

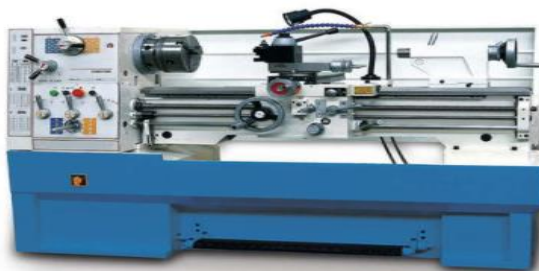





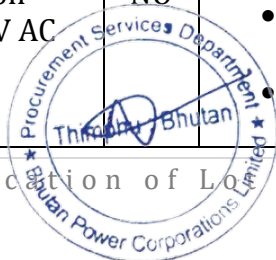
TECHNICAL SPECIFICATIONS OF LOT 2 (ELECTRICAL EQUIPMENT)




| Item No. | Item Description | Unit | Technical Specification | Sample Picture |
|----------|--|------|---|---|
| 2(1) | Portable air compressor machine with pipe, spray gun & accessories | SET | Portable Air compressor machine with pipe, spray gun, Capacity 0.5 HP, Battery with spray gun Battery voltage not less than 18V Lithium Ion battery pack Rechargeable and cordless |  |
| 2(2) | Transformer oil dielectric breakdown voltage tester, Portable type, AC 230V operated | SET | Transformer oil dielectric breakdown voltage tester. <ul style="list-style-type: none"> ● Operation: Automatic. ● Display: Not less than 2.8 inch colour display. ● Suitable for all oil breakdown testing to not less than 90 kV. ● Automatic 1-minute timer for easy withstand testing. ● Both battery and 230 V AC operated. Portable type (30 kg max.), ● Protection: Safety Interlocks, ● Operating Altitude: 2500m, ● Frequency: 50 Hertz | |
| 2(3) | Transformer oil filtration plant complete set | SET | Refer page 9 Technical specification of Lot 2 for detailed Technical Specification and Guaranteed Technical Particular. | |



| | | | | |
|------|----------------------|-----|--|--|
| 2(4) | Digital Lux Meter | NO | <p>Digital Illuminance Meter Measurement: Illuminance as irradiation</p> <p>Required Specification Range Max.: min. 200,000Lux (Lx) Resolution: min. 0.1Lx. Irradiance 1kW/m^2 = around 116,000Lx ~120,000Lx.</p> |  |
| 2(5) | Manual Lathe Machine | NO | Refer page 16 Technical specification of Lot 2 for detailed Technical Specification. |  |
| 2(6) | Pipe Bending Machine | SET | <p>Hydraulic Pipe Bending Machine Size: 3/8 to 6 inches, Bending Angle: Up to 90 Degree, Pump Force: 7 Tones, No. of Formers: 4, Net Weight: 42 kg, Gross Weight: 60 kgs</p> |  |



| | | | | |
|------|-----------------------------------|-----|--|--|
| 2(7) | Industrial Scrubber Dryer Machine | NO | <p>Scrubbing Width:500 mm, Effective suction width: 850 mm, Theoretical area coverage:2000 m.sq/hr, Working speed up to: 4 km/h, Airflow rate:28 L/sec, Vacuum pressure:1087 mm of H2O, Power Supply:230/50 V/Hz, Total Power:1400 W, Brush Motor:800 W, Vacuum motor power:400 W, No. of brushes:1, Diameter of brush:500mm, Brush Speed:180 rpm, Brush Load:26 kg, Fresh water tank:45 L, Dirty water tank:45 L, Dimensions (L*W*H) : 1360*545*1140 mm, Total weight empty:92 kg, Total weight ready to operate:138 kg</p> |  |
| 2(8) | Hydraulic Press (50T) | SET | <p>Ram max applied force: 100,000 lbs. (50 tons) Ram maximum stroke: 7-7/16" Ram diameter: 2-1/4" Maximum distance to table: 39" Minimum distance to table: 9-1/4" Hand winch lifting capacity: 1000 lbs. Working air pressure: 110-125 PSI Bed support pin diameter 1-3/16" Bed adjustment holes: 8 Bed adjustment hole spacing: 6" On center Hydraulic fluid type: Standard hydraulic jack oil Footprint: 39-1/2" L x 27-1/2" W Overall dimensions: 51" W x 36" D x 68" H</p> |  |


| | | | | |
|-------|--|-----|---|---|
| | | | Approximate shipping weight: 540 lbs. | |
| 2(9) | Conductor Turn Table | NO | Turn table, 5 Ton capacity, suitable to use for winding and pay out of ACSR conductor during conductor stringing operation, Material: mild steel. |  |
| 2(10) | Pallet Trolley | NO | <ul style="list-style-type: none"> • Lift Capacity: Minimum 2500 kg • Fork Length: Not less than 1150 mm • Width Overall Fork: Not less than 550 mm • Lower Fork Height: Not less than 80 mm • Max Lifting Height: Not less than 200 mm • Steering Wheel: Not less than 200x50 mm • Roller Small: Not less than 80x70 mm |  |
| 2(11) | Fusion Splicing Machine | SET | Refer page 17 Technical specification of Lot 2 for detailed Technical Specification. |  |
| 2(12) | Portable Diesel Generator 1.5kVA-5kVA, HPM Non-Silent GE-3500D, 230V AC | NO | <ul style="list-style-type: none"> • Max AC Output: Petrol fuel version engine = 4500 VA (4.5 kW output), • Alternator: 415 Volt , • Brushless with Rare Earth Magnet Rotor, • Engine: OHV, 4 Stroke, Air cooled, Engine (100% Indian make engine and spare parts), • Starting System: Recoil/Rope Start & Self Start option (Key start), |  |

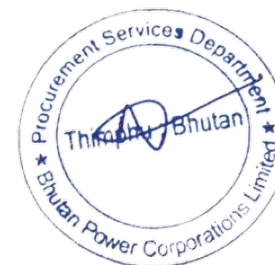


| | | | | |
|-------|---------------------------------------|----|--|---|
| | | | <ul style="list-style-type: none"> Fuel Consumption: 1 Ltr/Petrol/HR, Fuel Tank Capacity:20 Ltr. Petrol, Net Weight:60 Kg only, Compact & light weight. | |
| 2(13) | Electric Fork Lift (2 Tons) | NO | Refer page 19 Technical specification of Lot 2 for detailed Technical Specification. |  |
| 2(14) | Diesel Generator cum Welding Machine | NO | Portable Diesel Generator cum welding machine: <ul style="list-style-type: none"> Maximum O/P @60%duty cycle:140A, Working voltage: 20-30V, Current regulation: 40-140A, Type :brush less with rear earth magnet rotor, AC voltage on power mode:250+/-5%, Single phase, Maximum Power: 6.5HP, starting system: recoil/electric start, Fuel tank: 21Ltr. |  |
| 2(15) | Single Phase Electric Welding Machine | NO | Single phase arc welding machine 230V: <ul style="list-style-type: none"> Amperage control range: 40-150A, Open CKT voltage: 50V, Welding cable connection:12 mm dia; Max. electrode size: 3.25 mm, Dimension:360x250x240; Weight:20-25kg |  |

