



Vendor Registration Application form -F1

Application No.:

I. VENDOR DETAILS:

1. Basic details

a. Company Address

Address: Phone:
City: Mobile:
State: Fax:
Country: E-Mail:

b. Manufacturing Unit 1 (Works/factory) Address

Address: Phone:
City: Mobile:
State: Fax:
Country: E-Mail:

c. Manufacturing Unit 2 (Works/factory) Address

Address: Phone:
City: Mobile:
State: Fax:
Country: E-Mail:

d. Incorporation details of company as per Companies act, 1956

ROC Certificate No: ROC Date:
GST No. :
PAN card:

e. For renewal of Present Vendor Registration

Present Vendor registration Number:
Expiry date:

f. Authorized Person

Name: Aadhar no.:
Designation: Mobile:
Address: Phone:
Fax: E-Mail:

g. If Vendor has registration with other utilities, specify

- APSPDCL APEPDCL APCPDCL
 APGENCO PGCIL OTHERS

2. History of Company

a. Quality accreditations

- National Assessment and Accreditation Council (NACC)
 British Accreditation Certificate (BAC)
 National Board of Accreditation (NBA)
 Others
 None

b. Pending Litigations

| S.No. | Court name | Case no. | Date | Opposite Party | Value of the litigation | Present status |
|-------|------------|----------|------|----------------|-------------------------|----------------|
| | | | | | | |
| | | | | | | |
| | | | | | | |

c. Terminations (Contracts/Agreements)

| S. No | Terminated by the Utility (name) | Product/ Equipment | PO/ LOA no. | Value of the Contract/ agreement | Reason | In the Year | Remarks |
|-------|----------------------------------|--------------------|-------------|----------------------------------|--------|-------------|---------|
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

d. Black List/Debar

| S. No. | Black List/ Debar by the Utility (name) | Period of Black List | | Product/ Equipment | PO/ LOA no. | Value of the Contract/ agreement | Reason | Remarks |
|--------|---|----------------------|----|--------------------|-------------|----------------------------------|--------|---------|
| | | From | To | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

3. Strength

a. Man power

| Technical Qualification | Total No. of employees | No. of Employees with Experience | | | | |
|-------------------------|------------------------|----------------------------------|--------|---------|---------|--------|
| | | >1 Yr | >8 Yrs | >15 Yrs | >25 Yrs | >30Yrs |
| Graduate | | | | | | |
| Diploma | | | | | | |

cal

| Product / Material | Past supply | | Supplied to power utility | Supplied against PO/LOA | Successful supply completion certificates | Performance Certificates issued towards past supply from APTRANSCO/PGCIL/ other power utilities |
|--------------------|-------------|----------------------------------|---------------------------|-------------------------|---|---|
| | Year | Qty., supplied (in nos./ Tonnes) | | | | |
| | | | | | <input type="checkbox"/> Attach | <input type="checkbox"/> Attach |
| | | | | | <input type="checkbox"/> Attach | <input type="checkbox"/> Attach |
| | | | | | <input type="checkbox"/> Attach | <input type="checkbox"/> Attach |



c. Financial

i. Annual Turnover during last Five financial years

| Year | Amount (in Crores) |
|------|--------------------|
| | |
| | |
| | |
| | |

ii. Funding and Non-Funding facilities

| Name of the Bank | Bank guarantee / LC/ Cash limit | Amount (in Crores) | Validity |
|------------------|---------------------------------|--------------------|----------|
| | | | |
| | | | |



Certificate from bank not less than one month old.

iii. List of orders on hand, Present status and commitments etc



4. Fee Particulars

Name of the Bank:

Name of th

| PO/LOA no. | Period of Supply as per order | | Description of Product/ equipment | Quantity (No/ Tonnes) | Name of Utility |
|------------|-------------------------------|----|-----------------------------------|-----------------------|-----------------|
| | From | To | | | |
| | | | | | |
| | | | | | |
| | | | | | |

| | |
|---|--|
| e B r a n c h: h: | |
| A d d r e s s o f t h e B r a n c h: h: | |
| IF S C C o d e: | |
| D D · N o. : | |
| D a t e: | |
| A m o u n t (i n R s) : | |

II. DEVICES

1. Power Transformers

| Capacity of Transformer | Manufacturing Capacity (Units/Year) | Testing facilities |
|-------------------------|-------------------------------------|--------------------------|
| 500 MVA | | <input type="checkbox"/> |
| 315 MVA | | <input type="checkbox"/> |
| 160 MVA | | <input type="checkbox"/> |

| | | |
|-----------|--|--------------------------|
| 100 MVA | | <input type="checkbox"/> |
| 80 MVA | | <input type="checkbox"/> |
| 50 MVA | | <input type="checkbox"/> |
| 31.5 MVA | | <input type="checkbox"/> |
| 10/16 MVA | | <input type="checkbox"/> |
| 15 MVA | | <input type="checkbox"/> |
| 250 kVA | | <input type="checkbox"/> |
| 100 kVA | | <input type="checkbox"/> |

Testing facilities available for the following

- i. Main Tank & Conservator tank
 - Dimensional verification
 - Pressure test
 - Vacuum test
 - Air cell Dimensional verification
 - Air cell Leakage test
 - Pressure withstand test
- ii. Bushings(400kV/220kV/132kV/33kV)
 - Dimensional verification
 - Impulse tests (LI & SI)
 - Capacitance & Tan delta test (Before and after HV tests)
 - Power frequency withstand voltage test
 - Pressure test
 - Any other tests as per latest IS
- iii. Core (CRGO)
 - Dimensional verification
 - Aging test
 - Specific loss test (before and after aging tests)
- iv. Paper Insulated copper Windings (PICC)
 - Dimensional Verification
 - Mechanical Elongation test
 - Resistance Test
 - Any other tests as per latest IS
- v. Radiators
 - Dimensional verification

