do- | | V | | - | |
| 1.10 | Paper Insulated Copper Conductor (PICC) / Glued Insulated Copper conductor (GPICC) | a) Dimensions & tolerances (Bare & Insulated) b) Resistivity c) Elongation /Tensile Strength d) Proof Stress e) Break down Voltage f) Insulation Test b/n strands for bunched conductors | Major | Measure | Lot/sample/ size (No.of drums) | Lot/sample/ size (No.of drums) | Mfr Drawings & Bidder to indicate | Mfr Drawings & Bidder to indicate | TC/TR | | P | | V | |
| | | | -do- | -do- | 2-50 : 1 | 2-50 : 1 | -do- | -do- | -do- | | V | | V | |
| | | | -do- | -do- | 51-280 : 3 | 51-280 : 3 | -do- | -do- | -do- | | V | | V | |
| | | | -do- | -do- | -do- | -do- | -do- | -do- | -do- | | V | | V | For Non-Proof Stressed Conductors |
| | | | -do- | -do- | -do- | -do- | -do- | -do- | -do- | | V | | V | For Proof Stressed Conductors |
| | | | -do- | -do- | -do- | -do- | -do- | -do- | -do- | | V | | V | For enamelled conductor |
| | | | -do- | -do- | -do- | -do- | -do- | -do- | -do- | | V | | V | Manufacturer shall conduct insulation test of bunched conductor on 100% basis |


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| | | ITEM : | | | | | | | | | | | | |
| | | POWER TRANSFORMER | | | | | | | | | | | | |
| | | <div></div> | | | | | | | | Page : 4 of 15 | | | | |
| SL NO | COMPONENT & OPERATIONS | CHARACTERSTICS | CLASS | TYPE OF CHECK | QUANTUM OF CHECK | | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | AGENCY | | | REMARKS | |
| | | | | | M | C/N | | | | M | | N | | |
| 1 | 2 | 3 | 4 | 5 | 6 | | 7 | 8 | 9 | D* | 10** | | 11 | |
| | | h) Copper Purity of CC rod | -do- | -do- | 1sample/lot | 1sample/lot | | | -do- | | V | | V | |
| | | i) Oxygen content of CC rod | -do- | -do- | -do- | -do- | | | -do- | | V | | V | |
| 1.11 | Continuously Transposed Copper Conductor (CTC) / Glued CTC (where applicable) | a) Dimensions & tolerances (Bare & Insulated) | Major | Measure | Lot/sample/size (No.of drums) 2-50 : 1 51-280 : 3 | Lot/sample/size (No.of drums) 2-50 : 2 51-280 : 3 | Mfrr Drawings & Bidder to indicate | Mfrr Drawings & Bidder to indicate | TC/TR | | P | | V | Manufacturer shall conduct insulation test of bunched conductor on 100% basis |
| | | b) Resistivity | -do- | Test | -do- | -do- | -do- | -do- | -do- | | V | | V | |
| | | c) Elongation / Tensile Strength | -do- | -do- | -do- | -do- | -do- | -do- | -do- | | V | | V | For Non-Proof Stressed Conductors |
| | | d) Proof Stress | -do- | -do- | -do- | -do- | -do- | -do- | -do- | | V | | V | For Proof Stressed Conductors |
| | | e) Flexibility & adherence of enamel covering | -do- | -do- | -do- | -do- | -do- | -do- | -do- | | V | | V | |
| | | f) Break down Voltage | -do- | -do- | -do- | -do- | -do- | -do- | -do- | | V | | V | |
| | | g) Copper Purity | -do- | -do- | -do- | -do- | -do- | -do- | -do- | | V | | V | |
| | | h) Oxygen content | -do- | -do- | -do- | -do- | -do- | -do- | -do- | | V | | V | |
| 1.12 | Insulating Oil | a) Kinematic viscosity at 40°C & (-)30°C | Major | Test | As per IS/IEC | As per IS/IEC | NTPC Specification | NTPC Specification | Insp. Record | √ | W | | W | |
| | | b) Flash point | -do- | -do- | -do- | -do- | -do- | -do- | -do- | √ | W | | W | |
| | | c) Pour Point | -do- | -do- | -do- | -do- | -do- | -do- | -do- | √ | W | | W | |
| | | d) Appearance | -do- | -do- | -do- | -do- | -do- | -do- | -do- | √ | W | | W | |
| | | e) Density at 20° C | -do- | -do- | -do- | -do- | -do- | -do- | -do- | √ | W | | W | |
| | | f) Interfacial tension at 25°C | -do- | -do- | -do- | -do- | -do- | -do- | -do- | √ | W | | W | |
| | | g) Neutralisation value | -do- | -do- | -do- | -do- | -do- | -do- | -do- | √ | W | | W | |
| | | h) Corrosive sulphur | -do- | -do- | -do- | -do- | -do- | -do- | -do- | √ | W | | W | |
| | | i) Water content | -do- | -do- | -do- | -do- | -do- | -do- | -do- | √ | W | | W | |
| | | j) Anti oxidants additives | -do- | -do- | -do- | -do- | -do- | -do- | -do- | √ | W | | W | |
| | | k) Oxidation Stability | | | | | | | | | | | | |
| | | i) Neutralisation value | -do- | -do- | -do- | -do- | -do- | -do- | -do- | √ | W | | W | |
| | | ii) Sludge % by mass | -do- | -do- | -do- | -do- | -do- | -do- | -do- | √ | W | | W | |
| | | l) Breakdown voltage | | | | | | | | | | | | |
| | | i) As delivered, kV | -do- | -do- | -do- | -do- | -do- | -do- | -do- | √ | W | | W | |
| | | ii) After treatment | -do- | -do- | -do- | -do- | -do- | -do- | -do- | √ | W | | W | |