| | | | | |
|-------|---------------------------|-----|---|---|
| 2(16) | Portable Generator, 2kW | NO | <ul style="list-style-type: none"> • Model No. : EP1000 • Description code: EEHD • Length: 404mm • Width: 352mm • Height: 431mm • Dry mass (Weight): 27.8Kg • Engine type: 4 stroke, overhead valve, single cylinder • Displacement: 79.7cm³ • Bore x stroke: 46 x48 mm • Cooling system: Forced air • Ignition system: Transistorized magneto ignition. • Oil capacity: 0.36L • Fuel tank capacity: 3.6L • Spark plug: LR4C-E (NGK) • Rated volatge:230V • Rated frequency: 50Hz • Rated ampere: 3.3A • Rated output: 0.75KVA • Max Output: 0.85KVA |  |
| 2(17) | Local Earthing with spike | SET | <p>Certified According to the Standard IEC 61230</p> <ul style="list-style-type: none"> • 3 aluminium alloy clamps closing by automatic spring activation for cylindrical • Conductors with diameter between 8 and 30 mm. • 1 clamp dispenser head with recovery hook. • 2 copper cables with PVC insulation of (16, 25, 35, 50, 70 mm²) section • Depending on model and 2.5 m long. • 1 copper cable with PVC insulation of (16, 16, 25, 35, 50 mm²) section • Depending on model and 15 m long. • 1 metallic spool to store the 15 m of earthing cable. • 1 telescopic pole (1.15 m folded and 2 m extended). • 1 earthing rod. • 1 plastic case to store and transport the equipment. |  |

| | | | | |
|-------|--|-----|--|---|
| | | | <ul style="list-style-type: none"> 1 bag to store and transport the pole and the earthing rod. Can be used on 33kV/11kV system voltage Portable and easy to carry to site. Total weight of the set should not exceed 9.5 kg <p>A sample should be submitted. Bid without samples shall be considered non-responsive.</p> | |
| 2(18) | Meter Testing Equipment | NO | Refer page 21 Technical specification of Lot 2 for detailed Technical Specification and Guaranteed Technical Particular. |  |
| 2(19) | 5kVA Telecom Invertor | NO | Refer page 29 Technical specification of Lot 2 for detailed Technical Specification. | |
| 2(20) | (EHT 1250 MAX-3) Offline Overhead EHVAC Transmission Line Analyser | SET | Refer page 30 Technical specification of Lot 2 for detailed Technical Specification. | |
| 2(21) | Motorized oil pump | NO | Refer page 35 Technical specification of Lot 2 for detailed Technical Specification. |  |

| | | | | |
|-------|---------------------------------|----|---|---|
| 2(22) | Oil hand pump manually operated | NO | <p>Hand-crank rotary pump JP-11 for low-viscosity non-combustible fluids such as diesel, oils, mineral oils</p> <ul style="list-style-type: none"> • Material: Aluminium and galvanized steel NBR seals, • Flow rate: 1l/revolution, changing from forward to backward pumping at any time. • Head: 15m • Horizontal distance: 50m • Pump with outlet hose and barrel adapter G 2" |  |
|-------|---------------------------------|----|---|---|



Technical Specification of Item No. 2(3)

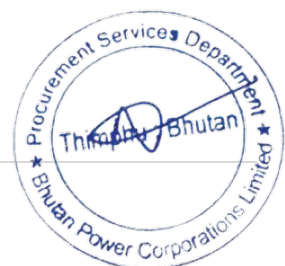
Double Stage High Vacuum Transformer Oil Filtration Machine (6000 ltr/hr or 100 ltr/min)

Description

- The plant shall be suitable for treating transformer oil by first heating it and then passing it through specially designed filter and then subjecting it to vacuum treatment which dehydrates and degasifies the oil.
- The Plant shall generally conform to **IS: 6034-1989** and its latest revision. The Oil Filtration Plant shall be designed for high vacuum and low temperature of oil for achieving required results.
- The Oil Filtration Plant shall be caster wheel mounted and supplied with adequate (at least 6) rubber caster arrangement provided for mobile operation of the machine inside the factory.
- The Plant shall be weather proofed and shall be suitable for both indoor and outdoor use. The casing shall be provided with doors of CRCA sheets, hinged on fabricated frame work, angles and channels to have access to the operational controls and inspection windows etc.
- The equipment shall be enclosed and protected against climatic conditions.
- All components shall have adequate strength and rigidity to withstand normal conditions of handling transport and usage and shall be free from edges or corners to avoid injury to operating personnel in normal conditions of use.
- The design of the Plant shall be such that if required the part/s can easily be replaced.
- Proper guarding arrangement shall be provided on all such parts which due to their position and nature of operation are liable to cause accidents.

Minimum Performance Requirement:

- a) Double stages vacuum pump, horizontal double vacuum dehydration, degasification vessels and blower capable of pulling vacuum down to 0.05 mbar.
- b) High efficiency three stage micro filter elements with capable of removing 99.5% particles as small as 1 micron.
- c) Achieving soluble air and gas content of $\leq 0.05\%$ and dielectric strength of $\geq 60\text{kV}$ per ASTM 877.
- d) The Transformer Oil Filtration Machine can process maximum moisture content 1000 ppm and achieve overall water content of ≤ 3 PPM By vacuum dehydration to remove free, emulsified and dissolved water.



Specifications

| | | |
|------------------------------|---------------------|-----------------------------|
| Capacity(L/min) | | 100L/Min or (6000L/hour) |
| Vacuum pressure | | -0.08~-0.099 Mpa |
| Working pressure | | ≤ 0.4 Mpa |
| Ultimate vacuum | | ≤ 5 Pa |
| Temperature range | | 20-80℃ |
| Breakdown voltage | | ≥ 60KV |
| Parameter after purification | Water content | ≤ 3ppm |
| | Gas content | ≤ 0.05% |
| | Filtering rate | ≥ 99.5% |
| | Filtering precision | ≤1 micron |
| Continuous work | | ≥200 hr |
| No failure running | | ≥5000 hr |
| Power supply | | 400V (+/-10%), 50Hz, 3Phase |
| Working noise | | Not more than 65 dB |
| Heating power (kw) | | Not less than 60 |
| Total power (kw) | | Not less than 68 |

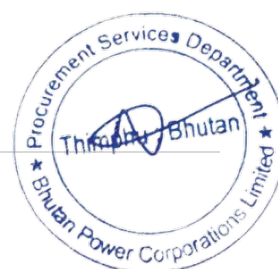
The Plant shall consist of at least the following parts:

1. Inlet Pump

A positive displacement gear type pump with a capacity of 6000 LPH shall be provided. The pump shall be thoroughly tested for vacuum and shall be suitable for continuous trouble free operation. The pump shall be provided with automatic protection against over-pressure build up. Interlocking arrangement shall be provided in between the oil inlet pump and the heater so that heater cannot be energized unless inlet pump is on. Interlocking arrangement shall be provided in the filter Plant between the inlet pump and high level float switch (located into degassing column) to avoid excessive rise of oil in the degassing column). For adjustment of flow rate through filter, a flow control valve shall be provided across the Gear pump.

2. Heaters

- Heaters shall be provided in protection tubes to avoid localized overheating, hot spot and breaking of oil.
- Heaters shall be capable of heating oil from 30°C to 60°C because, temperature during degassing and dehydration for good results should not exceed 60°C.
- Heaters shall be thermostatically controlled.
- Total heater power shall be not less than **60 KW**.



- Heaters shall be divided into **two** groups.
- Heater elements shall be of nichrome / Kanthal wire filament, inserted in refractory formers which are located in protection tubes.
- Construction of the heat exchanger shall be such that the replacement of heaters shall be easy and shall not require any special tools.
- Heaters shall be interlocked with gear pump and shall not be in on position, unless the inlet pump is working.
- Heater tank shall be adequately thermally insulated to minimize loss of heat.
- Each group of heaters shall be controlled by individual thermostat.
- A safety thermostat shall be provided to take care of any accidental rise of temperature of oil and shall put off the heaters in such eventuality.
- This thermostat shall be set at slightly higher temperature than that of controlling thermostats.
- One suitable pressure relief valve shall be provided on the heater chamber to prevent any pressure rise above the acceptable limit.
- A Drain valve for the heater tank shall be provided.