- Pressure test
- Leakage test (Before painting at Manufacture's place)
- After painting, Paint thickness test

vi. Insulating oil

- Oil break down voltage test
- Kinematic Viscosity test
- Density test
- Pore point test
- Water content (ppm)
- Dielectric dissipation factor (Tan δ)
- Carbon composition test
- Acidity test
- Sludge test
- Interfacial tension test
- Sulphur content test
- Flash point test
- PCB content test
- Any other test as per IS/IEC

vii. Low Voltage tests

- Measurement of Ratio & Polarity check
- Magnetic Balance and Magnetizing Current at low voltage
- Vector group Verification
- Measurement of insulation Resistance & Determination of Polarization Index
- Check of core & Frame insulation for liquid immersed Transformer
- Measurement Winding Resistance
- Measurement of Short Circuit Impedance at Low voltage

viii. High Voltage Tests

- Separate Source Voltage withstand test
- Line Terminal AC Voltage withstand Test
- Induced over Voltage with Partial Discharge measurement
- Measurement of Capacitance and Tan-Delta

ix. No load losses

- Measurement of No-load Loss & Current

Measurement of No-load Current at low voltage

Measurement of Harmonics of No Load Current

x. Type Tests

Temperature Rise Test

Hot Winding Resistance

Determination of noise/sound level

Measurement of Zero Sequence Impedance

Test on On-Load Tap changer

Determination of Transient Voltage transfer Characteristics

Measurement of Power taken by fans & liquid pump motors

Measurement of Load Loss & Impedance Voltage

xi. Special Tests

Switching Impulse Test

Lightning Impulse Test

Measurement of frequency Response Analysis

2. Reactors

| Capacity of Reactor | Manufacturing Capacity (Units/Year) | Testing facilities |
|---------------------|-------------------------------------|--------------------------|
| 125 MVAR | | <input type="checkbox"/> |
| 80 MVAR | | <input type="checkbox"/> |
| 63 MVAR | | <input type="checkbox"/> |
| 50 MVAR | | <input type="checkbox"/> |

Testing facilities available for the following

i. Main Tank & Conservator tank

Dimensional verification

Pressure test

Vacuum test

Air cell Dimensional verification

Air cell Leakage test

Pressure withstand test

ii. Bushings(400kV/220kV/132kV/33kV)

Dimensional verification

Impulse tests (LI & SI)

Capacitance & Tan delta test (Before and after HV tests)

- Power frequency withstand voltage test
 - Pressure test
 - Any other tests as per latest IS
- iii. Core (CRGO)
- Dimensional verification
 - Ageing test
 - Specific loss test (before and after aging tests)
- iv. Paper Insulated copper Windings (PICC)
- Dimensional Verification
 - Mechanical Elongation test
 - Resistance Test
 - Any other tests as per latest IS
- v. Radiators
- Dimensional verification
 - Pressure test
 - Leakage test (Before painting at Manufacture's place)
 - After painting, Paint thickness test
- vi. Insulating oil
- Oil break down voltage test
 - Kinematic Viscosity test
 - Density test
 - Pore point test
 - Water content (ppm)
 - Dielectric dissipation factor (Tan δ)
 - Carbon composition test
 - Acidity test
 - Sludge test
 - Interfacial tension test
 - Sulphur content test
 - Flash point test
 - PCB content test
 - Any other test as per IS/IEC
- vii. Low Voltage tests
- Measurement of Ratio & Polarity check
 - Magnetic Balance and Magnetizing Current at low voltage

- Vector group Verification
- Measurement of insulation Resistance & Determination of Polarization Index
- Check of core & Frame insulation for liquid immersed Transformer
- Measurement Winding Resistance
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viii. High Voltage Tests

- Separate Source Voltage withstand test
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- Induced over Voltage with Partial Discharge measurement
- Measurement of Capacitance and Tan-Delta

ix. No load losses

- Measurement of No-load Loss & Current
- Measurement of No-load Current at low voltage
- Measurement of Harmonics of No Load Current

x. Type Tests

- Temperature Rise Test
- Hot Winding Resistance
- Determination of noise/sound level
- Measurement of Zero Sequence Impedance
- Test on On-Load Tap changer
- Determination of Transient Voltage transfer Characteristics
- Measurement of Power taken by fans & liquid pump motors
- Measurement of Load Loss & Impedance Voltage

xi. Special Tests

- Switching Impulse Test
- Lighting Impulse Test
- Measurement of frequency Response Analysis

3. Circuit Breakers

| Rating of Circuit Breaker | Manufacturing Capacity (Units/Year) | Testing facilities |
|---------------------------|-------------------------------------|--------------------------|
| 420 kV | | <input type="checkbox"/> |
| 245 kV | | <input type="checkbox"/> |
| 145 kV | | <input type="checkbox"/> |
| 36 kV | | <input type="checkbox"/> |

Testing facilities available for the following

Routine/Acceptance tests

- Visual & Dimensional verification
- HV test (70 kV on Power circuit) for 1 minute
- HV test of 1 kV on auxiliary circuit
- Electrical & Mechanical operation
- Mechanical Endurance Test
- Power frequency voltage withstand tests (wet & dry)
- Lightning Impulse withstand test
- Basic short circuit tests, short line fault test duties and out of phase switching tests
- Short time withstand current and peak withstand current tests
- Line and cable charging current tests
- Capacitive current switching tests

Type Tests

- Partial discharge
- Temperature rise test
- Seismic withstand test
- RIV (Radio Interference) Voltage Test. (for 220 kV & 132 kV SF6 Circuit Breakers only)

4. Isolators

| Rating of Isolator | Manufacturing Capacity (Units/Year) | Testing facilities |
|--------------------|-------------------------------------|--------------------------|
| 400 kV | | <input type="checkbox"/> |
| 220 kV | | <input type="checkbox"/> |
| 132 kV | | <input type="checkbox"/> |
| 33 kV | | <input type="checkbox"/> |

Testing facilities available for the following

- Visual and Dimensional Check
- Voltage Test on Control and Auxiliary Circuits
- Measurement of Resistance of Main Circuit
- Mechanical Operation Test
- Sequence of Operation of Isolator
- Sequence of Operation of Earth Switch
- Test on Galvanising Components

Temperature rise test

5. Instrument Transformers (CTs/PTs/CVTs)

| Rating of Instrument Transformer | Manufacturing Capacity (Units/Year) | Testing facilities |
|----------------------------------|-------------------------------------|--------------------------|
| 400 kV | | <input type="checkbox"/> |
| 220 kV | | <input type="checkbox"/> |
| 132 kV | | <input type="checkbox"/> |
| 33 kV | | <input type="checkbox"/> |

Testing facilities available for the following

Routine/Acceptance tests

- Short- time current test
- High voltage power frequency wet withstand voltage test
- Tests for accuracy
- Temperature Coefficient Test
- Partial Discharge measurement
- Thermal stability test
- Tan Delta and capacitance Test
- Power frequency voltage with stand tests on primary terminals
- Power frequency voltage with stand tests between sections, if applicable
- Power frequency voltage with stand tests on secondary terminals
- Tests on accuracy
- Inter-turn over voltage test
- Test for winding resistance, rated knee point E.M.F and exciting current at rated knee point E.M.F for all ratios
- Verification of terminal marking and polarity
- Determination of the instrument security factor (FS) of measuring current transformer at all ratios

Type Tests

- Temperature –rise test
- Impulse voltage withstand test on primary terminals

6. Surge Arresters (Lightning Arrestors)

| Rating of Surge Arrester | Manufacturing Capacity (Units/Year) | Testing facilities |
|--------------------------|-------------------------------------|--------------------------|
| 400 kV | | <input type="checkbox"/> |

| | | |
|--------|--|--------------------------|
| 220 kV | | <input type="checkbox"/> |
| 132 kV | | <input type="checkbox"/> |
| 33 kV | | <input type="checkbox"/> |

