

**PRE-QUALIFICATION REQUIREMENTS
PQR**

1. The bidder should have an annual turnover (T.O.) of minimum Rs. 35.0 Lakhs/year in last 03 (Three) years.

Following documents proving the firm is active in past 3 years to be provided.

- a. Certificate of Incorporation.
 - b. Last 3 years "Profit & Loss account/Balance Sheet/ GST returns/Any other acceptable document certified by CA".
2. Bidder should have supplied "**Min 10 Nos. of Chemical Laboratory Equipments**" in last 05 years as on date of bid opening. Proof of supply and end user details should be attached for the same.

CHEMICAL LAB EQUIPMENTS FOR 5X800 MW YADADRI PROJECT**TECHNICAL SPECIFICATIONS**

S/N	Item Description	Qty (No) Stage-I	Qty (No) Stage-II	Specification
Water Analysis				
1	Conductivity Meter	2	2	Annexure -1
2	Conductivity Meter (portable)	1	1	Annexure -2
3	pH meter	2	2	Annexure -3
4	pH meter (Portable)	1	1	Annexure -4
5	Turbidity meter	1	1	Annexure -5
6	Flame Photometer	1	1	Annexure -6
7	Jar Test Apparatus	1	1	Annexure -7
8	Analytical balance	1	1	Annexure -8
Fuel Oil and Flue Gas Analysis				
9	Apparatus for oxidation stability test	1	1	Annexure -9
10	Redwood viscometer for oil analysis	1	1	Annexure -10
11	Interfacial tension apparatus	1	1	Annexure -11
12	Automatic Flash Point Apparatus	1	1	Annexure -12
13	Penetrometer for grease testing	1	1	Annexure -13
14	Dean & stark moisture determination apparatus	2	2	Annexure -14
15	Explosimeter	1	1	Annexure -15
16	Centrifuge	1	1	Annexure -16
17	Automatic K-F (Karl- Fisher) Titrimeter	1	1	Annexure -17
18	Orsat apparatus	1	1	Annexure -18
19	Hydrogen Purity apparatus	1	1	Annexure -19
Coal Analysis				
20	Muffle Furnace	1	1	Annexure -20
21	Oven	1	1	Annexure -21
22	Lab Pulveriser	1	1	Annexure -22
23	Sieve Shaker	1	1	Annexure -23
24	Jaw Crusher	1	1	Annexure -24
25	Roll Crusher	1	1	Annexure -25
26	Humidity Oven	1	1	Annexure -26
27	Coal Sample Riffler	1	1	Annexure -27
28	Furnace for determination of Volatile Matter	1	1	Annexure -28
29	Abrasive/Erosive index machine	1	1	Annexure -29
30	Laboratory plate mill	1	1	Annexure -30
31	Laboratory mini mill	1	1	Annexure -31
32	Analytical balance	1	1	Annexure -32
33	Ordinary balance	1	1	Annexure -33

CHEMICAL LAB EQUIPMENTS FOR 5X800 MW YADADRI PROJECT**TECHNICAL SPECIFICATIONS**

S/N	Item Description	Qty (No) Stage-I	Qty (No) Stage-II	Specification
Environmental & Pollution Control Laboratory Equipment				
34	Weather Monitoring System	1	1	Annexure -34
35	Autoclave	1	1	Annexure -35
36	BOD incubator	1	1	Annexure -36
37	COD reactor	1	1	Annexure -37
38	Inoculation chamber	1	1	Annexure -38
39	Dew Point Meter	1	1	Annexure -39
40	Dial type barometer	1	1	Annexure -40
41	Maximum & Minimum Thermometer	2	2	Annexure -41
42	Dry & Wet Bulb Thermometer	2	2	Annexure -42
43	Stack Monitoring Kit	1	1	Annexure -43
Other Equipment				
44	Flue gas analyzer	1	1	Annexure -44
General Equipment				
45	Kipps apparatus	1	1	Annexure -45
46	Photometer	1	1	Annexure -46
47	Potentiometric Titration Apparatus	1	1	Annexure -47
48	Gas heating assembly	1	1	Annexure -48
49	Stop Watch	1	1	Annexure -49
50	Constant temperature bath	1	1	Annexure -50
51	Water distillation assembly	1	1	Annexure -51
52	Vacuum pressure pump	1	1	Annexure -52
53	Heating Mantel	1	1	Annexure -53
54	Magnetic Stirrer cum Hot plate	1	1	Annexure -54
55	Refrigerator	2	2	Annexure -55
56	Hot Plate	2	2	Annexure -56
57	Magnetic Stirrer	1	1	Annexure -57
Chemicals/Glassware's/Safety Equipments/ Laboratory Furniture & General Lab. Requisites				
58	Chemical (As per Annex-A)	1 Set	1 Set	Annexure -58
59	Glassware (As per Annex-B)	1 Set	1 Set	Annexure -59
60	Safety Equipment (As per Annex-C)	1 Set	1 Set	Annexure -60
61	Furniture (As per annex-D)	1 Set	1 Set	Annexure -61
62	General Lab. Requisite with 4 Nos of Platinum Crucibles(As per annex-E)	1 Set	1 Set	Annexure -62

CHEMICAL LAB EQUIPMENTS FOR 5X800 MW YADADRI PROJECT

TECHNICAL SPECIFICATIONS

Annexure - 1

1.0 Conductivity Meter

Bench top conductivity Meter is used for determination of conductivity, TDS, salinity, resistivity and temperature.

Lab Model Conductivity Meter with conductivity probe, conductivity standard 1413 $\mu\text{S}/\text{cm}$ and of following specifications should be provided.

1. Range : 0 to 1000 mS/cm with minimum low level measurement of 0.001 $\mu\text{S}/\text{cm}$
2. Accuracy : 0.5% or better
3. Temp compensation : Automatic
4. Display : Digital Display
5. Power Requirement : Mains operated (220 Volts AC \pm 10%, 50 Hz \pm 3%, single phase supply) / Battery operated.

Accessories:

- (a) Conductivity probe for low conductivity with Flow through vessel.
- (b) Electrode stand.
- (c) Conductivity standard 100 $\mu\text{S}/\text{cm}$.
- (d) 1 No spare cell

Annexure - 2

2.0 Conductivity Meter (Portable)

Portable conductivity for determination of conductivity, TDS, salinity, resistivity and temperature.

Portable Conductivity Meter with conductivity probe, conductivity standard 1413 $\mu\text{S}/\text{cm}$ and of following specifications should be provided.