3. Filtration System

Filtration system shall consist of the following:

- Preliminary Filter:** The main function of this filter shall be to prevent any damage to the inlet pump. It shall have strainers capable of retaining all particles above **1 mm** size and also magnetic particles. Incoming oil shall pass through this filter. It shall be possible to clean the strainer without dismantling the filter from the pipeline.
- Filter Press:** Filter press shall consist of filters held between metallic discs. Filters shall be easily changeable. It shall be suitable for removal of particles bigger than **50 microns**. This shall be useful for removal of sludge content in the used oil. A drain valve shall be provided for the filter chamber.
- Cartridge Filter:** Non-hygroscopic throw away type Cartridge Filters of **1-micron** rating shall be provided. Cartridge Elements shall be made of resin impregnated fibers. This Cartridge Elements shall have large dust holding capacity. The replacement of Cartridge Elements should be very easy and can be done without any special tools. The Housing shall be suitable for high vacuum and pressure applications. Compound (Pressure / Vacuum) gauge shall be provided on filter vessel for inlet pressure indication in order to ascertain condition of Cartridge Elements. Aeration shall be provided on the Filter Vessel to aerate the Vessel during draining. The Cartridge type filter shall facilitate to achieve desired value of particle size in 1 micron. A Drain Valve shall be provided for the filter chamber.



4. Vacuum Pumping System (for Degassing Column)

Following Roots-Rotary combination of Vacuum pumps shall be provided for evacuation of degassing chamber. The pumps shall be of very good quality.

- a. **First Stage – Rotary Oil Sealed Pump (1 No.),**
- b. **Second Stage – Mechanical Booster (Roots Pump) (1 No.)**

The vacuum pumping system shall have following accessories:

- a. Vacuum Gauge (Digital Type)
- b. Vacuum Gauge (Bourdon type),
Range: 0 to (-) 760 mm of Hg
- c. Isolation valve.
- d. Non-Return Valve.
- e. Automatic By-pass valve for Roots Pump.

This system shall be capable of achieving the prescribed vacuum in the degassing chamber.

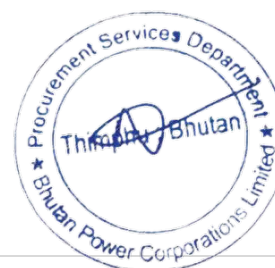
5. Degassing & Dehydration Chamber – Two Stage

The degassing chamber shall function as degasser and dehumidifier and shall be capable of removing dissolved gases and moisture from the oil. It shall be of M.S. and shall have welded construction. The chamber shall be able to withstand the vacuum to which it shall be subjected.

Efficiently spread Raschig Rings shall be placed in the degassing columns. The surface area offered by the Raschig Rings shall be sufficient to form a thin film of oil and shall facilitate removal of dissolved gases and moisture at the rated flow rate of oil. A sight glass with illuminating lamp shall be provided for observation of oil flow. One Float Switch on the Degassing Chamber shall be provided for preventing excess rise of level. It shall be electrically interlocked with inlet pump. Another float switch to control the low level of the oil in Degassing Chamber shall be provided and it shall be electrically interlocked with the discharge pump. Two stages shall be separated by a siphon seal.

6. Discharge Pump

A centrifugal mono block (glandless) type discharge pump with a prescribed capacity, suitable for sucking oil from chamber held under vacuum, shall be provided. This shall be fully tested for pressure and vacuum leak rate. Interlocking arrangement shall be provided between low level float switch (located in degassing column) and discharge pump to prevent dry running of discharge pump.



7. Electro-Magnetic (Solenoid) Valves at Inlet & Outlet

One no. Electro-magnetic valve at inlet and one at outlet shall be provided. Valve at the inlet and outlet shall be open automatically. The moment oil inlet and outlet pump are switched on. In case of power failure, these valves shall be capable of preventing the oil from entering into the Plant and thus avoiding the possibility of mixing processed oil with unprocessed oil.

8. Oil Sampling Valve

This valve shall be provided to collect the sample of oil for testing during operation.

9. Airing Valve

One airing valve for airing the degassing chamber shall be provided.

10. Gauges and Instruments

A dial type thermometer shall be provided at outlet and inlet of the heater tank for indication of oil temperature.

Pressure Gauge

One Pressure Gauge before Cartridge Filter and one Compound Gauge shall be provided near Degassing Column.

Independent Drives

Independent drives for Oil Discharge Pump, Oil Inlet Pump and Vacuum Pumps shall be provided.

Motors shall conform generally to IS: 325 (testing) and shall be of class 'F/H' insulation. Starters shall be of direct on-line type.

11. Control Panel

All electrical control gear, mains isolating arrangement, starters, contactors, pilot lamp, push buttons, HRC fuses, relays, indicating lamps and interlocking shall be housed in a compact control panel and made of CRCA sheets. A mimic diagram with indicating lamps shall be provided on the control panel. All wiring shall be neatly routed and all wire termination shall be suitably identified with ferrules. The Plant shall be suitable for operation on 400V, 3 ph, 4 wire 50 Hz. A.C. Supply. There shall be indication of R,Y,B ON led indication on the control panel.

12. Oil Hoses – 2 Nos.

Two nos. Nitrile Rubber Hoses each 10 meters long with flanged end connection on both sides shall be provided. One for oil inlet and one for oil outlet. Oil hoses shall be capable of handling the transformer oil at 100 °C (max.) and vacuum.

13. Lifting Hooks

Lifting Hooks for Plant shall be provided to facilitate ease of Plant loading / unloading.

14.Pre-dispatch inspection:

The Plant shall be offered for inspection and testing with transformer oil at your works. The firm shall demonstrate the Plant performance as per parameters mentioned in the specifications. Further following tests shall be carried out at manufacturer's works on the oil filtered by the filtration machine:

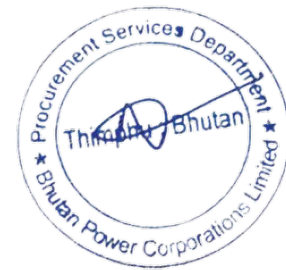
- | | |
|------------------------|---------------------------------|
| a. Break down voltage | d. Gas content |
| b. Moisture content | e. Plant flow rate confirmation |
| c. Suspended particles | |

15.Following spares shall be supplied along with the machine.

- ✓ All rubber parts ('O'-rings & gaskets) -1 Set
- ✓ Cartridge (fine) Filter - 2 Set
- ✓ Coarse Filter (Filter Press) - 2 Set
- ✓ Pressure Gauge - 1 No.
- ✓ Vacuum Gauge - 1 No.
- ✓ Thermostat - 2 Nos.
- ✓ Thermometer - 1 No

16.Operation and maintenance manual

Two numbers of hard copy operation and maintenance manual shall be provided.



GTP for Bidders to Submit

| Parameters | | Offer |
|------------------------------|---------------------|-------|
| Model No. | | |
| Manufacturer/ Brand | | |
| Capacity(L/min) | | |
| Vacuum pressure | | |
| Working pressure | | |
| Ultimate vacuum | | |
| Temperature range | | |
| Breakdown voltage | | |
| Parameter after purification | Water content | |
| | Gas content | |
| | Filtering rate | |
| | Filtering precision | |
| Continuous work | | |
| No failure running | | |
| Power supply | | |
| Working noise | | |
| Heating power (kw) | | |
| Total power (kw) | | |