Testing facilities available for the following

Insulation withstand Test

- Lightning Impulse
- Power frequency
- Switching Impulse (For 400KV)

Routine/Acceptance tests

- Residual Voltage Test
- Steep Current Impulse
- Test to verify long term stability under COV
- Repetitive charge transfer withstand
- Heat dissipation behaviour verification of test sample
- Switching surge operating duty test
- Power Frequency voltage Vs Time Curve
- Short circuit test
- High Current
- Low Current
- Bending Test(Cantilever Strength)
- Seal Leakage Test
- Test to verify the dielectric withstand test
- Test of internal grading components
- IP-67 test on surge Monitor
- test on silicon rubber as per standard IEC-61462
- Uniformity of Zinc coating for metal parts
- Lightning Impulse Residual voltage test
- Partial discharge test
- Tests on discharge counter
- Leakage check rate test for a duration of 24 hrs.

Type Tests

- Radio interference voltage test & Corona inception & extinction voltage
- Weather ageing test
- Salt fog test 1000 h

- UV light test 1000 h
- TERT (Tracking & Erosion resistance test
- Degree of Protection test on counter/surge monitor

7. Battery Sets

| Rating of Battery Sets | Manufacturing Capacity (Units/Year) | Testing facilities |
|------------------------|-------------------------------------|--------------------------|
| 220V, 200 AH | | <input type="checkbox"/> |
| 220V, 100 AH | | <input type="checkbox"/> |
| 48V, 400 AH | | <input type="checkbox"/> |
| 48V, 300 AH | | <input type="checkbox"/> |
| 48V, 250 AH | | <input type="checkbox"/> |
| 48V, 200 AH | | <input type="checkbox"/> |

Testing facilities available for the following

- Test for capacity and test for voltage during discharge.
- Ampere hour and Watt hour efficiency tests.
- Test for loss of capacity on storage.
- Endurance test.

8. AC DC Distribution Boards and Battery Chargers

| Rating of Battery Chargers | Manufacturing Capacity (Units/Year) | Testing facilities |
|----------------------------|-------------------------------------|--------------------------|
| 220V, 200 AH | | <input type="checkbox"/> |
| 200V, 100 AH | | <input type="checkbox"/> |
| 48V, 200 AH | | <input type="checkbox"/> |
| 48V, 150 AH | | <input type="checkbox"/> |
| 48V, 100 AH | | <input type="checkbox"/> |
| 48V, 50 AH | | <input type="checkbox"/> |
| 48V, 35 AH | | <input type="checkbox"/> |

Testing facilities available for the following

- Insulation Resistance Test
- High Voltage Test
- Annunciation Verification
- DC output voltage regulation
- Efficiency at full load

- Power factor
- DC output voltage ripple
- Battery path current limit
- Battery Low Trip Setting
- Protection against short circuit
- Ripple Test
- IP 54/IP 55 test

9. Insulators

| Item | Manufacturing Capacity (Units/Year) | Testing facilities |
|-----------------------|-------------------------------------|--------------------------|
| Disc Insulators | | <input type="checkbox"/> |
| Solid core Insulators | | <input type="checkbox"/> |
| SRC Insulators | | <input type="checkbox"/> |

Testing facilities available for the following

- Verification of Dimensions
- Verification of the tightness of the interface between end fittings and insulator housing
- Verification of the locking System
- Verification of the SML
- Galvanization Test
- Brittle Fracture Resistance Test
- Temperature cycle Test
- Hydrophobicity test
- Dye Penetration test
- N.D.T
- Glass Content test

10. Hardware (Both Conductor & Insulators)

| Item | Manufacturing Capacity (No. of sets/Year) | Testing facilities |
|---------|---|--------------------------|
| Panther | | <input type="checkbox"/> |
| Zebra | | <input type="checkbox"/> |
| Moose | | <input type="checkbox"/> |

| | | |
|---------------------|--|--------------------------|
| Ground Wire | | <input type="checkbox"/> |
| Clamps & Connectors | | <input type="checkbox"/> |
| Others, Specify: | | <input type="checkbox"/> |

Testing facilities available for the following

Tests for both suspension and tension hardware

- Visual examination
- Verification of dimensions
- Galvanising test / Electroplating
- Mechanical strength test on each component
- Mechanical strength test of welded joint
- Test on locking device for ball and socket coupling
- Chemical Analysis, hardness tests grain size
- Magnetic particle inspection of forgings and casting

Tests for Suspension Hardware

- Clamp slip strength Vs torque test for suspension clamp
- Shore hardness test of elastomer cushion for AG suspension clamp
- Bend test for armour rod set
- Resilience test for armour rods set
- Conductivity test for armour rods set

Tests for tension Hardware

- Slip strength test for dead-end assembly
- On Mid Span Compression Joint for Conductor and Earth Wire
- Visual examination
- Dimensional verification
- Galvanizing test
- Hardness Test

Tests on Flexible Steel Bond

- Visual examination
- Dimensional verification
- Slip strength test

Tests on Flexible Copper Bond

- Visual examination

- Dimensional verification
- Slip strength test

Tests on Vibration Damper for Power Conductor

- Visual examination
- Dimensional verification
- Galvanising test
- Verification of Resonance frequencies
- Clamp slip test
- Clamp bolt torque test
- Strength of the messenger cable
- Mass pull off test
- Fatigue Test

Tests on Earth Wire suspension & tension clamp Assembly

- Visual Examination and Dimension Verification
- Galvanizing Test
- Clamp Slip Strength Test
- Mechanical Strength test on each component
- Hardness Test for Tension clamp

11. Capacitor Banks

| Rating | Manufacturing Capacity (Units/Year) | Testing facilities |
|-----------------------|-------------------------------------|--------------------------|
| 132kV Capacitor Banks | | <input type="checkbox"/> |
| 33kV Capacitor Banks | | <input type="checkbox"/> |

Testing facilities available for the following

- Measurement of capacitance
- Voltage test between terminals
- Test between line terminals and container
- AC voltage test between terminals & containers
- Test of discharge device
- Capacitor loss tangent measurement
- Sealing test