1. Range : 0 to 1000 mS/cm with minimum low level measurement of 0.001 $\mu\text{S}/\text{cm}$
2. Accuracy : 0.5% or better
3. Temp compensation : Automatic
4. Display : Digital Display
5. Power Requirement : Mains operated (220 Volts AC \pm 10%, 50 Hz \pm 3%, single phase supply) and Battery operated.

Accessories:

- (a) Conductivity probe for low conductivity with Flow through vessel.
- (b) Conductivity standard 100 $\mu\text{S}/\text{cm}$.
- (c) 1 No. spare cell.

Annexure - 3

3.0 pH meter

Bench top pH meter with electrode stand, pH electrode, buffer 4,7,10.01 guide to pH measurement, operating manual and of following specifications should be provided..

1. Range pH : 0 to 14.00 pH
2. Accuracy pH : \pm 0.01 pH
3. Temp. compensation : Automatic
4. Display : Digital Display
5. Input connections : pH Combination electrode with Temperature Sensor
6. Power Requirement : Mains operated (220 Volts AC \pm 10%, 50 Hz, single phase supply) / Battery operated.

Accessories:

1. Single combination electrode with inbuilt temp.
2. One spare pH electrode.
3. Electrode Stand
4. Buffer Tablets/Solutions (4, 7 & 10.01 pH) – 1 Pack of 100 Nos. or 1.0 Litre Solution of each pH)
4. Electrode filling solution
5. Dust Cover
6. Guide to pH measurement

CHEMICAL LAB EQUIPMENTS FOR 5X800 MW YADADRI PROJECT

TECHNICAL SPECIFICATIONS

Annexure - 4

4.0 pH meter (Portable)

Portable pH meter with built-in NTC temp probe-single combination electrode with built-in temperature probe.

The portable pH Meter should be of following specifications:

1. Range pH : -2 to 19.9
2. Accuracy pH : ± 0.01 pH
3. Temp. compensation : Automatic
4. Display : Digital Display
5. Input connections : pH Combination electrode with Temperature Sensor
6. Power Requirement : Mains operated (220 Volts AC $\pm 10\%$, 50 Hz $\pm 3\%$, single phase supply) and Battery operated

Accessories :

1. Single combination electrode with inbuilt temp. probe
2. Electrode filling solution
3. One spare pH electrode.
4. Buffer Tablets / Solutions (4, 7 & 10 pH) – 1 Pack of 100 Nos. or 1.0 Litre Solution of each pH)
5. Carrying Case
6. Batteries
7. Instruction Manual

Annexure - 5

5.0 Turbidity meter

Turbidity meter shall be a microprocessor based instrument for measuring turbidity. Instrument shall have Auto Ranging from 0 to 1000 NTU. Instrument shall sense turbidity level of sample and automatically adjusts to the appropriate measurement. Instrument shall have a facility for Auto Alert Calibration Prompt: Automatically prompts the operator when calibration of the instrument is needed.

It shall have Simple Calibration Procedures: Calibration initiated with the push of a button ensures accurate readings.

Turbidity meter shall have infrared lamp source for colored samples measurement. Instrument shall meet international standard ISO 7027 for turbidity measurement.

Turbidity meter shall have resolution of 0.01 NTU at low turbidity readings and an extended range to 1,000 NTU.

Accessories:

- Calibration Standards (0.02, 10 and 100 NTU up to full range).
Two measuring cuvettes with light shield caps (1 Set)
Operator's manual (1 Nos.)
Plug-in power adapter (1 No.)

Annexure - 6

6.0 Flame Photometer

1. Range- 0 to 199.9 ppm.
2. Working range: Na 0.5-10 ppm, Ca 3 – 40 ppm, K 0.75-25 ppm
3. Reproducibility: 1% CV for 20 consecutive samples using 10 ppm Na set to 50 scale reading.
4. Linearity: Better than 2% when Na & K are 3 ppm, & are set to 100 scale reading.
5. Specificity: interference from Na, K equal in concentration to test of element will be < 0.5%.
6. Recorder output: nominal 1.00 V for a reading of 100.0
7. Na standard solution , K standard solution, Ca standard solution, regulator for natural gas, Air compressor 220 V shall be supplied.

CHEMICAL LAB EQUIPMENTS FOR 5X800 MW YADADRI PROJECT

TECHNICAL SPECIFICATIONS

Annexure - 7

7.0 Jar Test Apparatus

1. This shall be suitable for continuous run in a laboratory.
2. Illuminator base shall consist of fluorescent tube mounted below translucent plastic plate to provide diffused cold light through floc samples.
3. The Jar tester shall consist of geared continuous run heavy duty 1/20 HP variable speed motor from 10 to 100 rpm with built in speed control.
4. Stainless steel stirring rods (6 nos.) shall be provided with adjustable spacers to adjust the depth of stirring paddles.
5. The stirring shaft shall be removed without disturbing other stirrers.
6. The unit shall be supplied complete with breakers.
7. 6 Nos. Jars, Jar Capacity: 1 liter.

Annexure - 8

8.0 Analytical balance

Analytical Balance with metal housing to protect weighing cell and electronics, compact design, brilliant backlit display.

The balances shall have automatic calibration with internal weight and it shall be possible to calibrate with external weights also.

Weighing range : 220 gms
Readability : 0.0001 g
Linearity : 0.0002 g

Annexure - 9

9.0 Apparatus for oxidation stability test

1. Apparatus Suitable for both new and in-service many types of petroleum oils / turbine oils/ Transformer oil.
2. Standard: - Conforming to ASTM and related test method specifications.
3. Digital microprocessor based temperature control with sensor.
4. Test Capacity: Upto 8 oxidation cells
5. Temperature Range: ambient to 100°C or more.
6. Temperature Control Stability: 0.1°C
7. Bath Medium: white technical oil / Solid aluminum block bath
8. Electrical Requirements: Operation on 220-240V 50/60Hz AC
9. Equipment shall be supplied with complete required no. of oxidation tubes made of Borosil glass and flow meters for oxygen @1 lph.

Annexure - 10

10.0 Redwood viscometer for oil analysis

A standard viscometer in which the viscosity is determined by the time, in seconds, certain quantity of liquid to pass out through the orifice under given conditions; used for determining viscosities of fuel oils.