Technical Specification of Item No. 2(5): Manual Lathe Machine

| PARTICULARS | Requirement |
|---------------------------|-----------------------------------|
| Driven Type | ALL GEARED TYPE |
| Automation Grade | Semi-Automatic |
| Layout | Horizontal |
| Swing Over bed | 410mm(16") |
| Swing Over Cross slide | 255mm(10") |
| Swing in Gap Diameter | 580mm(23") |
| Length of Gap | 190mm(7-1/2") |
| Admits Between | 1000mm(40") |
| Center height | 205(8") |
| Width of bed | 250(10") |
| Spindle nose | D1-6 |
| Spindle bore | 52mm(2") |
| Taper of Spindle nose | No.6 Morse |
| Range of spindle speed | 16 Changes 45-1800r/min |
| Compound rest travel | 140mm(5-1/2") |
| Cross slide travel | 210mm(8-1/4") |
| Lead screw thread | 4T.P.I |
| Max. section of tool | 20x20mm(13/16") |
| Longitudinal feeds range | 0.05-1.7mm/rev(0.002"-0.067"/rev) |
| Cross feeds rang | 0.025-0.85mm(0.001"-0.0335"/rev) |
| Threads metric pitches | 39kinds 0.2-14mm |
| Threads imperial pitches | 45kinds 2-72T.P.I |
| Threads diametral pitches | 21kinds 8-44D.P |
| Threads module pitches | 18kinds 0.3-3.5M.P |
| Quill diameter | 50mm(2") |
| Quill travel | 120mm(4-3/4") |
| Quill taper | No.4 Morse |
| Cross adjustment | ±13mm(±1/2") |
| Main motor power | 2.2/3.3Kw(3/4.5 HP)3 PH |
| Coolant pump power | 0.1kW(1/8HP),3PH |



Technical Specification of Item No. 2(11)

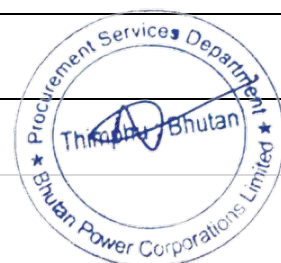
| Technical Specs for Fusion Splicing Machine (Brand restricted/preferred brand : FUJIKURA) | | |
|---|----------------------|---|
| Parameters | | Value |
| Fiber alignment method | | Active core alignment |
| Fiber count can be spliced | | Single fiber |
| Applicable fiber | Fiber type | Single mode fiber |
| | | Multi mode optical fiber |
| Applicable coating | Cladding dia. | 80 to 150 μ m |
| | Sheath clamp | Coating dia.: Max. 3,000 μ m Cleave length : 5 to 15mm*1 |
| Fiber splice performance | Splice loss *2 | ITU-T G.652 : Avg. 0.02dB |
| | | ITU-T G.651 : Avg. 0.01dB |
| | | ITU-T G.653 : Avg. 0.04dB |
| | | ITU-T G.654 : Avg. 0.04dB |
| | | ITU-T G.655 : Avg. 0.04dB |
| | | ITU-T G.657 : Avg. 0.02dB |
| | Splice time *3 | SM FAST mode : Avg. 7 to 9sec. |
| | | AUTO mode : Avg. 14 to 16sec. |
| Applicable protection sleeve | Sleeve type | Sleeve type Heat shrinkable sleeve |
| | Sleeve length | Sleeve length Max. 66mm |
| | Sleeve dia. | Sleeve dia. Max. 6.0mm before shrinking |
| Sleeve heat performance | Heat time *4 | 60mm slim mode : Avg. 9 to 10sec. |
| | | 60mm mode : Avg. 13 to 15sec. |
| Fiber tensile test force | | Approx. 2.0N |
| Electrode life *5 | | Approx. 5,000 splices |
| Physical description | Dimensions W | Approx.170mm without projection |
| | Dimensions D | Approx.173mm without projection |
| | Dimensions H | Approx.150mm without projection |
| | Weight | Approx. 2.8kg including battery |
| Environmental condition | Temperature | Operate : -10 to 50 degreeC |
| | | Storage : -40 to 80 degreeC |
| | Altitude Max. 5,000m | Max. 5,000m |
| AC adaptor | Input | AC 100 to 240V, 50/60Hz, Max. 1.5A |
| Battery pack | Type | Rechargeable Lithium Ion |
| | Output | Approx. DC14.4V / 6,380mAh |
| | Capacity *6 | Approx. 300 splice and heat cycles |
| | Temperature | Recharge : 0 to 40 degree C |
| | Battery life *7 | Approx. 500 recharge cycles |
| Display | LCD monitor | TFT 5 inches with touch screen |
| | Magnification | 200 to 320x |
| Illumination | V-grooves | LED lamp |
| Interface | PC | PC USB2.0 Mini B type |
| | External LED lamp | External USB2.0 A type Approx. DC5V, 500mA |
| | Ribbon Stripper | Mini DIN 6pin DC12V, Max. 1A |
| Data storage | Splice mode | 100 splice modes |
| | Heat mode | 30 heat modes |
| | Splice result | 20,000 splices |
| | Splice image | 100 images |

| | | |
|-----------------------|---------------------|---|
| Screw hole for tripod | | 1/4-20UNC |
| Other features | Automatic functions | Splice mode select by fiber type analysis |
| | | Discharge power calibrations |
| | | Wind protector: open/close |
| | | Sheath clamp: open |
| | | Heater lid: open/close |
| | | Heater clamp:open/close |
| | Sheath clamp | Easy sleeve positioning clamp |
| | Electrode | Replaceable without tool |

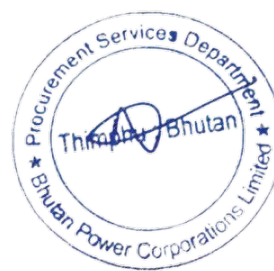


Technical Specification of Item No. 2(13): Electric Fork Lift

| Sl .No. | Parameters | Requirement |
|----------------------------|--|------------------------------------|
| 1. Characteristics | | |
| 1.1 | Power Unit | Battery |
| 1.2 | Operation | Seated |
| 1.3 | Load Capacity | 2000 kg |
| 1.4 | Load Centre | 500 mm |
| 1.5 | Axle Centre to Fork Face | 400 mm |
| 1.6 | Wheel Base | 1400 mm |
| 2. Weight | | |
| 2.1 | Service Weight | 3170 kg |
| 2.2 | Axle Load Laden, Front/Rear | 4480/690 kg |
| 2.3 | Axle Load unLaden, Front/Gear | 1250/1920 kg |
| 3. Wheels and Tires | | |
| 3.1 | Tyre | Solid (STD) , Pneumatic (Optional) |
| 3.2 | Tyre Size Front | 21x7x15' |
| 3.3 | Tyre Size Rear | 18x7-8-12' |
| 3.4 | Wheel, Number Front/Rear (x drive) | 2x2 |
| 3.5 | Tract Width Front | 990 mm |
| 3.6 | Tract Width Rear | 920 mm |
| 4. Dimensions | | |
| 4.1 | Mast Titlt, Forward/Backward | 6/10 degree |
| 4.2 | Mast Height, Lowered | 2350mm |
| 4.3 | Max Lift | 3500mm |
| 4.4 | Mast Height Extended | 4100 mm |
| 4.5 | Height of Overhead Guard | 2140 mm |
| 4.6 | Length of fork face | 2100 mm |
| 4.7 | Overall Width | 1150 mm |
| 4.8 | Fork Dimensions | 40x100x1070 mm |
| 4.9 | Fork Carriage, ISO Class | 2A |
| 4.10 | Fork Spread | 960 mm |
| 4.11 | Ground Clearance at Frame | 120 mm |
| 4.12 | Aisle width pallet 1000x1200 across fork | 3550 mm |
| 4.13 | Turning Radius | 1900 mm |
| 5. Performance | | |
| 5.1 | Travel Speed, with/without load | 11/11 km /hr |
| 5.2 | Lifting Speed, with/without load | 0.25/0.35 m/sec |



| | | |
|-----------------|-----------------------------------|-------------------------|
| 5.3 | Lowering Speed, with/without load | 0.45/0.4 m/sec |
| 5.4 | Gradability, with/without load | 17/17 % |
| 5.5 | Service Break | Hydraulic |
| 6. Drive | | |
| 6.1 | Motor Type | AC Motor |
| 6.2 | Drive Motor | AC, 8kW, 60 min rating |
| 6.3 | Lift Motor Rating | DC, 8 kW, 15 min rating |
| 6.4 | Battery Voltage/Rated Capacity | 48 V,440V/AH |
| 6.5 | Battery Weight | 730 kg |



Technical Specification of Item No. 2(18)

PORTABLE THREE PHASE / SINGLE PHASE ELECTRONIC REFERENCE STANDARD METER CAPABLE OF TESTING OF LT/HT/DIRECT CONNECTED METERS

1. Scope

This specification covers the general requirement of design, manufacturing, testing before despatch, supply and delivery of Portable Electronic Reference standard meter of accuracy of 0.1% in direct mode and 0.2% with clamp on CT's for 120A.