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| | | | MANUFACTURING QUALITY PLAN | | | | | |  | | | | | |
|---|--|---|----------------------------|-----------------------------|--------------------------|------------------------------|--|--|---|---|-----------------|-----------------|-----------------------|---|
| | | | ITEM : | | | | | | | | | | | |
| | | | POWER TRANSFORMER | | | | | | | | | | | |
| | | | <div></div> | | | | | | | | Page : 5 of 15 | | | |
| SL NO | COMPONENT & OPERATIONS | CHARACTERSTICS | CLASS | TYPE OF CHECK | QUANTUM OF CHECK | | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | AGENCY | | | REMARKS | |
| | | | | | M | C/N | | | | M | | N | | |
| 1 | 2 | 3 | 4 | 5 | 6 | | 7 | 8 | 9 | D* | 10** | | 11 | |
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| | | m) Dissipation factor at 90°C & 40 Hz to 60 Hz o) PCA content p) Impulse withstand level | -do- | -do- | -do- | -do- | -do- | -do- | -do- | √ | W | | W | |
| | | | -do- | -do- | -do- | -do- | -do- | -do- | -do- | √ | W | | W | |
| | | | -do- | -do- | -do- | -do- | -do- | -do- | -do- | √ | W | | W | |
| 1.13 | Oil Impregnated Paper (OIP) Conenser Bushing (Applicable for Bushing other than Mfir make) | a) Type, Model, Rating b) Routine tests c) Nitrogen Pressure test d) Dimensional Check e) Visual inspection | Major | Test | 100% | 100% | IEC-60137 / IS:2099 Appvd OGA Drwg. | IEC-60137 / IS:2099 Appvd OGA Drwg. | TC/TR | √ | P | | V | Creepage, lead & CT Length, total height etc |
| | | | -do- | -do- | -do- | -do- | -do- | -do- | -do- | √ | P | | V | |
| | | | -do- | -do- | -do- | -do- | -do- | -do- | -do- | √ | P | | V | |
| | | | -do- | -do- | -do- | -do- | -do- | -do- | -do- | √ | P | | V | |
| | | | -do- | Visual | -do- | -do- | -do- | -do- | -do- | √ | P | | - | |
| 1.14 | Resin Impregnated Paper (RIP) Bushing (as applicable) | a) Visual, Type, Model, Rating b) Routine tests c) Leakage (Tightness) Test d) Dimensional Check | Major | Test | 100% | 100% | IEC-60137 / IS:2099 | IEC-60137/ IS:2099 | TC/TR | √ | P | | V | |
| | | | -do- | -do- | -do- | -do- | -do- | -do- | -do- | √ | P | | V | |
| | | | -do- | -do- | -do- | -do- | -do- | -do- | -do- | √ | P | | V | |
| | | | -do- | -do- | -do- | -do- | -do- | -do- | -do- | √ | P | | V | |
| 1.15 | Marshalling Box & RTCC Panel | a) Dimensional / Visual checks for wiring b) Check for make of components c) 2 kV insulation test on wiring d) Paint shade, thickness and adhesion test e) Degree of protection class | Major | Measure | 100% | - - - - - | NTPC Appd.Drgs / IS:13947:1993 Pt. 3 | NTPC Appd.Drgs / IS:13947:1993 Pt. 3 | TC/TR | | W | | - - - - - | BIS approved makes of wire to be used. By paper insertion. |
| | | | -do- | Visual | -do- | - | -do- | -do- | -do- | | W | | - | |
| | | | -do- | Test | -do- | - | -do- | -do- | -do- | | W | | - | |
| | | | -do- | -do- | -do- | - | -do- | -do- | -do- | | W | | - | |
| | | | -do- | -do- | -do- | - | -do- | -do- | -do- | | W | | - | |
| 1.16 | Bushing C.T. | a) Dimensions b) Routine tests | Major | Measure Test | 100% -do- | 100% -do- | IS:2705-1992 & -do- | IS:2705-92 Aprvd Drg/DS -do- | TC/TR -do- | √ √ | P P | | V V | |
| 1.17 | Porcelain Bushing | a) Dimensional & brazing checks b) Visual Checks c) Routine tests | Major | Measure Test -do- | 100% -do- -do- | - - 100% | Mfir Drg. & IS:3347- P5 / IS:2099 -do- | Mfir Drg. & IS:3347- P5 / IS:2099 -do- | TC/TR -do- | √ -do- -do- | P P V | - - V | - - V | |
| 1.18 | Buchholtz Relay | a) Type, Size & Make b) Routine test | Major | Visual Test | 100% -do- | 100% -do- | IS:3637 -do- | IS:3637 -do- | TC/TR -do- | √ -do- | P P | | V V | |
| 1.19 | OTI & WTI (Local & Remote) | a) Type, Size & Make b) HV Test c) Calibration | Major | Visual Test -do- | 100% -do- -do- | 1sample / lot 10% -do- | -do- -do- | -do- -do- | TC/TR -do- -do- | √ -do- | P V V | | V V V | |
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| 1.20 | Valves - Gunmetal / CI (Gate / Globe) | a) Dimensional check b) Type, Size & Make c) Leakage Test (Hydraulic test for Body and Seat) | Major -do- -do- | Measure Visual Test | 100% -do- -do- | - - - | Bidder to indicate -do- -do- | Bidder to indicate -do- -do- | TC or TR -do- -do- | W W W | - - - | - - - | | |
| 1.21 | Valves - Butterfly | a) Dimensional check b) Type, Size & Make c) Leakage Test (Hydraulic test for Body and Seat) | Major -do- -do- | Measure Visual Test | 100% -do- -do- | - - - | Bidder to indicate -do- -do- | Bidder to indicate -do- -do- | TC or TR -do- -do- | W W W | - - - | - - - | | |
| 1.22 | Pressure Relief Valve | a) Dimensions, Type & Make b) Pressure operation test c) Leakage test at 75% rated press. d) HV Test | Major -do- -do- -do- | Measure Test -do- -do- | 100% -do- -do- -do- | - 1sample / lot - 1sample / lot | Bidder to indicate -do- -do- -do- | Bidder to indicate -do- -do- -do- | TC or TR -do- -do- -do- | P V V V | - - - V | - V - V | | |
| 1.23 | Magnetic Oil Gauge | a) Type, Size & Make b) Dial Marking c) Switch Continuity d) HV Test e) Operational test | Major -do- -do- -do- -do- | Visual -do- Test -do- -do- | 100% -do- -do- -do- -do- | - - - - - | Bidder to indicate -do- -do- -do- -do- | Bidder to indicate -do- -do- -do- -do- | TC or TR -do- -do- -do- -do- | P V V V V | - - - - - | - - - - - | | |
| 1.24 | Air Cell for Conservator | a) Dimensional check b) Surface Finish c) Acceptance Test | Major -do- -do- | Measure Visual Test | 100% -do- -do- | - - 100% | Bidder to indicate -do- -do- | Bidder to indicate -do- -do- | TC or TR -do- -do- | √ - V | P P V | - - V | - - V | |
| 1.25 | Gas Collecting Device | a) Dimensions b) Pressure Test | Minor -do- | Measure Test | 100% -do- | - - | Mfr/Supplier Drgs -do- | Mfr/Supplier Drgs -do- | TC or TR -do- | V V | - - | - - | | |
| 1.26 | Oil Pump & Motor Set | a) Type, Model, Rating b) Performance Test (Input, Output Discharge, No Load test, Locked Rotor test) c) HV Test d) Leakage Test | Major -do- -do- -do- | Verify Test -do- -do- | 100% -do- -do- -do- | 100% -do- -do- -do- | Mfrdrwg / data sh. Bidder to indicate -do- -do- | Mfrdrwg / data sh. Bidder to indicate -do- -do- | TC or TR -do- -do- | √ - V V | V V V V | - - - V | V V V V | |