12. Telecom Equipment

- a. Optical Line Terminal Equipment (Plesiochronous Digital Hierarchy (PDH)/ Synchronous Digital Hierarchy(SDH))

| Item | Manufacturing | Testing |
|------|---------------|---------|
| | | |

| | Capacity (Units/Year) | facilities |
|--|--------------------------|--------------------------|
| Components of Plesiochronous Digital Hierarchy (PDH) | | |
| Power Supply Card | | <input type="checkbox"/> |
| E1 Interface Card | | <input type="checkbox"/> |
| Ethernet interface Card (10/100Mbps) | | <input type="checkbox"/> |
| Multiplexer Card | | <input type="checkbox"/> |
| Synchronization Card | | <input type="checkbox"/> |
| Distribution frame | | <input type="checkbox"/> |
| Clock Module | | <input type="checkbox"/> |
| Components of Synchronous Digital Hierarchy(SDH) | | |
| Power supply card | | <input type="checkbox"/> |
| S type optical card | | <input type="checkbox"/> |
| L Type Optical card | | <input type="checkbox"/> |
| Optical line interface Optical card | | <input type="checkbox"/> |
| Tributary Card | | <input type="checkbox"/> |
| n x n ports switching matrix | | <input type="checkbox"/> |
| E1 interface Card | | <input type="checkbox"/> |
| Ethernet interface Card (10/100Mbps) | | <input type="checkbox"/> |
| Drop & Insert Multiplexer | | <input type="checkbox"/> |
| 2 wire voice Chanel Card | | <input type="checkbox"/> |
| 4 wire E & M Voice Chanel Card | | <input type="checkbox"/> |
| Asynchronous sub channels data Card (V.24/V.48) | | <input type="checkbox"/> |
| Synchronous Data Cards | | <input type="checkbox"/> |
| Digital Access cross connect switch | | <input type="checkbox"/> |
| Network manage & Elementary management system | | <input type="checkbox"/> |
| Main Distribution frame (200pairs) | | <input type="checkbox"/> |
| GPS Clock | | <input type="checkbox"/> |

Testing facilities available for the following

- Power Supply Test
- BER test at E1 interface
- BER test at STM-4 Interface
- Out Inter for E1 Interface
- Output jitter at STM level Interface

- Input jitter Tolerance for E1 Interface
- Input jitter Tolerance for STM level
- Pulse mask Measurement at E1 Interface
- Optical Power Measurement
- Optical Receiver sensitivity Measurement
- Network management Interface performance through Remote login
- Simulation of failure condition and fail over or each redundant unit
- Ethernet Performance Test

b. Multiplexer/Digital Distribution Frame(DDF)

| Item | Manufacturing Capacity (Units/Year) | Testing facilities |
|----------------------------------|-------------------------------------|--------------------------|
| Multiplexer | | <input type="checkbox"/> |
| Digital Distribution Frame (DDF) | | <input type="checkbox"/> |

Testing facilities available for the following

- Electrical Interface – 2M loop back test
- Cross Connection function Measurement
- E1 Pulse space shape
- Framing signalling, operational and maintenance test
- Data Channel BER Measurement on N*64k bit/sec
- E & M Gain level Measurement
- E & M/Idle Channel Noise Measurement
- Exch/Sub Frequency level Measurement
- Exch/Sub – Idle Channel Noise Measurement
- Power Supply unit Redundancy check
- 1+1 Control Card Redundancy

c. EPAX Exchange/EPABX Exchange

| Item | Manufacturing Capacity (Units/Year) | Testing facilities |
|------------------------------------|-------------------------------------|--------------------------|
| <u>Components of EPAX Exchange</u> | | |
| Power supply Card | | <input type="checkbox"/> |

| | | |
|---|--|--------------------------|
| Ringer Module | | <input type="checkbox"/> |
| Central Processing Unit with stored program control and backup memory | | <input type="checkbox"/> |
| Switching Matrix | | <input type="checkbox"/> |
| Line Interface Card | | <input type="checkbox"/> |
| Trunk Interface Card | | <input type="checkbox"/> |
| <u>Components of EPABX Exchange</u> | | |
| Power supply Card | | <input type="checkbox"/> |
| Ringer Module | | <input type="checkbox"/> |
| Central Processing Unit with stored program control and backup memory | | <input type="checkbox"/> |
| Switching Matrix | | <input type="checkbox"/> |
| Line Interface Card | | <input type="checkbox"/> |
| Junction Interface Card | | <input type="checkbox"/> |

Testing facilities available for the following

- Power supply test
- Protection test
- Engage pulse timing test
- Priority timing test
- Digital pulse timing test
- Inter digit pulse timing test
- Releasing pulse timing test

Test calls for EPAX Exchange

- Subscriber to Subscriber
- Subscriber to Trunk
- Trunk to Trunk

Test calls for EPABX Exchange

- Subscriber to Subscriber
- Subscriber to Junction
- DID facility

13. Automation Hardware

a. SAS Control & Relay Panels

| Rating | Manufacturing Capacity (Units/Year) | Testing facilities |
|--------|-------------------------------------|--------------------------|
| 400 kV | | <input type="checkbox"/> |

| | | |
|--------|--|--------------------------|
| 220 kV | | <input type="checkbox"/> |
| 132 kV | | <input type="checkbox"/> |
| 33 kV | | <input type="checkbox"/> |

Testing facilities available for the following

- Physical Verification Panel
- BOM Verification
- AC and DC Circuit
- IR Value before HV Test (500V DC)
- HV Test (2KV AC, 1mm)
- IR Value after HV Test (500V DC)
- Leakage Current
- CT/PT Check
- Backup Relay
- Bay control Unit (BCU)
- Bay control & protection Unit (BCPU)
- Trip Circuit Supervision
- Annunciator Circuit
- Closing/Tripping Circuit
- Interlock Circuit/AUX Relay circuit
- Paint Shade and Thickness
- Others, Specify:

b. SAS C&R Panel Components

| Rating | Manufacturing Capacity (Units/Year) | Testing facilities |
|--------|-------------------------------------|--------------------------|
| 400 kV | | <input type="checkbox"/> |

| | | |
|--------|--|--------------------------|
| 220 kV | | <input type="checkbox"/> |
| 132 kV | | <input type="checkbox"/> |
| 33 kV | | <input type="checkbox"/> |

| Item | Manufacturing Capacity (Units/Year) | Testing facilities |
|---|-------------------------------------|--------------------------|
| Bay control Unit (BCU) | | <input type="checkbox"/> |
| Bay control & protection Unit (BCPU) | | <input type="checkbox"/> |
| Bay protection Unit (BPU) | | <input type="checkbox"/> |
| Data Concentrator | | <input type="checkbox"/> |
| Gateway for remote control | | <input type="checkbox"/> |
| Gateway interface | | <input type="checkbox"/> |
| GPS Clock, Antenna with time display unit | | <input type="checkbox"/> |
| Intelligent Electronic Devices (IEDs) | | <input type="checkbox"/> |
| 3kVA Inverter (RS485 Compatible) | | <input type="checkbox"/> |
| Ethernet switches | | <input type="checkbox"/> |
| Display Unit | | <input type="checkbox"/> |