2. Application

The function of the Portable Electronic Reference Standard Meter shall be suitable to measure the system parameters and verify the accuracy of three phase and single phase energy meters in the laboratory and at site without disconnecting consumers supply when used with the clamp-on CT.

The Portable Electronic Reference Standard Meter shall be extensively used in field & laboratory for verification of the accuracy of all types of three phase whole current, LT/HT-CT operated and single phase energy meters.

The portable reference standard shall have features to display: Coloured Graphic Screen to show vector diagram (for installation check). Harmonics Analysis for selected voltage, current, Power (Active, Reactive & Apparent) from 2nd to 31st (Minimum) harmonics, for analysing the quality of power. The instrument shall have real time waveform display for selected voltage & current circuits.

The reference standard shall have built-in memory to store customer information at site. The reference standard shall have provision to pre-load customer information for selected customer to allocate the saved database to measured results to save time during testing at site.

3. System Technical Data

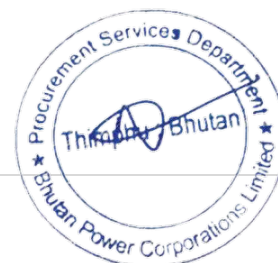
The Electronic Reference Standard Meter shall be suitable to test energy meters under the following conditions:

- | | | |
|-----|----------------|---|
| 3.1 | Voltage Range | : 46V...300V (Phase to Neutral) |
| 3.2 | Frequency | : 45Hz...65Hz |
| 3.3 | Power Factor | : zero Lag-unity-zero Lead |
| 3.4 | Current Ranges | : 1mA...12A Direct : 100mA...120A with Clamp on CT, 120A |

4. Service (Climatic) conditions:

The equipment to be supplied against this specification should be capable of performing and maintaining the required accuracy for satisfactory operation under all tropical conditions mentioned below:

- | | | |
|-----|------------------------------------|-------------|
| 4.1 | Maximum ambient temperature | : 50 Deg. C |
| 4.2 | Minimum ambient temperature | : -5 Deg. C |
| 4.3 | Average daily ambient temperature | : 40 Deg. C |
| 4.4 | Minimum relative humidity | : 25% |
| 4.5 | Maximum relative humidity | : 90% |
| 4.6 | Annual average ambient temperature | : 40 Deg. C |



5. Standard applicable:

Unless otherwise specified elsewhere in this specification, the Portable Reference Standard Meter shall conform to relevant clause of the following standards in all respects including performance and testing thereof to the following Indian / International Standards to be read with up to date and latest amendments / revisions thereof:

IEC 687 : Alternating current static watt-hour meters for Active Energy
IS 12346 : Testing equipment for AC Electrical Energy Meters

6. General Requirements:

- 6.1 All the materials, electronic and power components and ICs used in the manufacturing of the meter shall be of the highest quality and reputed make to ensure higher reliability, longer life and sustained accuracy.
- 6.2 The electronic components shall be mounted on the PCB using latest surface mount technology (SMT).
- 6.3 The Electronic Reference Standard Meter shall be of rugged construction, lightweight and shall be portable and handy. It shall have ergonomic design.
- 6.4 Clamp-on CT along with a suitable connecting cable and a set of voltage leads with suitable crocodile clips which enable the testing without isolating or interrupting the supply of the consumer shall be supplied along with Electronic Reference Standard Meter. The error compensation for the Clamp CT (120A) shall be along with the CT and not inside the equipment. This is desirable to allow any CT set to be used with any other portable equipment.
- 6.5 All error calculator shall be incorporated in the Electronic Reference Standard Meter, which shall have facility to calculate error in percentage of meter under test by feeding the meter constant and number of revolutions for which meter was tested with Electronic Reference Standard Meter, through the inbuilt keyboard.
- 6.6 The keyboard of the equipment shall be organised in form of alphanumeric matrix. The equipment should preferably have Human Touch Interference for easy operation.
- 6.7 The Portable Reference Standard shall have TFT LCD graphic colour display of minimum 3.5" size. The graphic display should be able to display voltage / current waveforms along with network analysis features: Harmonic and distortion analysis in graphic form. The resolution of display shall be VGA 320X240 pixels minimum.
- 6.8 Reference standard shall have non-volatile memory to store measurement results, for at least 20,000 customers, along with customer data, installation data, and special attribute tests related to site. It should be possible to preload customer information, installation information and special attributive tests information into the instrument for at least 5 sites. It should be possible to assign and allocate particular site and installation information to the actual measurement results.
- 6.9 The equipment shall be equipped with USD2.0 or RJ45 Ethernet port for Direct Connectivity to PC.
- 6.10 The equipment preferably should have WI-FI/Bluetooth Wireless Interface for connectivity with WAN/Local network. The equipment shall have webserver for connection to any mobile device.

7. Standard Rated Current and Maximum Current:

The Portable Reference Standard current range shall be a wide one. In DIRECT mode reference standard shall have current measuring range of 1mA...12A whereas with external CT the current range shall be 10mA...120A for 120A CT clamp.

8. Measurement Mode

The offered equipment should have following measurement modes to test LT/HT CT operated Meters and direct connected type meters, using scanning heads.

- 8.1 Direct Mode: To test LT/HT-CT meters, direct mode for 1A and 5A rating shall be provided.
- 8.2 Clamp-on CT mode: One set of three clamp on type current transformer (CT) along with equipment to test direct connected meters without disconnecting them from circuit. The one CT clamp set shall be of 120A rating,
- 8.3 The equipment should have provision to test Energy Registers of meter under test E.g., Energy Register (Dial Test). It should be possible to test Active, Reactive and Apparent Energy Registers of Meter under Test simultaneously.

9. Accuracy Requirement

The class of accuracy of the offered calibrator shall be 0.1s for Direct mode (10mA...12A) and class 0.2s for Clamp CT100a (100mA...120A). The reference standard should detect appropriate CT clamp or DIRECT mode automatically.

The error compensated CT clamps set shall have error compensation as part of CT secondary cable assembly and not in the instrument internal memory.

The portable reference standard shall carry out accuracy tests using built-in error calculator with Scanning Head suitable for testing Electronic as well as electromechanical meters. Scanning Head should be able to pick LED/LCD output in wavelength range 500-960nm. The scanner should be fast enough to pick pulses of frequency as high as 400Hz.

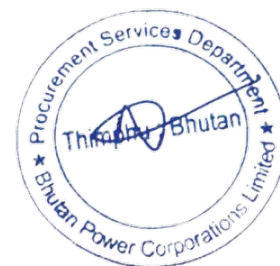
The Equipment should have provision to test Energy Registers of meter under test E.g., Energy Register (Dial Test). It should be possible to test Active, Reactive and Apparent Energy Registers of Meter under Test simultaneously.

10. Display

The display of the Reference Standard Meter shall be of TFT GRAPHIC VGA COLOUR type with minimum resolution of 320x240 pixels. The display shall have size of 3.5" minimum to enable display of voltage/current waveforms in real time mode. The display should also have provision to render network analysis features like: Vector and Harmonics along with distortion measurement.