| 1.27 | Cooling Fan & Motor Assembly | a) Type, Model, Rating b) Insulation Resitance c) HV Test d) Power consumption & RPM | Major -do- -do- -do- | Verify Test -do- -do- | 100% -do- -do- -do- | - - - - | Mfrdrwg / data sh. -do- -do- -do- | Mfrdrwg / data sh. -do- -do- -do- | TC or TR -do- -do- -do- | √ - V V | V V V V | - - - - | - - - - | |
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| 1.28 | Oil Flow Indicator | a) Type, Model, Rating b) Dimensional Check c) Functional Test | Major -do- -do- | Verify Measure Test | 100% -do- -do- | - - - | Bidder to indicate -do- -do- | Bidder to indicate -do- -do- | TC or TR -do- -do- | | V V V | - - - | | | |
| 1.29 | SRBP Cylinder (if applicable) | a) Visual Inspection for any Void & damage b) Dimension | Major -do- | Visual Measure | 100% -do- | 100% -do- | Mfrr Drgs/ Specs -do- | Mfrr Drgs/ Specs -do- | TC or TR -do- | | P P | | W V | | |
| 1.30 | On Load Tap Changer / Off Circuit Tap Changer (For Mfrr make only. For other make, TC Review will be done) | a) Mechanical test of divertor switch Insert, 4000 switching operation (Min) | Major | Test | 100% | 100% | IEC-60214 & Mfrr Drawings | IEC-60214 & Mfrr Drawings | TR | √ | P | | V | | |
| | | b) Mili volt drop / contact resitance measurement before & after Mechanical test (4000 switching oprn) | -do- | -do- | -do- | - | -do- | -do- | -do- | √ | P | | - | For reference only | |
| | | c) Sequence test | -do- | -do- | -do- | 100% | | IEC-60214 & Mfrr Drawings | IEC-60214 & Mfrr Drawings | -do- | √ | P | | V | NA for off ckt.tap switch |
| | | d) Pressure test of divertor switch compartment with oil | -do- | -do- | -do- | -do- | -do- | -do- | Withstand | -do- | √ | P | | W | NA for off ckt.tap switch |
| | | e) Mechanical test of tap selector with motor drive 500 staisfactory operations (in all) from one extreme position to the other in air | -do- | -do- | -do- | -do- | -do- | -do- | IEC-60214 & Mfrr Drawings | -do- | √ | P | | W | |
| | | f) Operation test of complete (functional check) tapchanger - satisfactory operation for one complete cycle | -do- | -do- | -do- | -do- | -do- | IEC-60214 & Mfrr Drawings | IEC-60214 & Mfrr Drawings | -do- | √ | P | | W | For outsourced OLTC, Mfrr will Perform this test & NTPC will verify the same. |
| | | g) Auxiliary circuits HV Test at 2KV for 1 min. | -do- | -do- | -do- | -do- | -do- | IEC-60214 & Mfrr Drawings | IEC-60214 & Mfrr Drawings | -do- | √ | P | | V | NA for off ckt.tap switch |
| | | h) Condition of Silver plating on contacts on the jop after 4000 switching operation | -do- | -do- | -do- | -do- | -do- | Mfrr Drawing | Good condition | - | | P | | W | |
| | | i) Adhesion & thickness check on silver plated contact | -do- | -do- | On sample basis | On sample basis | -do- | Mfrr Drawings | | TC or TR | | P | | V | |
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| 1.31 | Terminal Connector | a) Dimensional check b) Surface Finish c) Acceptance tests | Major -do- -do- | Measure Visual Test | As per IS -do- -do- | - - | IS 5561:1970 & NTPC aprvd Drgs -do- -do- | IS 5561:1970 & NTPC aprvd Drgs -do- -do- | TC or TR -do- -do- | | P V V | - - - | - - - | | |
| 1.32 | Pressure Gauge | a) Dimensions b) Accuracy check (calibration) | Major -do- | Measure Test | 100% -do- | - - | Bidder to indicate -do- | Bidder to indicate -do- | TC -do- | | P V | - - | - - | | |
| 1.33 | Roller Assembly | a) Dimensions b) Mechanical properties c) Chemical Properties | Major -do- -do- | Measure Test Test | 1 Sample/lot of raw material -do- -do- | - - - | Mfrr Drawings & -do- -do- | Mfrr Drawings & -do- -do- | TC/TR -do- -do- | | P V V | - - - | - - - | | |
| 1.34 | Power / Control Cables | a) Review of Supplier's TC for physical & electrical tests as per specn. / drg | Major | Visual | Sample | 1 sample/Lot | Bidder to indicate IS 1554 : 1988 | Bidder to indicate IS 1554 : 1988 | TC | | V | | V | | |
| 1.35 | Silicagel Breather | a) Visual check, dimensions b) Pressure Test | Major -do- | Measure Test | 100% -do- | - - | -do- | -do- | TC -do- | | P V | | - - | | |
| 2.00 | IN PROCESS CHECKS: | | | | | | | | | | | | | | |
| 2.01 | Fabrication of Tank, Cover, Conservator, End Frame - Welding requirement & Painting | a) WPS approval b) PQR & welder qualification c) Welding electrode type d) Check for fit up for butt welds on tank walls, base & cover e) DP test on all load bearing welds as per drawing f) Visual check on weldment for undercuts, contour & uniformity g) Dimensional check after final welding including foundation dimn. h) Rim flatness, fitment & matching of fabricated parts | Major -do- -do- -do- -do- Critical Major Major | Verify -do- -do- Visual Test Visual Measure -do- | Once 100% -do- -do- -do- -do- -do- -do- | Once 100% - - -do- -do- -do- Ist tank of each design per mfr -do- | Mfrr WPS as per ASME Sec IX -do- -do- Mfrr Drawings Mfrr Drawings / Mfrr Drawings / Mfrr Drawings Mfrr Drawings | Mfrr WPS as per ASME Sec IX -do- -do- Mfrr Drawings Mfrr Drawings / Mfrr Drawings Mfrr Drawings | TC/IR TC/IR -do- TC/IR -do- -do- -do- | | W W V V W W W W | | V V - - W W W W | 1) Mfrr approved WPS, PQR & Welders' qualification shall be reviewed by NTPC. ii) In case of welded construction, all weld joints should ground flush from inside. iii) In case of doubt, particular weld shall be checked visually from inside | |
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| | | i) Pressure & Vacuum test (Type Tests) j) Air Leakage test for: i) Transformer Tank with turret ii) Conservator & Pipes k) Mounting , matching & orientation of Fabricated component l) Surface cleaning by shot blasting m) Paint film thickness inside & outside, paint shed n) Paint film adhesion test o) Visual checks for any foreign material in the entire tank with conservator, pipes, etc and blanking of ends with bolted plates. | -do- -do- -do- Critical Major -do- -do- | Measure -do- Measure Visual Test -do- Visual | 100% -do- 100% 100% 100% - 100% | 100% -do- Ist tank of each design - - - 100% | Mfrr Drawings -do- & Mfrr Drgs -do- -do- -do- - | Mfrr Drawings -do- & Mfrr Drgs -do- -do- -do- - | -do- -do- -do- -do- -do- -do- | W W W W W P | W W W - - W | NTPC RIO to verify type test clearance from NTPC Site, if envisaged in PO specifications. < | |