1. Electrically heated with energy regulator for temperature control.
2. Red wood viscometer should be Supplied with:
 - (a) thermometer (low range) ip 8c,
 - (b) thermometer (medium range) ip 9c,
 - (c) thermometer (high range) ip 10c
 - (d) stop watch (electronic)

CHEMICAL LAB EQUIPMENTS FOR 5X800 MW YADADRI PROJECT

TECHNICAL SPECIFICATIONS

Annexure - 11

11.0 Interfacial tension apparatus

1. Measurement of surface & interfacial Tension of liquids by du nouy's principal. As per IS:6104/1972 & ASTM-D-971,1590 & 1331 for oils, Detergents, Dyes, Cosmetics, Insecticides, Imulsifiers, Pharmaceuticals, Biological Fluids etc.
2. Display: LED
3. Unit of measurement: Dynes/cm or mN/m
4. Range: 1-999 Dynes/cm
5. Accuracy: ± 0.01 Dynes/cm.
6. Sample: 40ml.
7. Scope of supply: Complete apparatus with levelling screws, torsion wire, Carrying Case, Platinum Ring 6 cm and Operation manual.

Complete apparatus with levelling screws, torsion wire, Carrying Case, Platinum Ring 6 cm and Operation manual shall be supplied.

Annexure - 12

12.0 Automatic Pensky Marten Flashpoint Apparatus for Oil Analysis

1. Application: automatic measurement of flash point of oil and lubricants.

The Flashpoint Apparatus is microprocessor controlled fully automatic to determine the closed cup flashpoint ensuring accurate and repeatable measurement. Automatic correction of flash point per actual barometric pressure shall have electric and gas igniters.

2. Technical specification:

- 2.1 Temperature range: 25°C to 400 °c
- 2.2 STANDARD: As per ASTM D 93 (A&B), EN ISO (A&B), IP 34 (A&B)
- 2.3 flash point detection: differential thermocouple/ionization.
- 2.4 stirring speed: 120 & 250 rpm
- 2.5 Temperature control: programmable, software for temperature control.
- 2.6 Corrections: automatic correction of flash point, as per actual barometric pressure.
- 2.7 Operation: microprocessor controlled, 14 pre-programmed test methods, programmable library for the user with suitable software support for easy to operate.
- 2.8 Encasement: encasement/cabinet of corrosion resistant stainless steel material.
- 2.9 power supply: 230 v, 50 hz.
- 2.10 data output: PC interface.
- 2.11 ambient condition: equipment shall be suitable for operation in ambient temperature from 0 to 50 degree Celsius and relative humidity of 0 to 98%.

Annexure - 13

13.0 Penetrometer for grease testing

1. Standard Penetrometer as per IP-50, IS-1448 (P-60) with cone, Container & weight with geared arrangement for moving the arm with geared centering device & digital timer.
2. Digital timer (0-9 secs)
3. Brass cone
4. Weight (50 & 100 gms)
5. Grease container 10cm dia & 10cm height.

Annexure - 14

14.0 Dean & stark moisture determination apparatus

Dean & stark apparatus for estimation of moisture in lubricating oils as per IP-74, ASTM D 95.

The apparatus shall consist of receiver 10ml graduated, with 19/26 outer joint and 24/29 inner joint, round bottom flask 1000ml with 24/29 outer joint and liebigh condenser 200 mm with 19/26 joint.

CHEMICAL LAB EQUIPMENTS FOR 5X800 MW YADADRI PROJECT

TECHNICAL SPECIFICATIONS

Annexure - 15

15.0 Explosimeter

An explosimeter is a device which is used to measure the amount of combustible gases present in a sample. When a percentage of the lower explosive limit (LEL) of an atmosphere is exceeded, an alarm signal on the instrument is activated.

The device, also called a combustible gas detector, operates on the principle of resistance proportional to heat—a wire is heated, and a sample of the gas is introduced to the hot wire. Combustible gases burn in the presence of the hot wire, thus increasing the resistance and disturbing a Wheatstone bridge, which gives the reading. All standard accessories required for proper operation shall be supplied along with the instrument.

Specifications:

1. Gas to Be Detected: All Explosive Gases
2. Range: 0 to 100% LEL
3. Detection Principle: Catalytic Pellister
4. Display: LCD
5. Battery: Rechargeable Battery
6. Temperature: -5 to 50 Deg C
7. Alarm: Audible & Visual

Annexure - 16

16.0 Centrifuge for Oil Analysis

The driving motor and the centrifuge chamber have been specially designed to suit the hazardous requirements of oil centrifuge application.

These units are equipped with a Stepless speed regulator, Safety Lid interlock to prevent cover opening during centrifugation, Digital speed meter and 0-60 minutes digital countdown timer, Dynamic break for quick deceleration, Imbalance detector with cut off.

Max. Speed: rpm: 5250,

No. of tubes: 4. each graduated tube shall have a capacity of 100 ml and shall be of glass.

Annexure - 17

17.0 Automatic K-F (Karl- Fisher) Titrimeter

Coulometric Karl Fischer Titrator for measuring moisture content in Transformer oil, lube oil in ppm range.

1. Principle of measurement: Coulometric method
2. Type: Microprocessor Based Digital Automatic Karl Fischer Titration Apparatus (Coulometric)
3. Measuring range: 5 ppm to 5%
4. Accuracy: 0.3 % at 1 mg water
5. Display Format: Liquid Crystal Display in ppm (mg/Kg)
6. Printer: Printer Port provided to connect printer
7. Power Supply: 230V AC, 50Hz
8. The instrument should be supplied with Titration cell with all necessary small parts for mounting and putting into operation like tubes, septum, gasket etc. double platinum pin electrode, Magnetic stirring bar, Magnetic stirrer motor, Brown glass bottle 1 L molecular sieve, Pump unit, Drying tube with cover, Syringe with injection needle, Operation instructions.
9. 01 liter of reagent suitable for operation should be supplied along with instrument.

CHEMICAL LAB EQUIPMENTS FOR 5X800 MW YADADRI PROJECT

TECHNICAL SPECIFICATIONS

Annexure - 18

18.0 Orsat apparatus

For measurement of carbon dioxide, carbon monoxide & oxygen in furnace flue gases; the apparatus shall include:-

- (a) Three test gas manifold & rubber bellow - 1Nos
- (b) 03 Absorption pipette with fitted glass tubes shall be having total filling cap 250ml (appr.) & have fine glass tubes for CO₂ & O₂ absorption pipette whereas for CO tubes shall have copper wire with glass tubes
- (c) Gas burette complete with outer water jacket, capacity 100ml with bulb at top-1 No
- (d) Leveling bottle cap. - 250 ml-1Nos

The above items shall be fitted in Good quality wooden cabinet with front & rear sliding doors with lifting handle-1No.