The Reference Standard Meter shall display the following system parameters namely:

- 10.1 Instantaneous voltage of each phase,
- 10.2 Instantaneous line current of each phase,
- 10.3 Simultaneous display of Active, Reactive and Apparent power,
- 10.4 Instantaneous power factor of each phase & total power factor,
- 10.5 Instantaneous frequency,
- 10.6 Phase sequence,
- 10.7 Active, Reactive (lag/lead) and Apparent three phase energies,
- 10.8 Continuous update of active, reactive (lag/lead) and apparent energies on display, simultaneously,
- 10.9 Instantaneous date and time.



11. Display Resolutions:

Minimum resolution of various parameters shall be as follows:

- 11.1 Voltage : 0.01V
- 11.2 Current : 0.0001 (1A), 0.001(5A), 0.01(200A)
- 11.3 Power Factor : 0.001
- 11.4 Energy : 0.0001(Wh)
- 11.5 % Error Resolution : 0.01

12. Automatic Checking of Connection

The equipment TFT graphic display shall be capable of indicating display for the following conditions using vector display:

- 12.1 Missing potential
- 12.2 Missing current
- 12.3 Reverse current if any current is reverse
- 12.4 Phase sequence "Forward or Reverse"
- 12.5 Over current
- 12.6 Over voltage

13. Memory

The memory of the portable reference standard shall be organized to store customer information, site information, tester information and measurement results and special attributive tests. The memory should be sufficient to store at least 20000 measurement results along with customers' data and date and time stamp. The portable reference standard should store:

- 13.1 Customer information: Name, Address and Contact Info.
- 13.2 Site information: Meter serial number, meter type, CT/PT information
- 13.3 Measurement results: Voltage, Current, Power, % error, Dial test results
- 13.4 Attributive Tests: Site installation tests like: Seal OK, Display OK

All the measured data shall be date and time stamped. The memory management unit software shall be a part of portable reference standard firmware. This shall allow the user to manage memory (delete or erase) in case the memory is full without the use of external software.

It should be possible to preload customer database: Customer information, site information, and special attributive test information into the memory of the unit. The memory should be enough to allow preload of customer database to measurement results at site with ease. The memory management function should be a part of instrument only and not external software.

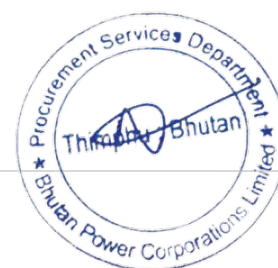
14. Auto diagnosis:

The Portable Electronic Reference Standard Meter should be capable of conducting an automatic built-in internal test, which verifies all indicators whenever it is turned on:

- 14.1 It should display initialization at power up;
- 14.2 It should do self-test and report errors, if any;
- 14.3 It should be able to detect automatically the current measurement mode: Direct or 120A CT clamp mode.

15. Interface:

The reference meter should have interface provisions:



- 15.1 High resolution electrical pulse output to allow testing of portable standard against reference standard of higher accuracy,
- 15.2 Scanning head input to allow counting of pulses from the scanning head,
- 15.3 USB2.0 or RJ45 Ethernet port to allow uploads / download of information from / to portable reference standard,
- 15.4 Wi-LAN interface or WAN and near field PDA connectivity,
- 15.5 Webserver for control and display of measured parameters on portable mobile devices like: Mobile phones, tablets, and laptops.

16. Dial Testing

The portable reference standard shall be able to conduct multiple dial tests using the functional keys of the instrument only. It should be possible to store multiple Dial test results for a single installation only. The equipment shall have provision to perform DIAL TEST for Active, Reactive and Apparent Energies simultaneously. The equipment should perform Maximum Demand Test too along with Energy Registers test.

17. Safety Requirements

The electronic reference standard meter shall be designed and constructed in such a way as to avoid introducing any danger in normal use and under normal working conditions, so as to ensure especially:

- 17.1 Personal safety against electric shock
- 17.2 Personal safety against effect of excessive temperature
- 17.3 Safety against spread of fire.

All parts, which are subject to corrosion, shall be suitably protected and any protective coating shall not be liable to damage by normal handling.

18. Case and window

The Electronic Reference Standard Meter should be housed in a suitable engineering plastic or metal case and any non-permanent deformation of the case shall not affect the satisfactory performance of the equipment.

19. Power consumption

The active power consumption of the Electronic Reference Standard Meter at a reference voltage, frequency, temperature and rated current shall not be more than 1VA per phase in current circuit for direct mode excluding the leads and 20VA per phase in voltage circuit excluding the leads.

20. Carrying case

Each Electronic Reference Standard Meter shall be supplied in an Aluminium/ engineering plastic case suitable for easy portability, rugged used and to prevent damage during transit. The Electronic Reference Standard Meter should be immune to vibrations and shocks in normal transportation and handling.

21. Software

Each Electronic Reference Standard Meter shall be supplied with PC Software. The software shall be suitable for downloading the test results into IBM compatible PC using Communication port. The software shall have facility to generate test report for individual testing and summary report of all test reports.



The offered software shall have facility to convert all stored test results in ASCII file format. The offered software shall be user friendly and menu driven. The supplier shall impart necessary training regarding installation and use of the software.

The software shall have a facility to upload customer information, site information, and special attributive tests information into the memory of the reference standard from its database. It should be possible to upload and download customer database between reference standard and the software.

22. Accessories

Each Electronic Reference Standard Meter shall be supplied with the following accessories:

- 22.1 Common optical sensor for automatic testing, which can be used to sense disc revolutions in electromechanical meters as well as indicating LED and LCD in static meters;
- 22.2 Mounting arrangement (clamp) for the optical sensor;
- 22.3 Clamp-on CT for on-line testing: set of 120A current clamp;
- 22.4 A set of voltage leads with insulated clips;
- 22.5 Current leads to connect Electronic Reference Standard Meter in direct mode;
- 22.6 Serial communication cord with USB/RJ45 connector to retrieve stored data from the Electronic Reference Standard Meter and upload / download the same to a PC;
- 22.7 Snap switch along with cable;
- 22.8 Base Computer Software (BCS) for upload and download of information.

23. Guarantee

The Electronic Reference Standard Meter should be guaranteed for performance for a period of 18 months from the date of commissioning or 12 months from the date of receipt in stores, which date is earlier. The equipment found defective within the above guarantee period shall be repaired / replaced by the supplier free of cost within one month of the receipt of intimation.

24. Tests

24.1 Type Tests:

The Electronic Reference Standard Meter should be type tested at any of the best laboratories by the bidder as per relevant standards and this technical specification. The bidder shall furnish the following type test reports along with the bid:

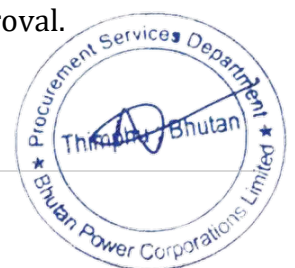
- Test of insulation properties,
- Test of accuracy requirements,
- Repeatability of error test,
- Test of influence quantities,
- Test of operation of optical scanner,
- Test of power consumption.

24.2 Acceptance Tests:

The supplier shall carry out all the acceptance tests as stipulated in the relevant standards and in this specification.

24.3 Routine Tests:

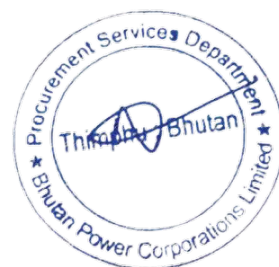
All routine tests as stipulated in the relevant standards shall be carried out and routine test certificates / reports shall be submitted to the Purchaser for approval.