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| 2.04 | Test on core | a) Isolation test test b/n: i) Core to yoke bolts ii) Core to core clamps iii) Core clamps to yoke bolt iv) Core to tank, if applicable b) Visual inspection of fabricated components & core assembly c) Core Verticality d) Visual Inspection of built core e) Preliminary core loss test | Major | Test | 100% | 100% | Mfrr Drg/Plant Std/ NTPC Spec. | Mfrr Drg/Plant Std/ NTPC Spec. | TR | | P | | V | |
| | | | -do- | -do- | -do- | -do- | -do- | -do- | -do- | | P | | V | |
| | | | -do- | -do- | -do- | -do- | -do- | -do- | -do- | | P | | V | |
| | | | -do- | -do- | -do- | -do- | -do- | -do- | -do- | | P | | V | |
| | | | Major | Test | 100% | Surveillance | Mfrr Drg/Plant Std/ NTPC Spec. | Mfrr Drg/Plant Std/ NTPC Spec. | TR | | P | | W* | |
| | | | -do- | -do- | -do- | -do- | -do- | -do- | -do- | | P | | W* | |
| | | | -do- | Visual | -do- | -do- | -do- | -do- | -do- | | P | | W* | |
| | | | -do- | -do- | 1core/design | 1core/design | -do- | -do- | -do- | | P | | V | For core having top yoke |
| 2.05 | Winding of Coil | a) Brazing procedure & Brazer qualification b) Brazed joints- visual check b) PICC width & thickness c) Coil ID / OD, radial depth, no. of turns/discs, disc anchoring, spacer block alignment, cross-over & interleaving d) Leads & coil identification/mark e) Coil clamping for shrinking & shrunk coil height f) Megger test between strands of bunched conductors g) Continuity test b/n conductors | Major | Verify | 100% | 100% | ASME Sec IX | ASME Sec IX | TR | | P | | V | NTPC to review record of Mfrr approved BPS, BQR & Brazer's qualification. Mfrr to maintain proper record of brazer deployed for each transformer. |
| | | | -do- | Visual | 100% | - | ASME Sec IX | ASME Sec IX | TR | | P | | - | |
| | | | -do- | Measure | -do- | - | Mfrr drawing | Mfrr drawing | -do- | | P | | - | |
| | | | -do- | -do- | -do- | - | -do- | -do- | -do- | | P | | - | |
| | | | -do- | -do- | -do- | - | -do- | -do- | -do- | | P | | - | |
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| | | | -do- | -do- | -do- | - | -do- | -do- | -do- | | P | | - | |
| | | | -do- | Test | - | - | Mfrr Elect. Spec. & Drg. | Mfrr Elect. Spec. & Drg. | TR | | P | | - | |
| | | | -do- | -do- | -do- | - | -do- | -do- | -do- | | P | | - | |
| 2.06 | Core coil assembly | a) Placement of core assembly on bottom tank b) Insulation & coil assembly & relacing of top yoke c) Proper scarfing of insulation during tapping of terminal gear joints, Position of leads | Major | Physical | 100% | 100% | Mfrr QC checklist / Mfrr Drawing | Mfrr QC checklist Mfrr Drawing | QC-CL | | P | | V | |
| | | | -do- | Measure | -do- | - | -do- | -do- | -do- | | P | - | - | |
| | | | -do- | Physical | -do- | - | -do- | -do- | -do- | | P | - | - | |
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| | | d) Electrical clearance & inspection of core & coil assembly after completion of terminal gear connections. e) Check coil clamping torque f) Check provision of core & core frame earthing g) Alignment of spacers/blocks h) Flash / Isolation test between i) Core to yoke bolts ii) Core to core clamps iii) Core to Tank | -do- -do- -do- -do- -do- -do- -do- | Measure Test Physical -do- -do- -do- -do- | -do- -do- -do- -do- -do- -do- -do- | 100% - 100% - 100% -do- -do- | -do- Mfrr Drawing Mfrr Drg/NTPC specs Mfrr Drawing Mfrr Drg/NTPC specs -do- -do- | -do- Mfrr Drawing Mfrr Drg/NTPC specs Mfrr Drawing Mfrr Drg/NTPC specs -do- -do- -do- | -do- -do- TR -do- -do- -do- -do- | | P P P P P P P | - V - V V V V | | |
| 2.07 | OLTC / OCTC Fixing & connection | a) Measurement of tan delta of OLTC b) Provision insulation over tap changer mounting frame b) Lead disposition c) Brazing / crimping of joints d) Insulation over joints e) Vector group f) Ratio test, resistance, magnetic balance & magnetising current on all taps | Major Major -do- -do- -do- -do- -do- | Physical Physical -do- -do- -do- Test -do- | 100% 100% -do- -do- -do- -do- -do- | 100% - - - - - - - | NTPC Specs Mfrr Drawings -do- Mfrr Drawings -do- -do- | NTPC Specs Mfrr Drawings -do- Mfrr Drawings -do- -do- -do- | TR -do- -do- -do- -do- -do- -do- | | P P P P P P P | - - - - - - - | V - - - - - - - | For 132 kV Class transformers & above |
| 2.08 | Tanking | a) Cleanliness of tank b) Electrical Clearances c) Tanking | Major -do- -do- | Visual Measure Physical | 100% -do- -do- | - - - | Mfrr Drg / QC-CL -do- -do- | Mfrr Drg / QC-CL -do- -do- | QC-CL -do- -do- | √ - | P P P | - - - | - - - | |
| 2.09 | Treatment Process | a) Vacuum Drying- 1st Process b) Servicing (visual inspection of active part, tightening of all joints, clamping, bracing, etc) c) Vacuum Drying- 2nd Process | Major -do- -do- | Physical -do- -do- | 100% -do- -do- | 100% Surveillance Check -do- | Mfrr Drg. Mfrr Drg. | Mfrr Drg. Mfrr Drg. | TR -do- -do- | | P P P | - V | V W* V | - Record to be maintained for exposure time during services. Cleaning of Tap Changer Contacts is to be done |
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| | | POWER TRANSFORMER | | | | | | | | | | | |
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| SL NO | COMPONENT & OPERATIONS | CHARACTERSTICS | CLASS | TYPE OF CHECK | QUANTUM OF CHECK | | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | AGENCY | | | REMARKS |
| | | | | | M | C/N | | | | M | | N | |
| 1 | 2 | 3 | 4 | 5 | 6 | | 7 | 8 | 9 | D* | 10** | | 11 |
| 3.00 | TYPE TESTS, SPECIAL TESTS & STAGE INSPECTIONS: | | | | | | | | | | | | |
| 3.01 | Type & Speical Tests | a) Review of Test Reports | | | | | | | | | | | NTPC RIO to verify type test clearance from NTPC site for complete transformer if envisaged in PO specification . |
| 3.02 | Stage Inspections | a) Review of all previous stage of inspection prior to final testing. | Major | Verify | 100% | 100% | Reports | Reports / NTPC Spec. | TC / TR | | V | | |
| ROUTINE TESTS: | | | | | | | | | | | | | |
| 4.00 | a) Each transformer shall be fully assembled with all fittings and accessories (as per GA drawing) meant for the particular transformer for testing. b) Routine test to be read in conjunction with test schedule approved by NTPC site. | | | | | | | | | | | | |
| 4.01 | Transformer | a) Partical Counting for Oil | Major | Test | 100% | 100% | | | TC / TR | | P | | V |
| | | b) Electric strength (BDV), water content, resistivity & tan delta & interfacial tension for insulating oil | Major | Test | 1 Sample / transformer | 1 Sample / transformer | IS 1866 | IS 1866 | -do- | | P | | V |
| | | c) Bushing CT Ratio | Major | Verify | 100% | 100% | NTPC Spec/Test Report | NTPC Spec/Test Report | -do- | √ | P | | V |
| | | d) Measurement of winding resistance of LV & HV at all taps | Critical | Measure | -do- | -do- | IS 2026/IEC-60076/ NTPC Spec & DS | IS 2026/IEC-60076/ NTPC Spec & DS | -do- | √ | P | | W |
| | | e) Measurement of voltage ratio at all taps, polarity & vector group verification. | -do- | -do- | -do- | -do- | -do- | -do- | -do- | √ | P | | W |
| | | f) Measurement of no load losses & meagnesting current at 90%, 100% & 110% of rated voltage | -do- | -do- | -do- | -do- | -do- | -do- | -do- | √ | P | | W |
| | | g) Magnetic balance test with low voltage single phase supply of LV side for 3 phase transformer before & after final inspection | -do- | -do- | -do- | -do- | -do- | -do- | -do- | √ | P | | W |
| LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. | | | | | | | | | Notes: # NTPC Inspection Engineer to check, approval date/revison no. of reference documents at the time of Inspection | | | | |
| **M: MANUFACTURER/SUB-SUPPLIER, C: MAIN SUPPLIER, N: NTPC, P: Perform, W: Witness and V: Verification as appropriate, CHP: NTPC shall identify in column "N" as W | | | | | | | | | | | | | |