Accessories:

- (a) Three test manifold & rubber bellow - 3 Nos
- (b) Absorption pipette - 3 Nos
- (c) Gas burette - 3 Nos
- (d) Leveling bottle cap. 250 ml - 3 Nos

Annexure - 19

19.0 Hydrogen Purity apparatus

Function: Sensing & Measurement of Hydrogen in Air, gas holders, valves, pipelines, etc.

Range : 0 - 100 % purity

Resolution: 0.1%,

Accuracy : $\pm 0.2\%$ of Full Scale.

Sensor : Thermal Conductivity Detector

Readout : LCD Digital display.

Sampling Method : suction

Alarms : Audio-Visual alarm for Low, High ranges & Battery low

Response Time : Less than 10 seconds.

Power : rechargeable batteries + charger

Ambient Condition : Equipment shall be suitable for operation in ambient temperature from 0 to 50 degree Celsius and relative humidity of 0 to 98%

Annexure - 20

20.0 Muffle Furnace

Heating elements shall be of KANTHAL wire in coil form wrapped on the muffle, embedded in high grade refractory cement & backed by High Density Ceramic Fibre Blanket, which avoids loss of heat.

Max. Temp. : 1200 °C.

Approx. Internal size : 20 x 20 x 30 cm Approx.

Accessories:

- (a) Two (2) numbers each of stainless steel tongs of sizes 15 & 24 inch
- (b) One (1) spare heating element

Annexure - 21

21.0 Oven for Coal Analysis

1. Electrically operated outer chamber made of mild steel & inner chamber made of mild steel/ stainless steel/aluminum for drying.

2. Oven should be equipped with digital display of temperature and electronic controller.

3. Temp. Range: 30 °C to 250 °C Max. temp.

4. Accuracy: ± 2 °C

5. Size: 60X60X90 cm

Accessories:

- (a) Two (2) mercury thermometer, range 40 to 250 °C
- (b) Twelve (12) silica crucible of 50ml capacity, with lid
- (c) Temp. Sensor
- (d) Spare Heating element

CHEMICAL LAB EQUIPMENTS FOR 5X800 MW YADADRI PROJECT

TECHNICAL SPECIFICATIONS

Annexure - 22

22.0 Lab Pulveriser

1. Lab pulverizer Which can be mounted and securely bolted on steel stand with main drive pulley, feed hopper, shifter pulley & belt with metal guards.
2. Screened drum with 212 micron screen, motor pulley, v-belt.
3. Motor Capacity : 3 HP or more
4. Six(6) extra screens of 212 microns.

Annexure - 23

23.0 Sieve Shaker

1. Electrically operated Ro-Tap sieve shaker will be furnished to accommodate seven 50 mm highX200 mm diameter standard test sieves.
2. The shaker will produce both circular and tapping motion to provide uniform mechanical action ensuring accurate and dependable test result.
3. The shaker will be provided with a timer switch so that the test is automatically terminated after the present time.
4. Standard sieve will be of brass/steel frame 200mm diameter and 50mm high above the wire cloth and drawn from one piece without a seam.

Accessories:

- (a) Two (2) polished brass lid and pan for the above sieves of 200mm diameter
- (b) Sieves: 850microns, 710microns, 600microns, 500microns, 425 microns, 355 microns, 250 microns and 212 microns.

Annexure - 24

24.0 Jaw Crusher

Jaw size: 100X150mm

Maximum feed size: upto 50 mm

Product size: 5 to 15 mm

Capacity: 100 to 200 kg/Hr

Motor : Min 3 HP or better with triple V belt, starter and required accessories.

AWS Strokes : Forward & Downward strokes with rocking action

Annexure - 25

25.0 Roll Crusher

The machine is to be provided with hopper of suitable size fabricated from mild steel sheet.

Maximum feed size: 8 mm

Product size: 1mm to 2 mm

Motor : 2 HP or better with starter.

Annexure - 26

26.0 Humidity Oven

1. Temperature range: + 5 °C to 60 °C
2. Accuracy: ±1 °C
3. Temperature and humidity controlled by digital temperature controller cum indicator- LED (dual display) from 40% to 90% with sensitivity of ±3%.
4. Humidity Oven should be provided with Hygrometer (Humidity Indicator), with humidity range of 0-100%.
5. Preferable dimension: Width (W)- 455 to 460 mm
Depth (D)- 455 to 460 mm
Height (H)- 710 to 715 mm

CHEMICAL LAB EQUIPMENTS FOR 5X800 MW YADADRI PROJECT

TECHNICAL SPECIFICATIONS

Annexure - 27

27.0 Coal Sample Riffler

1. Riffle Sampler should be with adjacent slots to deliver coal to opposite side and to divide it into two identical halves.
2. Slots should be of 25 mm size and number of total slots should be 36. The sampler should be provided with legs and removable containers.
3. The material of construction of the equipment shall be mild steel, painted with gray hammertone paint. Qty - 1 No.
4. All details given in (1) above except the slot size shall be 12.5 mm and total number of slots shall be 24. Qty - 1 No.
5. Ambient Condition: Equipment shall be suitable for operation in ambient temperature from 0-50 degree C and relative humidity of 0-98 %.

Annexure - 28

28.0 Furnace for determination of Volatile Matter (VM)

Maximum operating Temperature -1000°C
Temperature sensor required - Thermocouple Type N mineral insulated
Over temperature protection sensor-Required
Temperature to be controlled automatic by cut out system digital temperature controller cum indicator.
Furnace shall be equipped with siliminite base high temperature refractory muffle & Kanthal heating elements for max temperature upto 1000°C.
Equipment to be supplied complete with contractor, thermocouple with compensating load wire, fuse plug.
Approx Internal Size: 10" x 5" x 5"

Annexure - 29

29.0 Abrasive/Erosive index machine

1. Main Equipment: The main equipment should comply with IS 9949-1986 Re affirmed 1994, "Methods of Test for Abrasive Properties of Coal and Associated Minerals.
2. The equipment should be able to handle high ash coal (upto 45% ash)
3. Mill Pot: Mill pot or Motor should be of Steel.
4. Blade Assembly: Blade assembly should consist of four number of carbon steel blades.
5. Driver unit: Driver unit to be fitted with 2.5 to 3 HP, three phase motor to run at 1450 RPM.
6. Gauges: Gauges for checking the gap between the edges of the blade & internal wall bottom of mill pot to be supplied.
7. Accessories: Sieves having nominal aperture / perforated plate having size of 6.3 mm, 12.5 mm conforming to IS 460 (Part i) -1978 along with brush to clean the sieve to be provided.
8. Painting: The machine shall be painted with two coats of red oxide primer & two coats of light gray paint.
9. Power Supply: 220 volts A.C 3 phase, 50Hz
10. Ambient Conditions: Equipment shall be suitable for operation in ambient temperature 0 to 50 degree Celsius and relative humidity of 0 to 98%.