Testing facilities available for Control IEDs and Communication Equipment

Power Input

- Auxiliary Voltage
- Current Circuits
- Voltage Circuits
- Indications

Accuracy Tests

- Operational Measured Values
- Currents
- Voltages
- Time resolution

Insulation Tests

- Dielectric Tests
- Impulse Voltage withstand Test

Influencing Quantities

- Limits of operation

- Permissible ripples
- Interruption of input voltage

Electromagnetic Compatibility Test

- 1 MHZ burst disturbance test
- Electrostatic Discharge Test
- Radiated Electromagnetic Field Disturbance Test
- Electrical Fast transient Disturbance Test
- Conducted Disturbances Tests induced by Radio Frequency Field
- Magnetic Field Test
- Emission (Radio interference level) Test.
- Conducted Interference Test

Function Tests

- Indication
- Commands
- Measured value Acquisition
- Display Indications

Environmental tests

- Cold Temperature
- Dry Heat
- Wet heat
- Humidity (Damp heat Cycle)
- Vibration
- Bump
- Shock

Other tests

- Hardware Integration test
- Integrated System test
- Factory Acceptance test

c. Relays

| Item | Manufacturing Capacity (Units/Year) | Testing facilities |
|----------------|-------------------------------------|--------------------------|
| Distance relay | | <input type="checkbox"/> |

| | | |
|------------------------------|--|--------------------------|
| Differential relay | | <input type="checkbox"/> |
| Over flux relay | | <input type="checkbox"/> |
| Over current relay | | <input type="checkbox"/> |
| Earth Fault relay | | <input type="checkbox"/> |
| DC supply Supervision relay | | <input type="checkbox"/> |
| Restricted Earth fault relay | | <input type="checkbox"/> |
| Auxiliary relay | | <input type="checkbox"/> |

Testing facilities available for the following

Insulation test

- Dielectric test
- Insulation Resistance Measurement Test
- Impulse Voltage withstand test
- Tests for thermal and mechanical requirements
- Tests for rated burden
- Contact performance test
- High frequency disturbance test
- Fast transient test
- Relay characteristics, performance and accuracy test
- Steady state Characteristics and operating time
- Dynamic Characteristics and operating time for distance protection relays and current differential protection relay
- Disturbance recorder and Event logger only performance tests are intended under this item
- 5kV Impulse Peak voltage Test
- Vibration test
- Overshoot time test

d. Remote Terminal Unit (RTU)

| Item | Manufacturing Capacity (Units/Year) | Testing facilities |
|------|--|--------------------|
|------|--|--------------------|

| | | |
|---------------------|--|--------------------------|
| Digital input Card | | <input type="checkbox"/> |
| Digital output card | | <input type="checkbox"/> |
| Analog card | | <input type="checkbox"/> |
| CPU | | <input type="checkbox"/> |
| Power supply unit | | <input type="checkbox"/> |
| RTU (Total unit) | | <input type="checkbox"/> |

Type Tests

- Surge Immunity test
- Electrical fast transient burst test
- Damped Oscillatory wave test
- Electrostatic discharge test
- Radiated Electromagnetic field test
- Damped Oscillatory Magnetic field test
- Power frequency magnetic field test
- Power frequency Voltage withstand test
- 1.2/50µsec impulse Voltage withstand test
- Insulation resistance test
- Dry heat test
- Damp heat test

Acceptance Tests

- Functional test
- RTU & Panel power up
- RTU start up and shutdown
- Verification of CPU IP address
- Verification of dual LAN
- Verification of CPU dual ports
- Verification of Configuration download
- Verification of Configuration Upload
- Verification of IEC60870-5-104 Slave protocol
- IEC60870-5-104 Redundancy check
- RTU Time synchronization check
- Verification of System diagnostics
- RTU power consumption test
- Event logging buffer & Memory test
- Power Supply unit Redundancy check

CPU Redundancy check for control Central & Slave device (Energy Meter)

Reporting to multiple masters

e. IT Equipment

i. Desktop PC

| Item | Manufacturing Capacity (Units/Year) | Testing facilities |
|--------------------|-------------------------------------|--------------------------|
| a. Monitor | | |
| 22 inches | | <input type="checkbox"/> |
| 24 inches | | <input type="checkbox"/> |
| 26 inches | | <input type="checkbox"/> |
| 28 inches | | <input type="checkbox"/> |
| Others, Specify | | <input type="checkbox"/> |
| b. Processor Model | | |
| i3 | | <input type="checkbox"/> |
| i5 | | <input type="checkbox"/> |
| AMD | | <input type="checkbox"/> |
| Others, Specify: | | <input type="checkbox"/> |
| c. Mouse | | |
| Wireless | | <input type="checkbox"/> |
| Wired | | <input type="checkbox"/> |
| Others, Specify | | <input type="checkbox"/> |
| d. Keyboard | | |
| Wired | | <input type="checkbox"/> |
| Wireless | | <input type="checkbox"/> |
| Others, Specify | | <input type="checkbox"/> |
| e. RAM | | |
| 4GB | | <input type="checkbox"/> |
| 8GB | | <input type="checkbox"/> |
| 16GB | | <input type="checkbox"/> |
| Others, Specify | | <input type="checkbox"/> |
| f. System Type | | |
| 32 bit | | <input type="checkbox"/> |
| 64 bit | | <input type="checkbox"/> |
| Others, Specify | | <input type="checkbox"/> |
| g. CPU Speed | | |

| | | |
|---------------------|--|--------------------------|
| 3 GHz | | <input type="checkbox"/> |
| 4 GHz | | <input type="checkbox"/> |
| 5 GHz | | <input type="checkbox"/> |
| Others, Specify: | | <input type="checkbox"/> |
| h. Operating System | | |
| MS Windows | | <input type="checkbox"/> |
| Linux | | <input type="checkbox"/> |
| Others, Specify: | | <input type="checkbox"/> |
| i. Hard Disk Drive | | |
| 500GB | | <input type="checkbox"/> |
| 1TB | | <input type="checkbox"/> |
| 2 TB | | <input type="checkbox"/> |
| Others, Specify: | | <input type="checkbox"/> |

ii. Laptop

| Item | Manufacturing Capacity (Units/Year) | Testing facilities |
|--------------------|-------------------------------------|--------------------------|
| a. Size | | |
| 22 inches | | <input type="checkbox"/> |
| 24 inches | | <input type="checkbox"/> |
| 26 inches | | <input type="checkbox"/> |
| 28 inches | | <input type="checkbox"/> |
| Others, Specify | | <input type="checkbox"/> |
| b. Processor Model | | |
| i3 | | <input type="checkbox"/> |
| i5 | | <input type="checkbox"/> |
| i7 | | <input type="checkbox"/> |
| i8 | | <input type="checkbox"/> |
| AMD | | <input type="checkbox"/> |
| Others, Specify: | | <input type="checkbox"/> |
| c. RAM | | |
| 4GB | | <input type="checkbox"/> |
| 8GB | | <input type="checkbox"/> |
| 16GB | | <input type="checkbox"/> |
| Others, Specify | | <input type="checkbox"/> |
| d. System Type | | |
| 32 bit | | <input type="checkbox"/> |