| | | MANUFACTURING QUALITY PLAN | | | | | |  | | | | | | |
|-------|------------------------|--|----------|---------------|------------------|------|-----------------------------------|---|------------------|----|--------|---|---------|---|
| | | ITEM : | | | | | | | | | | | | |
| | | POWER TRANSFORMER | | | | | | | | | | | | |
| | | | | | | | | Page : 13 of 15 | | | | | | |
| SL NO | COMPONENT & OPERATIONS | CHARACTERSTICS | CLASS | TYPE OF CHECK | QUANTUM OF CHECK | | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | | AGENCY | | REMARKS | |
| | | | | | M | C/N | | | | | M | N | | |
| 1 | 2 | 3 | 4 | 5 | 6 | | 7 | 8 | 9 | D* | 10** | | 11 | |
| | | h) Measurement of impedance voltage / short circuit impedance at principal & two extremes taps | Critical | Measure | 100% | 100% | IS 2026/IEC-60076/ NTPC Spec & DS | IS 2026/IEC-60076/ NTPC Spec & DS | -do- | √ | P | | W | |
| | | i) Measurement of load loss | -do- | -do- | -do- | -do- | -do- | -do- | -do- | √ | P | | W | |
| | | j) Measurement of insulation resistance | -do- | -do- | -do- | -do- | -do- | -do- | -do- | √ | P | | W | |
| | | k) DGA of insulating oil before & after Temperature rise test | -do- | -do- | -do- | -do- | -do- | -do- | -do- | √ | P | | V | Sampling of oil to be done in presence of NTPC. |
| | | l) Temperature rise test at 110% of rated current including Infrared thermography. | -do- | -do- | -do- | -do- | -do- | -do- | -do- | √ | P | | W | For Generator Transformers |
| | | m) Oil leakage test | -do- | -do- | -do- | -do- | -do- | No leakage | -do- | √ | P | | W | |
| | | n) DGA of insulating oil before & after Dielectric Tests | -do- | -do- | -do- | -do- | -do- | IS 2026/IEC-60076/ NTPC Spec & DS | -do- | √ | P | | V | Sampling of oil to be done in presence of NTPC. |
| | | o) Lightning impulse (Full & Chopped wave) test | -do- | -do- | -do- | -do- | -do- | -do- | -do- | √ | P | | W | |
| | | p) Switching Impulse test | -do- | -do- | -do- | -do- | -do- | -do- | -do- | √ | P | | W | |
| | | q) Induced voltage test with partial discharge measurement (IVPD) | -do- | -do- | -do- | -do- | -do- | -do- | -do- | √ | P | | W | |
| | | r) Applied Voltage Test (AV) | -do- | -do- | -do- | -do- | -do- | -do- | -do- | √ | P | | W | |
| | | s) Repeat iron loss measurement and no-load current | -do- | -do- | -do- | -do- | -do- | -do- | -do- | √ | P | | W | |
| | | t) Measurement of insulation power factor & capacitance between winding & earth | -do- | -do- | -do- | -do- | -do- | -do- | -do- | √ | P | | W | |
| | | u) Tests on OLTC / OCTC | -do- | -do- | -do- | -do- | -do- | -do- | -do- | √ | P | | W | |
| | | v) Frequency Response Analysis | -do- | -do- | -do- | -do- | -do- | -do- | -do- | √ | P | | W | |
| | | w) Jacking test & DP check of jacking pad welds | -do- | -do- | -do- | -do- | -do- | -do- | -do- | √ | P | | W | |

LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.

****M:** MANUFACTURER/SUB-SUPPLIER, **C:** MAIN SUPPLIER, **N:** NTPC, **P:** Perform, **W:** Witness and **V:** Verification as appropriate, **CHP:** NTPC shall identify in column "N" as W

Notes: # NTPC Inspection Engineer to check, approval date/revison no. of reference documents at the time of Inspection

| | | | MANUFACTURING QUALITY PLAN | | | | |  | | | | | | |
|---|-----------------------------------|--|--|--|--|--|--|--|--|------------------------|------------------------------|--------------------------|---------------|---|
| | | | ITEM : | | | | | | | | | | | |
| | | | POWER TRANSFORMER | | | | | | Page : 14 of 15 | | | | | |
| SL NO | COMPONENT & OPERATIONS | CHARACTERSTICS | CLASS | TYPE OF CHECK | QUANTUM OF CHECK | | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | AGENCY | | | REMARKS | |
| | | | | | M | C/N | | | | M | | N | | |
| 1 | 2 | 3 | 4 | 5 | 6 | | 7 | 8 | 9 | D* | 10** | | 11 | |
| | | x) Isolation test / measurement of insulationat resistance between at 10 kV: i) Core to core clamp ii) Core to tank iii) Core clamp to tank y) Verification of core earthing z) Check orientation of component | Critical | Measure | 100% | 100% | IS 2026/IEC-60076 NTPC Spec / DS | IS 2026/IEC-60076 NTPC Spec / DS | | √ | P | | W | If earthing is done outside the tank |
| | | | -do- | -do- | -do- | -do- | -do- | -do- | -do- | √ | P | | W | |
| | | | -do- | -do- | -do- | -do- | -do- | -do- | -do- | √ | P | | W | |
| | | | -do- | -do- | -do- | -do- | -do- | -do- | -do- | √ | P | | W | |
| | | | -do- | -do- | -do- | -do- | -do- | -do- | -do- | √ | P | | V | |
| | | | -do- | -do- | -do- | -do- | NTPC aprd GA | approved GA | -do- | √ | P | | W | |
| 4.02 | Marshalling Box | a) 2 kV Test for Aux. wiring b) Degree of protection class check by thin paper insertion method c) Adhesion Test d) Paint, shade, thickness e) Functional / Continuity checking of WTI, OTI, Buscholtz relay, etc | Critical -do- -do- -do- -do- | Test Test Test -do- -do- | 100% 100% Spot check on random basis 100% | 100% 100% Spot check on random basis 100% | Mfrr Std. NTPC Specification -do- -do- | NTPC approved Drg NTPC Specification -do- -do- | TR -do- -do- -do- | √ P | P P P P | W W W W | | |
| 4.03 | Composite Monitoring System (CMS) | a) Make & BOM of CMS b) All functional tests including logic checks | Critical -do- | Test -do- | 100% -do- | 100% -do- | NTPC approved Drg/DS -do- | NTPC approved Drg/DS -do- | TR -do- | √ √ | P P | | W W | |
| 5.00 | PRE-SHIPMENT CHECKS: | | | | | | | | | | | | | |
| 5.01 | Transformer | a) Internal inspection of transformer b) Dew point measurement of N2 / Dry Air at the time of filling & after 24 hours in transformer tank c) Nitrogen gas / Dry Air tightness pressure reading, availability of pressure gauge & 2 nos of gas/air cylinders | Major Critical -do- | Verify Measure Physical | 100% -do- -do- | Surveillance Check -do- -do- | Mfrr QC-Check List NTPC Specification Pressure to be maintained at 0.17±0.02 kg/cm2 for 24 hrs or at 0.35±0.02 Kg/sq cm for 12 Hrs | Mfrr QC-Check List NTPC Specification Pressure to be maintained at 0.17±0.02 kg/cm2 for 24 hrs or at 0.35±0.02 Kg/sq cm for 12 Hrs | QC-CL TR | P | P P | | W* W* V | At the time of filling, dew point should be better than -50°C. After 24 hrs dew point should be better than (-)30°C |
| LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. | | | | | | | | | Notes: # NTPC Inspection Engineer to check, approval date/revison no. of reference documents at the time of Inspection | | | | | |
| **M: MANUFACTURER/SUB-SUPPLIER, C: MAIN SUPPLIER, N: NTPC, P: Perform, W: Witness and V: Verification as appropriate, CHP: NTPC shall identify in column "N" as W | | | | | | | | | | | | | | |

| | | MANUFACTURING QUALITY PLAN | | | | | |  | | | |
|-------|------------------------|---|-------------------|----------------------|------------------|------------------|---------------------------------------|---|------------------|-----------|--------------------|
| | | ITEM : | | | | | | | | | |
| | | POWER TRANSFORMER | | | | | | | | | |
| | | | | | | | | Page : 15 of 15 | | | |
| SL NO | COMPONENT & OPERATIONS | CHARACTERSTICS | CLASS | TYPE OF CHECK | QUANTUM OF CHECK | | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | AGENCY | REMARKS |
| | | | | | M | C/N | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | | 7 | 8 | 9 | D* | 10** |
| | | d) Installation of impact recorder & functional check on the same in X, Y & Z direction e) Check for proper loading of transformer on road trailer / railway wagon -proper bracing & anchoring | Major -do- | Verify -do- | 100% -do- | 100% - | Mfrr Drawings/ NTPC spec. - | Mfrr Drawings/ NTPC spec. - | TR QC-CL | P | V - |
| 5.02 | Accessories & fittings | a) Proper packing of accessories & fittings b) Cleaning of pipes & blanking of pipe ends with bolted plates | Major -do- | Physical -do- | 100% -do- | 100% -do- | Drawings / Packing List -do- | Drawings / Packing List -do- | TR -do- | P | V V |

Abbreviation :

W : Witness- Not to proceed without NTPC clearance

TR : Test record/test report issued by Mfrr

TC : Test certificate / Inspection report / Observation report issued by Mfrr Supplier / Vendor

W* (Surveillance Check): Specific call will be given before four hours from start of the activity. In case of non-availability of NTPC-RIO Executive, Mfrr will complete the activity within stipulated time and will proceed to next stage.