Annexure - 30

30.0 Laboratory Plate Mill

1. Mini Mill: Should be swing type pulveriser designed to powder laboratory samples to 60- 72 mesh (212-250 microns).
2. Powdering Device: Should have swing hammer type pulveriser design. The hammer to be fitted to a rotating shaft.
3. Size Reduction: The mini mill should be able to reduce the size 60- 72 mesh size.
4. Motor Capacity: 0.5 HP, Triple V-belt pulley drive I direct coupled & mounting.
5. Power Supply: 3 phase, 50 Cycles, 440 Volt, AC supply.
6. Ambient Condition: Equipment shall be suitable for operation in ambient temperature from 0- 50 degree C and relative humidity of 0-98 %.

CHEMICAL LAB EQUIPMENTS FOR 5X800 MW YADADRI PROJECT

TECHNICAL SPECIFICATIONS

Annexure - 31

31.0 Laboratory Mini Mill

1. Plate Mill: Disc type grinder to grind coal sample to produce about 600 microns (25 mesh) in one operation.
2. Disc: Should have rotating disc having planetary motion in the vertical plane. The disc should be hardened/heat treated of about 100 mm dia.
3. Size Reduction: 10-25 mesh. Plate should reduce 450-500 gm sample of coal to 25 mesh in 10-15 min.
4. Motor Capacity: 1 HP, Triple V-belt pulley drive and proper mounting
5. Power Supply: 3 phase, 50 Cycles, 440 Volt, AC supply
6. Feed Size: 5.0 mm
7. Ambient Condition: Equipment shall be suitable for operation in ambient temperature from 0- 50 °C and relative humidity of 0-98 %.

Annexure - 32

32.0 Analytical balance

Capacity: 200 gm
Accuracy: 0.1 mg
Type of display: Digital display
Operating Temperature: 10-45 °C

Annexure - 33

33.0 Ordinary balance

Capacity: 4000 gm
Accuracy: 0.1 gm
Type of display: Digital display
Operating Temperature: 10-45°C

Annexure - 34

34.0 Weather Monitoring System

1.0 Application: Measurement of meteorological parameters in ambient atmosphere at Pre-defined intervals, storage and display of meteorological data.

2.0 Technical Specification: Weather monitoring station comprising of following:

2.1 WIND SPEED SENSOR:

- 2.1.1 Measuring Range : 0-50 m/s
- 2.1.2 Resolution: 0.1 m/s

2.2 WIND DIRECTION SENSOR:

- 2.2.1 Measuring Range : 0 to 360 degree angle
- 2.2.2 Resolution: 2 degree

2.3 AMBIENT TEMPERATURE SENSOR:

- 2.3.1 Measuring Range : -20 to 70 degree centigrade
- 2.3.2 Resolution: 0.5 degree centigrade

2.4 RELATIVE HUMIDITY SENSOR :

- 2.4.1 Measuring Range : 0 - 100% RH
- 2.4.2 Resolution : 1%

2.5 RAINFALL SENSOR :

- 2.5.1 Sensor: Tripping bucket Rain gauge sensor
- 2.5.2 Measuring Range : 0-999.9 mm.
- 2.5.3 Resolution : 1 mm

2.6 SOLAR RADIATION (SUNSHINE RECORDER):

- 2.6.1 Measuring Range : 0 to 1300 W/m²
- 2.6.2 Resolution : 1 W/m²

2.7 Data Logger : Data logger having 8 sensor channels and 8 digital channels, upto 256 KB memory capacity with buffer battery power supply through built in 12V/6.5 Ah. Real time clock with calendar and liquid Crystal Display for instantaneous values of wind speed, direction, RH, Soalr radiation and temperature, data readout through memory card and RS232 interface.

CHEMICAL LAB EQUIPMENTS FOR 5X800 MW YADADRI PROJECT

TECHNICAL SPECIFICATIONS

2.8 A PC should be supplied along with the automatic weather station to store, analysis and printing of data.

PC should have Minimum configuration as mentioned below:-

- ☑ i7, Windows 10
- ☑ RAM : 8 GB or better
- ☑ Hard disk : 1 TB or better
- ☑ Monitor : 17" colour monitor
- ☑ Ports : 2 serial & 1 parallel
- ☑ Keyboard : Standard Windows
- ☑ Mouse
- ☑ Software : Windows based data logging / driver software
- ☑ Black & White printer

2.9 Software: Suitable software package for data transfer to computer, measured value acquisition, graphical presentation system for metrological data including preparation of wind roses.

2.10 Mounting Accessories: Tripod stand with provision of mounting all sensors with fittings and connecting cable of approximately 10 meter length from sensors to data logger.

2.11 Constant Voltage Transformer : Suitable Constant Voltage Transformer for stabilized voltage (230 V AC, 50 Hz) to the Weather station.

2.12 Compass: Standard magnetic compass for setting direction of Wind direction sensor.

2.13 Ambient Condition : Equipment shall be suitable for operation in ambient temperature from 0 to 50 degree Celsius and relative humidity of 0 to 98%.

2.14 Quality Assurance: Calibration and Test certificate should be supplied along with the Equipment.

Annexure - 35

35.0 Autoclave

1.0 General: autoclave is required for sterilization & preparation of Culture media for microbiological tests.

2.0 Specifications of Equipment:

1. The Autoclave should be double wall construction with boiler made of stainless steel 16 gauge sheets.
 2. The Autoclave should be 50 liters' capacity approximately.
 3. There should be mineral wool/glass wool insulation between Boiler and outer shell.
 4. Lid should be made of thick stainless steel plate and tightened all - around by radial locking / wing nut arrangement.
 5. There should be joint less gaskets made of neoprene rubber.
 6. This sterilizer should be hydraulically tested upto 40 psi.
 7. Sterilizer should be fitted with arrangement to indicate water level inside the boiler.
 8. Pressure gauge, air/Steam release cock and double safety valves should be provided.
- There should be Immersion type heating element of adequate wattage to achieve desired temperature and pressure. Stainless Steel basket should be provided.