**Guaranteed Technical Particulars of Electronic Reference Standard Meter of Accuracy
0.1s/0.2s for testing of LT/HT Meters**

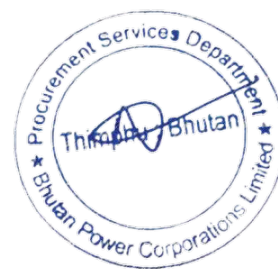
| SL# | Item | Parameters | Bidders to specify |
|-----|--------------------------------------|--|--------------------|
| 1 | Makers name and country | Please specify manufacturer's name | |
| 2 | Type of meter | | |
| 3 | Accuracy Class | 3.1 Direct mode: | |
| | | 3.2 Clamp-on mode: | |
| | | Error compensated CT clamps with compensation as part of CT | |
| 4 | Parameters displayed (YES/NO) | 4.1 Instantaneous voltage, U of every phase | |
| | | 4.2 Instantaneous line current, U of each phase | |
| | | 4.3 Simultaneous display of active (P), reactive (Q) and apparent power (S) | |
| | | 4.4 Instantaneous power factor of each phase & total power factor. | |
| | | 4.5 Instantaneous frequency | |
| | | 4.6 Phase sequence | |
| | | 4.7 Active, reactive (lag/lead) and apparent three phase energies | |
| | | 4.8 Continuous update of active, reactive (lead/lag) and apparent energies on display. | |
| | | 4.9 Time | |
| | | 4.10 Vectorial graphic display | |
| | | 4.11 Harmonic analysis display of U, I, P, Q | |
| | | 4.12 Real time waveform display of selected voltage & current. | |
| 5 | Display Resolution (SPECIFIC VALUES) | 5.1 Voltage: | |
| | | 5.2 Current: | |
| | | 5.3 Power factor: | |
| | | 5.4 Energy: | |
| | | 5.5 % Error Resolution: | |
| 6 | Connection check (YES/NO) | 6.1 Missing potential | |
| | | 6.2 Missing current | |
| | | 6.3 Reverse current if any current is reverse | |
| | | 6.4 Phase sequence "Forward or Reverse" | |
| | | 6.5 Over Current | |
| | | 6.6 Over Voltage | |
| 7 | Type of Display (DESCRIBE) | Specify the type of display and the resolution. | |
| 8 | Interface (YES/NO) | 8.1 USB or RJ45 connector for connecting to the PC | |
| | | 8.2 Scanning head | |
| | | 8.3 Remote snap switch to count pulses | |

| | | | |
|----|--|--|--|
| | | 8.4 Wi-Fi Connectivity | |
| | | 8.5 Webserver for remote connectivity | |
| 9 | Memory (YES/NO) | 9.1 Capacity of minimum 20000 test results | |
| | | 9.2 Upload of customer database for at least 5 customers | |
| | | 9.3 Memory management, part of instrument & external software | |
| | | 9.4 Selection of special attributive tests | |
| 10 | Instantaneous parameters to be logged in memory during each test | 10.1 Customer information | |
| | | 10.2 Site information | |
| | | 10.3 Attributive Test Information | |
| | | 10.4 Measurement results | |
| 11 | Auto detection of current measurement input (YES/NO) | Automatic detection of DIRECT, 120A CT modes | |
| 12 | Functional Checks (DESCRIBE) | 12.1 Accuracy using scanning head (Describe) | |
| | | 12.2 Register Test | |
| | | 12.3 Data storage function. | |
| 13 | Scanning head (YES/NO) | Common for rotor mark & LED pulses to sense pulses up to 500Hz. | |
| 14 | Snap switch | Snap switch to operate equipment remotely. | |
| 15 | Dial test facility | Test of Active, Reactive and Apparent Energy, simultaneously Test of Dial/Counter of Meter under test for all 3 vectors (Active, Reactive and Apparent) in one shot or simultaneously | |
| 16 | Keyboard (YES/NO) | Alphanumeric type | |
| 17 | Carrying case | Describe the type / material of the carrying case. | |
| 18 | Weight in kg | Without case: | |
| | | With case: | |
| 19 | Type Test | Calibration report from recognized lab shall be submitted. Declaration from manufacturer for standards adopted for test of insulation influence quantities (CE Declaration). | |



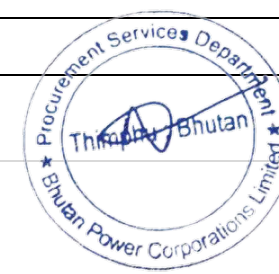
Technical Specification of Item No. 2(19)

| 5kVA Telecom Inverter | |
|-------------------------|---|
| Parameters | Value |
| Capacity | 5kVA/4kW |
| Power factor | 0.8 |
| Phase | DC input/Single phase AC output |
| Working input voltage | DC 40V-60V |
| Output Voltage | 230Vac \pm 2% |
| THD | <3%(linear load) |
| Frequency | 50 Hz \pm (with battery) |
| Crest factor | 3:1 |
| Wave | Sine wave |
| Dynamic characteristics | < \pm 5% (0 \leftrightarrow 100% load) |
| Recover time | <10ms |
| Overload | 125% 1min, 150% 3S |
| Efficiency | >85% (Full load) |
| General Protection | Output Short; Over Voltage ; Overload; Low BATT Voltage |
| Communication | RS232/RS485 |



Technical Specification of Item No. 2(20): Off Line overhead Transmission line fault locator and Line signature analyser kit

| Sl. No. | Parameters | Specifications |
|---------|----------------------------|---|
| 1. | Functional Requirement | <p>The instrument should be suitable to detect and locate the overhead line Fault (including high resistive faults) /Inhomogeneous points etc. in offline mode, in multi circuit overhead transmission line up to 400 kV & 765kV level, as per applicable standards/testing procedure.</p> <p>Capable to do the testing in offline mode from 66kV to 765kV Double circuit lines, when One line is in Off & other circuit is in charged condition.</p> <p>The test results should have repeatability, consistency & immunity to electromagnetic interference in live switchyard/adjacent transmission lines up to 400kV & 765kV levels in all-weather condition.</p> |
| 2. | Range of Operation | 1000 Km (min) |
| 3. | Accuracy | 100 M |
| 4. | Measurement Mode | 3-Phase Simultaneously |
| 5. | Test Leads and accessories | One complete set of cables of sufficient length (min 20 meter) with suitable clamps & connectors, compatible with the instruments should be provided for successfully carrying out the test in sub- station/Transmission line. Additionally all the required accessories, drawing & documents, tools etc. should be provided for the smooth functioning of kit. Further hard carrying case (which should be robust/ rugged enough) for ensuring proper safety of the kit during transportation shall have to be provided. |
| 6. | Design/Engg. | The entire equipment along with complete accessories must be designed/Engineered by Original Equipment Manufacturer. |
| 7. | Technology | Red Zone Technology for assessment of inhomogeneity in the line. |
| 8. | Power Supply | In built battery operated as well as through mains operated. Should work on single phase 230 Volts $\pm 10\%$, 50Hz $\pm 5\%$ supply with standard socket. |
| 9. | Operating Temperature | 0 to +50 deg. C |
| 10. | Relative humidity | Max. 90% non-condensing |
| 11. | Cooling Arrangement | Necessary in built cooling arrangement should be provided to dissipate the heat generated during testing. No external coolant/ accessory shall have to be required. |
| 12. | Weight | It should be easily portable. |