RIO : Regional Inspection Office of NTPC

QC-CL : Mfrr Quality Control Check List DS : NTPC approved data sheet, Drg : Drawing,

V:verification, P:Perform

Notes:

- In case of difference between Mfrr Specification / drg & NTPC contract specification / drawing, the later shall be binding considering comments / deviation mutually agreed between Mfrr & NTPC .
- TC correlation for stocked items (having no serial no for identification) will not be possible. For items having unique serial numbers, correlation with TC shall be made.
- Revisions of QP-referred purchase specification & plant standards will be submitted to NTPC for review and reference in case revision takes place during contract execution. In addition to Specs / Standard mentioned in MQP; the Specs / stds. as mentioned in contract drgs. of Mfrr shall be applicable. Similarly, Revision number of documents / standards will be as per Mfrr Design recommendation / drawing / technical specification.
- Relevant records should be available with concerned agency (as mentioned in agency column). NTPC may verify them at their discretion at any time.
- Spare fitting, accessories, components & instruments ordered by NTPC but not covered in this QP shall be accepted as under :-
 - Items of control cabinet e.g. contactor, overload relay, indicating lamp, push button, rotary switches, etc. shall be VDE / CE / UL / CSA Marking Certification preferably from Third Party Agency or BIS Approval Letter shall be submitted for NTPC's Verification /Information. Despatch clearance will be given based on visual inspection report including type designation and a certificate of conformance issued by Mfrr-QC. Other items shall be cleared for despatch on the basis of COC.
 - CHP clearance will be given after verification of supplier's test certificate or QC (TCB) inspection report for miscellaneous items procured as per Mfrr's Spec / drg / called in purchase order.
- All pipes / flange openings shall be blanked by bolted plates on flanges to prevent ingress of foreign material.
- Serial no. of testing instrument used, its range and calibration status shall form part of final test reports.
- All TCs/ Records must be reviewed by Mfrr prior to submitting it for NTPC Verification. In case of non availability of original TC with Mfrr, the Mfrr authenticated xerox copy of the same shall be put up for NTPC review.

LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (✓) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.

**M: MANUFACTURER/SUB-SUPPLIER, C: MAIN SUPPLIER, N: NTPC, P: Perform, W: Witness and V: Verification as appropriate, CHP: NTPC shall identify in column "N" as W

Notes: # NTPC Inspection Engineer to check, approval date/revison no. of reference documents at the time of Inspection

Acceptance & reference norms (if not indicated in the QP) shall be derived from following in the same sequence- 1) NTPC approved drawing /NTPC approved data sheet, 2) PO specifications, 3) drawing / data sheet pertaining to originally supplied equipment (if OEM/OES), 4) applicable national standard , 5) applicable international standard, 6) manufacturer's internal standard, 7) Good Engineering Practices

Indicative list of vendors for major raw material and Bols is annexed, bidder furnished sources for major items like tank,core steel laminations,copper, insulation matl,bushings,bucholz,radiator, marshalling box, WTI,OTI, fans, coolers etc

INDICATIVE LIST OF SUB-VENDOR FOR RAW MATERIAL AND BOUGHT OUT ITEMS

| | | | | | | | | | |
|---|------------------|---|--|--|---------------------------------|-----------------|--|--|-------------------|
| 1 | MS STEEL | * | | | Essar Steel | Hazira | | | |
| | | | | | IISCO | Asansole | | | |
| | | | | | Ispat Industries Ltd | Dolvi | | | |
| | | | | | Jindal Iron & Steel Co Ltd | Mumbai | | | |
| | | | | | Jindal Steel & Power Ltd | Raigad | | | |
| | | | | | Lloyd Steel Industries Ltd | Maharashtra | | | |
| | | | | | RINL | Vishakhapatnam | | | |
| | | | | | SAIL | India | | | |
| 2 | PIPES | * | | | TISCO | Jamshedpur | | | |
| | | | | | SAIL | India | | | |
| 3 | TANK FABRICATION | * | | | JINDAL | India | | | |
| | | | | | BHEL | Bhopal / Jhansi | | | |
| | | | | | Electro Auto | Bhopal | | | |
| | | | | | Electromechanical | Bhopal | | | |
| | | | | | Mech & Fab Industries | Bhopal | | | |
| | | | | | Mechmen Industries | Bhopal | | | |
| | | | | | Satyam Industries | Bhopal | | | |
| | | | | | Sigma Heavy Engg | Bhopal | | | |
| 4 | CRGO STEEL | * | | | AK Steel | USA | | | |
| | | | | | British Steel | UK | | | |
| | | | | | JFE Steel (Kawasaki) | Japan | | | |
| | | | | | Nippon Steel | Japan | | | |
| | | | | | Posco | Korea | | | |
| | | | | | TKES | Germany | | | |
| 5 | CRGO PROCESSORS | * | | | VizStal | Russia | | | |
| | | | | | BHEL | Bhopal / Jhansi | | | For M4 grade only |
| | | | | | KRYFS | Silvassa | | | |
| | | | | | Mahendra Steel Services Center | Kanhe (Pune) | | | |
| | | | | | National Laminations Industries | Daman | | | |
| | | | | | Precision Transcore | Daman | | | |
| | | | | | Surya Laminations | Vadodra | | | |
| | | | | | Vardhman Stamping | Kalol | | | |
| 6 | HARDWARE | * | | | BHEL approved sources | * | | | |
| 7 | COPPER WIRE ROD | * | | | Birla Copper | Bharuch | | | |
| | | | | | Hindalco Industries | Dahej | | | |
| | | | | | Hindustan Copper Ltd | Raidag | | | |
| | | | | | Kembel Wire & Rod | Australia | | | |
| | | | | | Norddeutsche Affinerie | Germany | | | |