Annexure - 36

36.0 BOD incubator

Specifications of Equipment:

1. Temperature range: 5 °C to 50 °C
2. Temp Stability: ± 2 °C
3. Dual LCD Display.
4. Thermostatically Controlled BOD Incubator of Volume 230 Ltrs.(approx.)
5. It shall be provided with a double walled clear see-through door for visual inspection of the samples without opening the door.
6. To achieve uniformity of temperature in the inner chamber it should be fitted with 2 nos. circulating fans.
7. Power: 230 V, 50 Hz, and 2.5 Amps.

CHEMICAL LAB EQUIPMENTS FOR 5X800 MW YADADRI PROJECT

TECHNICAL SPECIFICATIONS

Annexure - 37

37.0 COD Reactor

Specifications of Equipment:

1. COD reactor/digester to be used to for the sample digestion for the measurement of COD and all other thermal digestion processes.
2. Reactor shall be dry temperature control device with safety cover and Cell shafts 12 cell shafts for reaction cells 16 ± 0.2 mm.
3. Reaction time setting 20 min, 30 min, 60 min, 120 min (via fixed programs)
4. Temperature setting 100 °C, 120 °C, 148 °C and 150 °C via fixed programs
5. Controlling accuracy ± 1 °C ± 1 Digit
6. Temperature stability ± 0.5 K
7. Over temperature protection 190 °C ± 5 °C
8. Heating time (with empty thermo block) from
 - ☑ 25 °C to 100 °C approx. 5 min
 - ☑ 120 °C approx. 7 min
 - ☑ 148 °C approx. 10 min
9. Digestion unit shall come along with the following accessories and reagents:
 - ☑ cuvettes Pk/25 empty digestion vessels.
10. 250 tests reagents for up to 1500 ppm COD.

Annexure - 38

38.0 Inoculation chamber

1.0 General: autoclave is required for sterilization & preparation of Culture media for microbiological tests.

2.0 Specifications of Equipment:

1. The Inoculation chamber should be Vertical laminar flow cabinet with 100% exhaust system, suitable for exhaust duct upto 6 ft. to throw the contaminated air from the work area into the atmosphere outside the room.
2. The size (working size) of the Inoculation chamber should be approx. 3 x 2 x 2 ft.
3. A plenum should be provided under the S.S. perforated working table, with exhaust system which should work in coordination with the main air flow system.
4. The side panels should be made of thick transparent plexi glass duly framed.
5. The unit should be fitted pre-filter and HEPA filter so that air is drawn through pre-filter and is made to pass through highly effective HEPA filter, thus retaining all air-borne particles of size 0.3 micron and larger.
6. The air should flow down vertically from top towards the work table.
7. HEPA filter and virus burn out should also be provided at the exhaust.
8. The unit should be fitted with duly balanced, direct drive motor blower units sized to provide adequate air flow volume over the entire surface of HEPA filter. It should be fitted with reputed make motor which should operate with minimum noise level.
9. The unit should be complete with S.S. Table Top, Transparent front door (5 mm), Static Pressure Inclined Manometer, Built in U.V. Germicidal Light and cock for gas.
10. The work area should be properly illuminated by diffused, glare free fluorescent light fitted to the unit.
11. The number, location, rating and make of motor / motors being used in the equipment should be indicated in the offer.
12. The equipment should work on 230 Volts AC, 50 Hz single phase supply.
13. The following spare accessories should be quoted:
 - Pre Filter
 - HEPA Filter

CHEMICAL LAB EQUIPMENTS FOR 5X800 MW YADADRI PROJECT

TECHNICAL SPECIFICATIONS

Annexure - 39

39.0 Dew Point Meter

1.0 DESCRIPTION: Portable Dew Point Meter.

1.1 TECHNICAL SPECIFICATIONS :

- ☑ Range : (-) 60° to 0°C
- ☑ Resolution : ± 0.1°C
- ☑ Maximum Operating Pressure : 1 bar
- ☑ Accuracy : ± 2 deg C Dew point
- ☑ Indication : Digital
- ☑ Sensor Connection : Internal Sensor Connection required with the Dew point meter
- ☑ Calibration : Calibration will be manual
- ☑ Sensor : Capacitance thin film Polymer Sensor
- ☑ Power supply : 230 V AC
- ☑ Cabinet : Table mount with carrying case

Annexure - 40

40.0 Dial type barometer

Specifications of Equipment:

1. Dial Diameter: 100 mm

Annexure - 41

41.0 Maximum & Minimum Thermometer

Specifications of Equipment:

Thermometer shall register both maximum and minimum temperature.
Range: -40°C to +50 °C

Annexure - 42

42.0 Dry & Wet Bulb Thermometer

Specifications of Equipment:

1. This is shall be mercury filled wet and dry Bulb thermometers mounted on scales with amended graduations in 2 Deg. C intervals.
2. Nominal range 10 Deg. C to 50 Deg. C.
3. Hand blown glass cistern.
4. Overall dimensions 108 mm width x 225 mm high, with holes for wall mounting along with wick and booklet of relative humidity tables.

Annexure - 43

43.0 Stack Monitoring Kit

1.0 General: Equipment is required to measure concentration of Stack emissions.

Stack monitoring Kit as per IS 11255, consisting of :

1. Instrument Panel with fibre cover consisting of thermocouple, inclined cum vertical manometer, stop watch, rotameters, Cold Box Assembly.
2. Vacuum Pump Assembly
3. Probe Set consisting of probe pipe, pitot tube, thermocouple, filter holder, interconnecting hose pipes, nozzles .etc.
4. Dry Gas Meter.