| | | |
|---------------------|--|--------------------------|
| | | |
| 64 bit | | <input type="checkbox"/> |
| Others, Specify | | <input type="checkbox"/> |
| e. CPU Speed | | |
| 3 GHz | | <input type="checkbox"/> |
| 4 GHz | | |
| 5 GHz | | <input type="checkbox"/> |
| Others, Specify: | | <input type="checkbox"/> |
| f. Operating System | | |
| MS Windows | | <input type="checkbox"/> |
| Linux | | <input type="checkbox"/> |
| Others, Specify: | | <input type="checkbox"/> |
| g. Hard Disk Drive | | |
| 500GB | | <input type="checkbox"/> |
| 1TB | | <input type="checkbox"/> |
| 2 TB | | <input type="checkbox"/> |
| Others, Specify: | | <input type="checkbox"/> |

iii. Printers

| Item | Manufacturing Capacity (Units/Year) | Testing facilities |
|------------------|--|--------------------------|
| Dot matrix | | <input type="checkbox"/> |
| Laser jet | | <input type="checkbox"/> |
| Ink jet | | <input type="checkbox"/> |
| Others, Specify: | | <input type="checkbox"/> |

iv. Un-interrupted Power Supply(UPS)

| Item | Manufacturing Capacity (Units/Year) | Testing facilities |
|------------------------|--|--------------------------|
| a. Time back up | | |
| Half an hour | | <input type="checkbox"/> |
| One Hour | | <input type="checkbox"/> |
| Two Hours | | <input type="checkbox"/> |
| Others, Specify: | | <input type="checkbox"/> |
| b. Input Voltage Range | | |
| +/- 10% | | <input type="checkbox"/> |
| +/- 15% | | <input type="checkbox"/> |

| | | |
|------------------|--|--------------------------|
| Others, Specify: | | <input type="checkbox"/> |
|------------------|--|--------------------------|

f. Hard ware Components of Computer

i. CPU

| Description | Manufacturing Capacity (Units/Year) | Testing facilities |
|------------------|-------------------------------------|--------------------------|
| a. Processor | | |
| i3 | | <input type="checkbox"/> |
| i5 | | <input type="checkbox"/> |
| i7 | | <input type="checkbox"/> |
| AMD | | <input type="checkbox"/> |
| Others, Specify: | | <input type="checkbox"/> |
| b. Speed | | |
| 3GHz | | <input type="checkbox"/> |
| 3.5GHz | | <input type="checkbox"/> |
| 4 GHz | | <input type="checkbox"/> |
| Others Specify: | | <input type="checkbox"/> |

ii. Monitor

| Description | Manufacturing Capacity (Units/Year) | Testing facilities |
|-----------------|-------------------------------------|--------------------------|
| a. Size | | |
| 20 | | <input type="checkbox"/> |
| 22 | | <input type="checkbox"/> |
| 24 | | <input type="checkbox"/> |
| Others Specify: | | <input type="checkbox"/> |
| b. Type | | |
| LCD | | <input type="checkbox"/> |
| LED | | <input type="checkbox"/> |
| Others Specify: | | <input type="checkbox"/> |

iii. Keyboard

| Description | Manufacturing | Testing |
|-------------|---------------|---------|
|-------------|---------------|---------|

| | Capacity (Units/Year) | facilities |
|-----------------|--------------------------|--------------------------|
| Wired | | <input type="checkbox"/> |
| Wireless | | <input type="checkbox"/> |
| Others Specify: | | <input type="checkbox"/> |

iv. Mouse

| Description | Manufacturing Capacity (Units/Year) | Testing facilities |
|-----------------|---|--------------------------|
| Wired | | <input type="checkbox"/> |
| Wireless | | <input type="checkbox"/> |
| Others Specify: | | <input type="checkbox"/> |

v. RAM

| Description | Manufacturing Capacity (Units/Year) | Testing facilities |
|--------------------|---|--------------------------|
| 4GB | | <input type="checkbox"/> |
| 8GB | | <input type="checkbox"/> |
| 16GB | | <input type="checkbox"/> |
| Others Specify: | | <input type="checkbox"/> |

vi. Hard Disk Drive

| Description | Manufacturing Capacity (Units/Year) | Testing facilities |
|-----------------|---|--------------------------|
| 500GB | | <input type="checkbox"/> |
| 1 TB | | <input type="checkbox"/> |
| 2 TB | | <input type="checkbox"/> |
| Others Specify: | | <input type="checkbox"/> |

g. Communication Network

i. Local Area Network (LAN)

a. Ethernet Switches

- 8 port 16 port 32 port
 10port 24 port 64 port

b. Cables

- Cat5 Cat6

ii. Wide Area Network (WAN)

a. Routers

1841

3861

2811

Others, specify:

b. Modems

64Kbps

nX64Kbps,
specify:

2Mbps

c. Communication Channel

Leased line

Multi Port Label Switch(MPLS) leased line

Virtual Private Network (VPN)

d. Internet service provider

Bandwidth capacity, specify:

Upload speed(in Mbps), specify:

Download speed(in Mbps), specify:

e. Cyber security system

Firewall (Hardware)

5520

60E

1C

520

60F

2C

30E

80E

4C

40F

80F

12C

50E

100E

h. Servers

| Description | Manufacturing Capacity (Units/Year) | Testing facilities |
|-----------------|-------------------------------------|--------------------------|
| a. RAM | | |
| 8GB | | <input type="checkbox"/> |
| 16GB | | <input type="checkbox"/> |
| 32GB | | <input type="checkbox"/> |
| Others, Specify | | <input type="checkbox"/> |
| b. Cores | | |
| 18 Core | | <input type="checkbox"/> |
| 28 Core | | <input type="checkbox"/> |

| | | |
|--------------------|--|--------------------------|
| 32 Core | | <input type="checkbox"/> |
| Others, Specify | | <input type="checkbox"/> |
| c. Speed | | |
| 2.5GHz | | <input type="checkbox"/> |
| 2.6GHz | | <input type="checkbox"/> |
| 2.7GHz | | <input type="checkbox"/> |
| Others, Specify: | | <input type="checkbox"/> |
| d. Hard Disk Drive | | |
| 500GB | | <input type="checkbox"/> |
| 1TB | | <input type="checkbox"/> |
| 1.5TB | | <input type="checkbox"/> |
| Others, Specify: | | <input type="checkbox"/> |
| e. Type | | |
| Rack | | <input type="checkbox"/> |
| Tower | | <input type="checkbox"/> |
| Blade | | <input type="checkbox"/> |