| | | | | | | | | | | |
|----|-----------------------------------|---|--|--|--------------------------------------|---------------------------|--|--|----------------------------|--|
| | | | | | Sterlite Industries | Bharuch/Silvassa | | | | |
| 8 | CONTINUOUSLY TRANSPOSED CONDUCTOR | * | | | Asta Elektrodraht Gmbh | Austria | | | | |
| | | | | | Asta India | Vadodara | | | | |
| | | | | | Chandra Proteco | Silvassa | | | | |
| | | | | | Invex SPA | Italy | | | | |
| | | | | | KSH International | Chakan, Pune | | | | |
| | | | | | Lacroix | Germany | | | | |
| | | | | | Precision Wires | Silvassa | | | | |
| | | | | | Sam Dong | Korea | | | | |
| | | | | | Smit Draad | Netherland | | | | |
| 9 | PAPER INSULATED COPPER CONDUCTOR | * | | | # BCPL Conductors Pvt Ltd | Raisen | | | | |
| | | | | | Bhandari Poweerlines Pvt. Ltd | Manipal/Baroda | | | | |
| | | | | | Precision Wires | Silvassa | | | | |
| | | | | | Rima Transformer & Conductors | Bangalore | | | | |
| | | | | | Shakti Insulated Wire | Ankleshwar | | | | |
| | | | | | Shree Cables | Bhopal | | | | |
| | | | | | Vidya wires India Pvt. Ltd. | Vidyanagar | | | | |
| | | | | | KSH International | Chakan Pune/Taloja | | | Up to 132 kV Class Trf | |
| 10 | INSULATING PAPER for PCCC | * | | | Munksjo Smurtif | Sweden | | | | |
| | | | | | Weidmann | Switzerland | | | | |
| | | | | | Amtfors | Sweden | | | | |
| 11 | CONDENSER BUSHING | | | | ABB | Sweden | | | | |
| | | | | | Passoni villa (Alstom) | Italy | | | | |
| | | | | | Alstom T&D | Hosur | | | | |
| | | | | | Crompton Greaves Ltd | Nasik | | | | |
| | | | | | Hafely | France/Switzerland | | | | |
| 12 | EPOXY BUSHING | * | | | Baroda Bushings | Baroda | | | | |
| 13 | BUSHING METAL PARTS | * | | | BHEL approved sourecs | | | | | |
| 14 | PORCELAIN BUSHING INSULATOR | * | | | BHEL | Bangalore | | | | |
| | | | | | CJI | Khurja | | | | |
| | | | | | IEC | Bhopal | | | | |
| | | | | | Luster Ceramics | Vadodra | | | | |
| | | | | | Sarvana Insulator | Cuddalore | | | | |
| | | | | | Modern Insulator | Abu road | | | | |
| | | | | | WSI | Chennai | | | | |
| 15 | BUSHING CT | * | | | BHEL | Bhpal / Jhansi | | | | |
| | | | | | Enpay | Vadodara | | | | |
| | | | | | Pragati Electricals | Mumbai | | | | |
| | | | | | Prayog Electricals | Pune | | | | |
| 16 | INSULATING OIL | * | | | Apar Industries | Rabale/Trombay / Silvassa | | | | |
| | | | | | Raj Petro Specialities | Chennai/Silvassa | | | | |
| | | | | | Savita Oil Technologies | Mumbai/Silvassa | | | | |
| 17 | MOULDED INSULATION COMPONENTS | * | | | Enpay | Vadodara/Turkey | | | | |
| | | | | | Govik Electricals | Mumbai | | | Pressboard and wet | |
| | | | | | Pucaro Figholm Insulation Kit Centre | Vadodara | | | pressboard are supplied by | |
| | | | | | Senapathy Composite | Bangalore | | | | |
| | | | | | #Raman Board | Mysore/Vadodra | | | | |
| 18 | PRE-COMPRESSED BOARDS | * | | | Raman Board | Mysore | | | | |
| | | | | | Enpay | Turkey | | | | |
| | | | | | Wiedman | Switzerland | | | | |
| | | | | | ABB Power Tech AB | Sweden | | | | |
| | | | | | #OG Paper | Japan | | | | |

[illegible]

[illegible]

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|----|---------------------------------------|--|--|--|----------------------------|------------|--|--|--|--|--|--|--|--|--|--|--|--|--|
| c) | LT AC CONTROL/SELECTOR SWITCH | | | | Alstom | Chennai | | | | | | | | | | | | | |
| | | | | | BCH | Faridabad | | | | | | | | | | | | | |
| | | | | | GEPC | Bangalore | | | | | | | | | | | | | |
| | | | | | L&T | Mumbai | | | | | | | | | | | | | |
| d) | MINIATURE CIRCUIT BREAKER (MCB) | | | | Legrand | Mumbai | | | | | | | | | | | | | |
| | | | | | Schneider | Nasik | | | | | | | | | | | | | |
| | | | | | ALSTOM | Chennai | | | | | | | | | | | | | |
| | | | | | L&T | Mumbai | | | | | | | | | | | | | |
| e) | POWER & AUX. CONTACTORS | | | | Siemens | Mumbai | | | | | | | | | | | | | |
| | | | | | Siemens | Mumbai | | | | | | | | | | | | | |
| | | | | | L&T | Mumbai | | | | | | | | | | | | | |
| | | | | | BCH | Faridabad | | | | | | | | | | | | | |
| f) | TERMINAL BLOCKS & STUDS | | | | GEPC | Bangalore | | | | | | | | | | | | | |
| | | | | | KAYCEE | Mumbai | | | | | | | | | | | | | |
| | | | | | Alstom | Chennai | | | | | | | | | | | | | |
| | | | | | Elmex | Vadodara | | | | | | | | | | | | | |
| g) | PUSH BUTTON | | | | Essen | Chandigarh | | | | | | | | | | | | | |
| | | | | | Technoplast | Ahmedabad | | | | | | | | | | | | | |
| | | | | | Tosha | Vadodara | | | | | | | | | | | | | |
| | | | | | Connectwell | Mumbai | | | | | | | | | | | | | |
| h) | SWITCH FUSE UNIT | | | | BCH | Faridabad | | | | | | | | | | | | | |
| | | | | | Alstom | Chennai | | | | | | | | | | | | | |
| | | | | | Siemens | Mumbai | | | | | | | | | | | | | |
| | | | | | L&T | Mumbai | | | | | | | | | | | | | |
| i) | HRC FUSE LINK & BASE | | | | Concord | Faridabad | | | | | | | | | | | | | |
| | | | | | Siemens | Mumbai | | | | | | | | | | | | | |
| | | | | | ALSTOM | Chennai | | | | | | | | | | | | | |
| | | | | | L&T | Mumbai | | | | | | | | | | | | | |
| j) | TAP POSITION INDICATOR | | | | BCH | Faridabad | | | | | | | | | | | | | |
| | | | | | GEPC | Bangalore | | | | | | | | | | | | | |
| | | | | | Control and Switchgear | Delhi | | | | | | | | | | | | | |
| | | | | | Alstom | Chennai | | | | | | | | | | | | | |
| k) | CONTROL & AUXILIARY TRANSFORMER | | | | L&T | Mumbai | | | | | | | | | | | | | |
| | | | | | Siemens | Mumbai | | | | | | | | | | | | | |
| | | | | | GEPC | Hosur | | | | | | | | | | | | | |
| | | | | | Siemens | Mumbai | | | | | | | | | | | | | |
| l) | TIME DELAY RELAY (PNEUMATIC / STATIC) | | | | Pradeep Sales and Services | Mumbai | | | | | | | | | | | | | |
| | | | | | Lekro lab Equipment | Mumbai | | | | | | | | | | | | | |
| | | | | | Neutronics | Mumbai | | | | | | | | | | | | | |
| | | | | | Radix | Mumbai | | | | | | | | | | | | | |

| | |
|---|--------------------------------|
| G | ON LINE DGA ANALYZER |
| H | ON LINE MOITURE REMOVAL SYSTEM |
| I | COMPOSITE MONITORING SYSTEM |

| | | | | |
|--|--|------------------------------------|--------------|--|
| | | GE Kelmen Ltd | UK | |
| | | Serveron | USA | |
| | | A-Eberle (EMH EncRGIE) | Germany | |
| | | Doble | USA | |
| | | GE Syprotech | Canada | |
| | | Hydran | Canada | |
| | | Morgan Scehaffer | Canada | |
| | | Transec | UK | |
| | | PTSS-Velcon (Cartrige from VELCON) | Combaitore | |
| | | Velcon | USA | |
| | | Dry Keep | South Africa | |
| | | Dry Keep | USA | |
| | | Dyanamic Ratings | USA | |
| | | A-eberle | Germany | |