CHEMICAL LAB EQUIPMENTS FOR 5X800 MW YADADRI PROJECT

TECHNICAL SPECIFICATIONS

2.0 Technical Specifications:

1. Stack Temperature Range: Ambient to 600 Deg C.
2. Stack Velocity Range: 0-50 m/sec
3. Particulate sampling: 10– 60 lpm
4. Gaseous sampling: 1-2 lpm in a of Borosilicate glass impingers.
5. Digital Temperature Indicator : 0-600 deg. C
6. Thermocouple : Thermocouple sensor in SS casing, Length of insertion 1 m with 2m long cable
7. Pitot Tube : S-type pitot tube fabricated from SS, 1.5 m in length
8. Rotameter: Rotameter with 2% FSD accuracy, 0-60 lpm for Particulates and 0.6-5 lpm for gases
9. Differential Density Manometer Assembly
10. Extension Vacuum Hose Pipe, 10 m long
11. Sampling Probes: Made from SS, 1.5m length
12. Filter Holder: Fabricated from SS suitable to hold either cellulose filtration thimble (size-28mm ID & 100mm long) or glass micro fibre, thimble (Size-19mmID, 90 mm long)
13. Whatman Cellulose Thimble (size-28mm ID & 100mm long) – 1 pkt. with kit
14. Nozzles: A set of 3 SS nozzles (1/4, 3/8,1/2 inch)
15. Digital Clock: 0-60 minutes,1 second, readout with start and stop watches.
16. Sampling Train:5 borosilicate glass impingers of 250 ml cap., accommodated in cold box .
17. Vacuum Pump:100 lpm approx free flow capacity.
18. Dry Gas Meter: To measure dry gas volume.

Annexure - 44

44.0 Flue gas analyzer

General:Flue Gas Analyser suitable for Industrial applications viz. Thermal Power Stations, Diesel Generator Sets and Heat Treatment Furnaces etc.

The following parameters would be monitored:

Continuous Analysis of :

Applicable to various fuel types: Coal, Natural Gas, Heavy Fuel Oil, Light Oil.

Flue gas & Air Temperature Measurement: Temperature Sensor

- 1.1 O₂ : 0 - 25%
- 1.2 CO : 0-8000/20000 ppm
- 1.3 NO : 0-4000 ppm
- 1.4 NO₂ : 0-1000 ppm
- 1.5 SO₂ : 0-4000ppm
- 1.6 CO₂ : 0-20% (NDIR)
- 1.7 Flue gas temperature up to 999.90C
- 1.8 1 m long sampling probe with 3 m hose
- 1.9 Fresh Air Purging
- 2.0 Excess Air
- 2.1 Combustion Efficiency
- 2.2 Battery Charger
- 2.3 Computer Interface
- 2.4. Printer Inbuilt with printer rolls
- 2.5. Data logging
- 2.6. Calibration Certificate
- 2.7. Carrying bag
- 2.8. Dust filter elements (pack of 10 elements)
- 2.9. Moisture free elements (pack of 5 elements)
- 2.10. Printer paper roll (pack of 5)
- 2.11. Printer cartridge
- 2.12. Efficiency: 1 to 99.9%
- 2.13. Sample Gas Flow Rate Approx.:1.1 L/min
- 2.14. Display measured value in LCD screen.
- 2.15. Flue gas analyser shall have internal memory and facility to transfer the data to PC
Instrument shall be supplied with all required accessories as a ready to use analyser.

CHEMICAL LAB EQUIPMENTS FOR 5X800 MW YADADRI PROJECT

TECHNICAL SPECIFICATIONS

Annexure - 45

45.0 Kipps apparatus

1.0 General: Kipp's apparatus, also called Kipp's generator, is an apparatus designed for preparation of small volumes of gases.

3.0 Specifications of Equipment:

1. The apparatus is made of three vertically stacked cylinders.
2. The solid material is placed into the middle cylinder; the acid is put into the top cylinder.
3. A tube extends from the top cylinder into the bottom cylinder.
4. The middle cylinder has a tube with a stopcock attached, which is used to draw off the evolved gas. When the stopcock is closed, the pressure of the gas in the middle cylinder rises and expels the acid back into the top cylinder, until it is not in contact with the solid material anymore, and the chemical reaction stops.
5. Capacity: 1000 ml.

Annexure - 46

46.0 Photometer

Specifications of Equipment:

1. Colorimeter shall have pre-programmed methods for common water and boiler water parameters like iron, Silica, Phosphate, Hydrazine, Copper and Iron etc.
2. Colorimeter shall be used for both field as well as laboratory testing.
3. Colorimeter shall be supplied with following:
 - ☑ Eight sample cells
 - ☑ Silica Reagent set for 500 tests
 - ☑ Iron Reagent set for 500 sets
 - ☑ Hydrazine reagent set for 500 tests
 - ☑ Copper reagent set for 500 tests
 - ☑ Phosphate Reagent set for 500 tests
 - ☑ Micro pipette with tips
 - ☑ Carry case
 - ☑ Instructions Manual

Annexure - 47

47.0 Potentiometric Titration Apparatus

Specifications of Equipment:

1. Potentiometric titration is a technique similar to direct titration of a redox reaction. No indicator is used; instead the voltage across the analyte, typically an electrolyte solution is measured. To do this, two electrodes are used, a neutral electrode and a standard reference electrode. The voltage is recorded at intervals as the titrant is added.
2. Technical Specification:
 - ☑ pH range: 0 -14 pH
 - ☑ Resolution: 0.01 pH.
 - ☑ Automatic and Manual Temperature Compensation.
 - ☑ Ambient conditions Ambient temperature + 10 ...+ 40 °C for operation
 - ☑ Potentiometric Titration Apparatus with Stirrer System
3. Electrode for Redox titration shall be supplied with the Potentiometric Titration Apparatus.

CHEMICAL LAB EQUIPMENTS FOR 5X800 MW YADADRI PROJECT

TECHNICAL SPECIFICATIONS

Annexure - 48

48.0 Gas heating assembly

Specifications of Equipment:

1. The Gas Heating Assembly (Gas Stove) should conform to IS: 4246.
2. It should be a Double Burner Cooking Gas Stove without cover and with Non-Automatic Ignition System.
3. Size – Approx. Dimensions (when packed) 690 x 370 x 110 mm.
4. It should be sleek, streamlined, high efficiency with stainless steel body.
5. It should have brass burner tops and stainless steel drip-trays.
6. It should have one small burner and one big burner.
7. Detailed printed leaflet be supplied along with quotation.

Annexure - 49

49.0 Stop Watch

Specifications:

1. Stop Watch 1/100th of second, Digital with date, time and one lap function from Reputed indigenous make

Annexure - 50

50.0 Constant temperature bath

Specifications:

1. This shall be used to maintain the temperature of the water in the temperature range 5°C above ambient to 100°C. Accuracy of temperature control shall be $\pm 0.01^\circ\text{C}$.
2. The tank shall be of stainless steel with stainless steel (or) aluminum housing and a glass view panel. An electric heater with digital temperature indicator cum controller shall be provided. Suitable capacity pump / stirrer shall be provided for the circulation/ agitation of the tank media.
3. Capacity of the tank shall be minimum 25 liters.
4. This temperature bath shall be supplied with necessary accessories.