i. Operating System

Linux Windows Unix

ii. Database

Oracle Sybase MSSQL
 MAXDB HANA

iii. Interfaces

1GB Ethernet port V.24 V.28
 Other standards, Specify:

iv. Redundant Array of Independent Discs (RAID) support

0 1 5
 6 Others, Specify:

v. Network ports

2 4 Others, specify:

vi. Power supply

Single A.C Dual A.C

14. Automation Software

| Software | Development team size (in no.) | |
|---|-----------------------------------|--------------|
| | India | Out of India |
| Supervisory Control and Data Acquisition (SCADA) Software | | |
| Substation Automation System(SAS) Software | | |
| Energy Management Software | | |
| Enterprise Resource planning (ERP) | | |
| Asset Management (GIS) | | |
| Others, Specify: | | |

a. Supervisory Control and Data Acquisition (SCADA) Software

RTU/Gateway Data Acquisition

- RTU/Gateways database & Remote diagnostics
- RTU/Gateway in Test mode
- RTU/Gateway time synchronization
- RTU/Gateway communication monitoring, recording & Statistics
- Backup communication channel processing

Data exchange with the Control centres

- Inter control Centre communication Protocol Data Exchange
- Data exchange with Information Storage Retrieval system
- Data exchange with other system/Application
- Data exchange priorities

Data processing

- Analog Data processing
- Digital status Input Data processing
- Continuous Real time data storage and playback
- Open Database Connectivity (ODBC) Interface
- Network Status processor
- Sequence of Events Recording
- Pulse Accumulator processing

Calculated data processing

- MVA Calculation
- MW and MVAR Integration
- Rate of change
- Line loss Calculations
- Average Value calculations

- Max/Min value calculations
- System Load and Interchange data
- Frequency Variation Index

Supervisory control

- Select before execute
- Control Inhibit
- Control Action Monitor
- Power Flow Check Before Control
- Interlocks and security checks for supervisory control
- Sequential Switching Operation

Information Storage and Retrieval

- Realtime data snapshot storage
- Storage of SCADA System Statistics
- Storage of files and save cases
- System message logs storage & Retrieval

System parameters

- State Estimation (SE)
- Bus load Forecast
- Contingency Analysis
- Optimal Power Flow
- Transmission/Corridor Capacity Monitor
- Short Circuit Analysis
- Transient Stability Studies

Other features

- Operator Training Simulator
- Control centre SCADA system communicating with RTU/SAS on IEC 60870-5-101 or IEC 60870-5-104 protocol
- Feasibility for Bays augmentation in long run
- Defined user levels with proper authentication
- Graphical user interface
- Integration of new Gate way
- Integration of new control centre on Inter control centre Protocol
- Critical & Non-critical functions

SCADA functions including control functions

- Periodic Scans & Exception scans
- GIS technology

b. Substation Automation System (SAS) Software

Gateway Data Acquisition

- Gateways database & Remote diagnostics
- Gateway in Test mode
- Gateway time synchronization
- Gateway communication monitoring, recording & Statistics
- Backup communication channel processing

Data processing

- Analog Data processing
- Digital status Input Data processing
- Continuous Real time data storage and playback
- Open Database Connectivity (ODBC) Interface
- Network Status processor
- Sequence of Events Recording
- Pulse Accumulator processing

Calculated data processing

- MVA Calculation
- MW and MVAR Integration
- Rate of change
- Average Value calculations
- Max/Min value calculations
- System Load and Interchange data
- Frequency Variation Index

Supervisory control

- Interlocks and security checks for supervisory control
- Sequential Switching operations
- Capacitor/Reactor Banks
- Tap Changing of Transformer
- Control Action Monitor
- Power Flow check before control
- Select before execute

Storage of SCADA system statistics

- Storage of files and save cases
- System message logs storage & Retrieval

Other features

- Critical & Non-critical functions
- Data dissemination
- Adjustable parameters
- Output requirements
- Periodic Scans & Exception scans
- Data exchange with Information Storage Retrieval system
- Feasibility for Bays augmentation in long run
- Defined user levels with proper authentication
- Data exchange with other system/Application
- Data exchange priorities
- Substation Event logger logs & Automatic disturbance recorder files extraction
- IED access for configuration
- Graphical user interface
- Manual data entry
- Condition monitoring applications
- Transmission/Corridor Capacity Monitor
- Integration of Gate way
- GIS technology
- Shall support IEC 61850, IEC 60870-5-101/104 Protocols

c. Energy Management Software

i. Scheduling Software

- Prepare Schedules for Day ahead, Weekly ahead and Monthly ahead
- Certification of availability of Generators
- Forecast Load Generation Balance Report for Day Ahead, Weekly ahead and Monthly ahead
- Develop Intra-state Availability Based Tariff module
- Mobile application
- Generate Report for Visualization

ii. Open access Software

- Issue Energy exchange No objection certificate
- Issue Bilateral Concurrence
- Issue Intra state Approvals
- Check Regional Load Dispatch Centres approvals
- Generate Report for Visualization
- Communicate Schedules to Generators
- Communicate Schedules to consumers
- Communicate Schedules to DISCOMs

iii. Energy accounting

- Certify Energy for Distribution Companies (manual readings)
- Certify energy for Private Developers
- Calculate Deviation Energy
- Certify energy for Generating stations
- Calculate Transmission losses with MRI data
- Issue ABT compatibility for energy meters of ISOA Generators
- Settle Intrastate open access energy for consumers
- Certify Distribution companies energy
- Calculate DSM for wind and solar generators
- Generate Report for Visualization.
- Prepare AMC Bills.

iv. Billing and Load Dispatch Centre report

- Outage planning and management system
- Market Operations Management
- Master Data Management, Data Archival and Retrieval
- Data Migration & Maintenance Mechanism from different Data sources
- Data Integration
- Dashboard
- MIS Reports
- Mobile Application

v. Renewable Energy Forecasting and scheduling

- Issue Renewable Energy Accreditation
- Certify Energy Injection Reports
- Verify Renewable Power Purchase obligation compliance

- Issuing of Technical clearance for Synchronization of RE generators
- Generate Report for Visualization
- vi. Financial accounting & Statutory compliance
 - Payments Accounting System for Load Dispatch Centre
 - User Administration
 - Security Management
- d. Enterprise Resource planning (ERP) Software
 - Human Capital Management
 - Finance & Costing
 - Plant Maintenance
 - Project Systems
 - Material Management
 - Sales & Distribution
 - Quality Management
- e. Asset management (GIS) Software
 - Geo-tagging features
 - Geocoding Capability
 - Map Creation Capability
 - Spatial Analysis Capability
 - GPS Tracking Capability
 - Routing and Navigation Capability
 - Edit, Visualize, Manage and analyse geospatial data
 - Reverse Geo-coding Capability
 - Geo-reference imagery Capability
 - User Management features
 - Users Access Control feature
 - Single Sign on feature
 - Role-Based Permissions feature
 - Data base management
 - Data import/Export and Synchronization feature
 - Data Visualization feature
 - Data Management feature
 - Secure Data Storage feature
 - Maximum user handling capability
 - Concurrent user handling capability