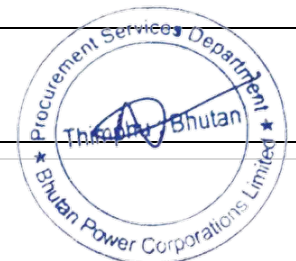
| | | |
|-----|-------------------------|--|
| 13. | Software | The software should be suitable for report generation and trend analysis. The kit should have facility to store and communicate with windows based computer for exporting the test data. |
| 14. | Display | LCD (Backlit type) should have Multi Display for Fault Locator & Signature analyser |
| 15. | Type of Faults | <p>The kit need to be capable of identifying the following types of faults.</p> <p>The kit should also be capable of locating inhomogeneous points on power lines from 66 kV to 765 kV lines.</p> <p>Transmission Line Response Analyser is overhead line fault analyser system, capable of locating and detecting over-head power line faults such as:</p> <ul style="list-style-type: none"> (a) line open (b) line shorting with ground (c) line to line fault (d) Faults like decapping (e) inhomogeneous points. (f) Indicate faults on the spur lines from base location itself without the necessity to transport the equipment to the point of spur tapping. |
| 16. | Data Storage/Analysis | A reputed laptop with latest specification available in the market during the supply of the equipment. The Laptop should be compatible with the equipment supplied for data analysis and for report generation. |
| 17. | Environment | The test kit shall be compatible for EMI/EMC / safety environment requirement as per IEC. |
| 18. | Type Testing | The test kit shall be type tested for Environmental Tests, Emil-EMC & Safety Tests as per relevant IEC Standard. The type test report form NABL accredited lab should be submitted along with the offer. |
| 19. | Warranty/Guarantee | <p>18 months from the date of delivery or 12 months from the date of successful & complete commissioning at sub-station whichever is earlier.</p> <p>All the materials, including accessories, cables, laptops (wherever supplied) etc. are to be covered under warranty / guarantee period. If the kit needs to be shifted to supplier's works for repairs within warranty / guaranty period, suppliers will have to bear the cost of repairs, spares and transportation of kit for repair at service centre/works.</p> |
| 20. | Calibration certificate | Unit shall be duly calibrated before supply and the date of calibration shall not be older than two months from the date of inspection/supply of the kit. |
| 21. | Training | Supplier shall have to ensure that the kit is made user friendly and give proper Training for site Engg |



TECHNICAL SPECIFICATION FOR THE OFFLINE OVERHEAD LINE FAULT LOCATOR & ANALYSER SYSTEM

A. FAULT ANALYZER SYSTEM

| | | |
|-----|---|--|
| 1. | Details of working of the equipment | OFFLINE OVERHEAD LINE FAULT LOCATOR & ANALYSER SYSTEM |
| 2. | Source of supply | |
| | i) Voltage | 230 -250 V AC, 50Hz |
| | ii) Whether AC or DC | Both Mains and Battery operated with built in battery and battery charger. (Both AC & DC operable) |
| 3. | Display of fault data | Should be direct reading in kilometres |
| 4. | Whether portable or not | Portable |
| 5. | Range of operation | 1000 kms and above for Fault Location & 600 kms & above for Line Signature Analysis |
| 6. | Whether it can detect both open and short circuits in the above range. If not, specify the range for each type of fault. | Should detect both open and short circuit faults, decapping, Open Jumpers, faulty insulators etc. |
| 7. | Whether suitable for operation over long period without any repeated calibration or adjustment or reference line or parameter input | Should be suitable |
| 8. | Resolution | +/- 100 meters |
| 9. | Auto calibration | Should be a auto calibrated system that can be used on any line from 66 KV to 765 kV. |
| 10. | Type of fault information | Should be direct reading in kilometre for both low resistance faults & Line Signature Analysis. Signature Analysis data should be directly printable on hard copy and downloadable on Laptop |
| 11. | T- Off / spur Line testing | Kit should be able to locate T-Off Line Faults by using Blanking facility in fault Locator system |
| 12. | Type of circuitry; whether solid state or of electron tube type | Should be solid state type |



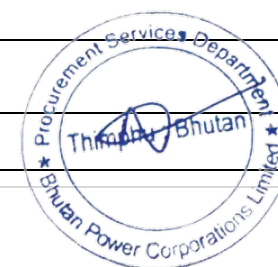
| | | |
|-----|--|---|
| 13. | Details of testing and demonstration facilities provided | Suitable to test using Simulator |
| 14. | Type of construction Rugged & solid copolymer Polypropylene portable & transportable casing. | Type of construction |
| 15. | Laptop accessory | Should be integrated with the data management software so as to facilitate easy inference of the test data. |
| 16. | Connecting hook rods | Long rods for connecting to 66 KV to 765 kV lines with Teflon cables. |

B. 3-PHASE HEAVY DUTY ADAPTER UNIT

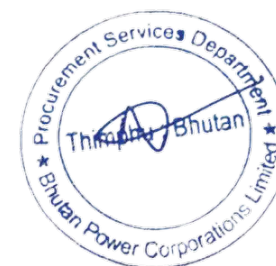
- Complete suppression of all induced voltages from adjacent charged lines including double circuit / Multi circuit line. Up to 100kV measurable - In Volt
- Automatic impedance matching for all lines from 66 KV to 765 KV level
- In built filter modules to eliminate HVDC switching noise as well as other RF Noise.
- In built transmitter module housing sophisticated oscillator crystals.
- Scale indicator reflecting the dynamic state of the transmitter.
- Heavy duty flash proof threaded connectors for safety of operation
- Connection to fault locator/ Analyser unit
- Connection to the 3 phase
- Protection/ Control/Safety: Proper earth check indicator to assess the Earthing Condition
 - At very high induction level, the equipment will go to sleep mode for safety of operators and equipment
 - Induction thresh hold limit defined in the equipment for safety

C. SIGNATURE ANALYSER UNIT

| | | |
|----|-----------------|---|
| 1. | Auto Mode | Automatic gain selection and scan |
| 2. | Data Processing | Automatically noise eliminated and correlated processed data. |



| | | |
|---|---|---|
| 3. | Signature Format | -Analysis of every 100 meters of the line with indication of all in-homogeneities present and the degree to which they have developed and their corresponding distances. - Multiple frequency selection (LF/HF/VHF) to locate and analyse the vulnerability, Severity and location of the faults |
| 4. | Print out facility | Multi formats of printout |
| 5. | Line vision Mode. | Real time graphic image capture of all the three phases of the line condition providing clear information of the in-homogeneities prevalent phase comparison in display mode |
| 6. | Manual Gain | Manual gain setting for visual & detailed observation of all the three phase simultaneously or individually. |
| 7. | Vision Mode operation for detailed line Study | Image zoom and display scroll desired areas of the line can be brought into close security up to a range of 600 kms. increased range print out is optional |
| 8. | Data Transfer Facility | Direct data transfer to Pentium Laptop |
| 9. | Accuracy Line Signature | Six Gains with 10 pulses to locate the vulnerabilities in the line. Sample of each gain is compared with rest to ascertain the nature, Severity and location of the vulnerability |
| 10. | Weather AC or DC | Both Mains and Battery operated with built in battery and battery charger, (Both AC & DC operable). |
| D. | LAPTOP | |
| A reputed laptop with latest specification available in the market during the supply of the equipment. The Laptop should be compatible with the equipment supplied for data analysis and for report generation. | | |
| Communication of data to laptop:- Direct data transfer to Pentium Laptop and Software updating should be done by free of cost and should have USB communication | | |



Technical Specification of Item No. 2(21): Motorised oil pump

| Parameter | Specification |
|--------------------|--|
| Horsepower | .33 HP |
| Max Flow Rate | 10 gal./Minute |
| Power Cord | 12' w/ Plug |
| Powered By | Electric |
| Power Requirements | 230V/50 Hz |
| Speed | Dual Speed |
| Temperature Limit | Maximum Temperature 212°F (100°C) |
| Weight | 10.95 lbs/5 kg |
| Composition | Motor: Steel, Plastic Pick-Up Tube: 316 Stainless Steel Shaft: 316 Stainless Steel O-ring: FKM Impeller: ETFE Hose: Reinforced PVC Drum Adapter: Stainless Steel |
| Includes | 1 - FTI .33 HP Electric Pump Motor 1 - 5M FTI EFS Pick-Up Tube 1 - int. dia. 0.75" x 5' L PVC Discharge Hose 1 - FTI IPS Adapter |