Other Features

- Image Exporting Capability
- Image Management Capability
- Interoperability Capability(OGC)
- Labelling Capability
- 3D Analysis Capability
- Census data Integration
- Visual Analytics feature
- Web integration feature
- Up-gradation to Higher version
- Drag & Drop Interface feature
- Forecasting feature
- Mobile Integration feature
- Multi-Language feature
- Performance Management feature

f. Others, Specify:

15. Other Devices as per relevant standards

| Sl. No. | Equipment/Product/ Material | Type test during last 5 years | Relevant standard | Year of test |
|---------|--------------------------------|-------------------------------------|----------------------|-----------------|
| | | | | |
| | | | | |
| | | | | |
| | | | | |

III. STRUCTURES

Tower Parts including Stubs and Structures

| Rating | Manufacturing Capacity (MT/Year) | Testing facilities |
|--------|--|--------------------------|
| 400 kV | | <input type="checkbox"/> |
| 220 kV | | <input type="checkbox"/> |
| 132 kV | | <input type="checkbox"/> |
| 33 kV | | <input type="checkbox"/> |

Testing facilities available for the following

Galvanising Test

Mechanical Tests

Yield Load (N)

Yield Stress Test (N/Sq.mm)

Ultimate Load (N)

Ultimate tensile strength (N/Sq.mm)

Percentage Elongation

Bend test

Chemical Test

Carbon %

Silicon %

Manganese %

Phosphorous %

Sulphur %

IV. CIRCUIT SEGMENTS

1. Conductor

| Item | Manufacturing Capacity (Km/Year) | Testing facilities |
|------------------|----------------------------------|--------------------------|
| Panther | | <input type="checkbox"/> |
| Zebra | | <input type="checkbox"/> |
| Moose | | <input type="checkbox"/> |
| Others, Specify: | | <input type="checkbox"/> |

Testing facilities available for the following

Break load(KN)

Resistance(at 20°C ohms/km)

Wrapping

Lay-Ratio

Over all Diameter (mm)

Elongation (%)

Wt. of Zinc Coating(g/Sq.m)

Uniformity of Zinc Coating

Chemical test on Aluminium strands

2. Underground XLPE cable

| Description | Manufacturing Capacity (Km/Year) | Testing facilities |
|-------------|----------------------------------|--------------------------|
| 400 kV | | <input type="checkbox"/> |
| 220 kV | | <input type="checkbox"/> |
| 132 kV | | <input type="checkbox"/> |
| 33 kV | | <input type="checkbox"/> |

Testing facilities available for the following

Type Tests on Cable

- Bending Test
- Partial discharge test after bending test
- Tan δ measurement
- Heating cycle voltage test
- Partial discharge test during and after heating cycle test
- Impulse withstand test
- Power frequency voltage test

Tests on Conductor

- Dimensional verification
- D.C. Resistance at 20°C
- Measurement of thickness of metallic sheets
- Test on concentric metallic service
- Test on combined electrical resistance of copper wire screen and metallic test
- Annealing test after copper

Tests for insulation & sheath

- Thickness and dimensions of insulation and outer sheath
- Tensile strength and elongation at break of insulation & outer sheath
- Thermal ageing in air oven
- Tensile strength and elongation and break of insulation and outer sheath after ageing
- Hot set test for XLPE insulation
- Shrinkage test on XLPE insulation as per IEC
- Resistivity of semi-conducting conductor & insulation screen and at room temperature and at 90°C conductor temperature
- Hot deformation test for PE sheath

- Carbon black content of black PE sheaths
- Pressure test at high temperature on sheath
- Test on concentric metallic screen
- Tests for concentric copper wire
- Tests for concentric copper tape
- Test for combined electrical resistance of copper wire screen and metallic sheath
- Measurement of thickness of metallic sheath as per relevant IEC
- Type tests on accessories as per relevant IEC
- Type Tests on Cable system as per relevant IEC

3. Earth Wire

| Description | Manufacturing Capacity (Km/Year) | Testing facilities |
|-------------|----------------------------------|--------------------------|
| HTGS | | <input type="checkbox"/> |

Testing facilities available for the following

- Breaking Load
- Elongation
- Torsion
- Zinc Coating
- Uniformity of Zinc Coating
- Wrapping Test
- Adhesion
- Over all Strands Breaking Load
- Strand O.D
- Lay ratio
- DC Resistance of overall Strands at 20°C

4. Power & Control Cables

| Description | Manufacturing Capacity (Km/Year) | Testing Facilities |
|---------------------|----------------------------------|--------------------------|
| Power cables | | <input type="checkbox"/> |
| Control Cables | | <input type="checkbox"/> |
| Optical Fibre Cable | | <input type="checkbox"/> |

Testing facilities available for the following

Routine/Acceptance tests

- Annealing test

- Conductor resistance
- Thickness of insulation and sheath
- Tensile strength and elongation at break of insulation and sheath
- Insulation Resistance Test
- High Voltage Test at room temperature
- Conductor resistance test
- High voltage test at room temperature

Optional tests

- Cold bend
- Cold impact

5. OPGW

| Description | Manufacturing Capacity (Km/Year) | Testing facilities |
|-------------|----------------------------------|--------------------------|
| 24 Fibre | | <input type="checkbox"/> |
| 48 Fibre | | <input type="checkbox"/> |

Testing facilities available for the following

- Attenuation Co-efficient (1310 nm, 1550 nm)
- Visual material verification and dimensional checks as per approved drawings
- Rated/ultimate Tensile Strength
- Lay length measurements

V. METERS

Energy Meters

| Description | Manufacturing Capacity (Units/Year) | Testing facilities |
|------------------|-------------------------------------|--------------------------|
| 0.2 Class | | <input type="checkbox"/> |
| 0.2s Class | | <input type="checkbox"/> |
| Others, specify: | | <input type="checkbox"/> |

Testing facilities available for the following

Test on raw materials

- Component testing as per the relevant component specification
- Circuit card Assembly testing before burn-in
- Circuit Assembly burn-in
- Circuit card Assembly. Testing after burn-in

Routine/Acceptance tests

- AC High voltage tests
- Insulation resistance test
- Burden test
- No-load test
- Test of Accuracy requirement
- Starting current test
- Vibration test
- Test of meter Constant
- Reliability test
- Shock test
- Magnetic Induction of external origin (AC and DC)
- Tamper & Fraud Protection