Annexure - 51

51.0 Water distillation assembly

Specifications :

1. The double distillation unit shall consist of suitable capacity electrical heaters.
2. Body shall be glass.
3. Capacity of the plant shall be 2.0 lph and a storage tank of capacity 10 ltrs shall also be supplied to store the distilled water.

Annexure - 52

52.0 Vacuum pressure pump

Specifications:

1. Teflon diaphragm based oil-free, portable AC powered vacuum pump for Lab use operating on 230V / 50 Hz.
2. Accessories:
 - (a) Cellulose nitrate membrane filter dia 47mm, pore size 0.45 μm Qty- 4 Packets (each packet having 100 filters)
 - (b) All glass filter holders-47mm borosilicate glass filter holder for vacuum filtering of aqueous liquids with clamp, all parts contacting liquid are borosilicate glass with ground glass sealing surface Qty- 2 set.

Annexure - 53

53.0 Heating Mantel

1.0 Specifications of Equipment:

1. Heating mantel for oil analysis which can withstand high temperature up to 350°C with energy regulator and can hold flask size of 2 liters.

CHEMICAL LAB EQUIPMENTS FOR 5X800 MW YADADRI PROJECT

TECHNICAL SPECIFICATIONS

Annexure - 54

54.0 Magnetic Stirrer cum Hot plate

Specifications of Equipment:

1. Magnetic stirrer shall be provided with a stainless steel hot plate. The heating energy shall be controlled by stepless speed and energy regulator.
2. Max speed: 1200 RPM, Stirring Capacity 2 liters.

Annexure - 55

55.0 Refrigerator

Specifications:

1. Type : Electrically operated with freezer, chill trays, crispators and provided with magnetic door latch, pilot bulb, thermostat temperature control, automatic voltage stabilizer, leads, plugs , Double door with auto defrosting etc.
2. Capacity : 230 litres
3. Voltage : 230V AC nominal with input voltage range.

Annexure - 56

56.0 Hot Plate

Specifications:

Hot Plate for continuous heating up to 350 °C with cast iron top.
Size: 200 mm x 300 mm x 150 mm.

Annexure - 57

57.0 Magnetic Stirrer

Specifications:

1. A magnetic stirrer or magnetic mixer is a laboratory device that employs a rotating magnetic field to cause a stir bar immersed in a liquid to spin very quickly, thus stirring it.
2. Magnetic Stirrer should be electrically operated.
3. It should be fitted with a speed regulator with maximum speed of 1200 RPM.
4. Top plate should be made of stainless steel.
5. Capacity – 2 Litres
6. The magnetic stirrer should be supplied with Teflon coated stirring bar.
7. The magnetic stirrer is required without hot plate.

Annexure - 58

58.0 Chemical (As per Annex-A)

Chemical specification(As per Annex-A)

Annexure - 59

59.0 Glassware (As per Annex-B)

Glassware specification(As per Annex-B)

Annexure - 60

60.0 Safety Equipment (As per Annex-C)

Safety Equipment specification (As per Annex-C)

Annexure - 61

61.0 Furniture (As per annex-D)

Furniture specification (As per annex-D)

Annexure - 62

62.0 General Lab. Requisite (As per annex-E)

General Lab. Requisite specification (As per annex-E)

Note:

1. All standard accessories required for installation & Commissioning and proper operation of the equipments listed above shall be supplied along with the instrument.
2. Detailed printed Catalogue for the equipments must be provided along with the offer submitted.
3. Complete scope , Installation & Commissioning at Project site shall be in vendor scope.

CHEMICALS FOR YADADRI PROJECT		
List of Chemicals		(AR Grade)
S.N.	Chemical's Name	Quantity
1.0	Acid Acetic	4 X 500 ml.
2.0	Acid Benzoic	2 X 500 gms
3.0	Acid Hydrochloric A.R.	4 X 2.5 lits.
4.0	Acid Hydrofluoric	1 X 500 ml.
5.0	Acid Nitric A.R.	4 X 2.5 lits.
6.0	Acid Thioglycolic	2 X 500 ml.
7.0	Acid Oxalic	1 X 500 gms
8.0	Acid Phosphoric	4 X 500 ml.
9.0	Acid Pyrogallic	2 X 500 g.
10.0	Acid Sulphuric A.R.	4 X 2.5 lits.
11.0	Acid Succinic	1 X 250 gms
12.0	Acid Tartaric	1 X 500 gms
13.0	Acid 1- Amino - 2 - Napthol – 4 - Sulphonic	1 X 500 gms
14.0	Alcohol (Absolute)	1 X 2.5 lits.
15.0	Alcohol Iso Amyl	1 X 1 lit.
16.0	Alcohol Isopropyl	1 X 2.0 lit.
17.0	Liquid ammonia	6 X 500 ml
18.0	Ammonium Chloride	1 X 500 gms.
19.0	Ammonium Acetate	1 X 500 gms.
20.0	Ammonium Oxalate	1 X 500 gms.
21.0	Ammonium Persulphate	1 X 500 gms.
22.0	Ammonium Thiocyanate	1 X 500 gms.
23.0	Acetone	4 X 500 ml.
24.0	Ammonium Molybdate hepta hydrate	2 X 500 gms.
25.0	Aluminium Nitrate	1 X 500 gms.
26.0	Bromocresol green	2 X 5 gms.
27.0	Bromocresol purple	2 X 5 gms.
28.0	Benzene	1 X 500 ml.
29.0	Barium Chloride	1 X 500 gms.
30.0	Barium Chromate	1 X 500 gms.
31.0	Bromophenol Blue	1 X 5 gms
32.0	Bromocresol purple	1 X 5 gms
33.0	Bentonite	1 X 500 gms
34.0	Calcium Chloride	4 X 500 gms.
35.0	Calcium Chloride (fused)	2 X 2.5 kgs.
36.0	Calcium Oxide	1 X 500 gms.
37.0	Calcium Carbonate	1 X 500 gms.
38.0	Citric Acid	2 X 500 gms
39.0	Carbon Tetra Chloride	4 X 500 ml.
40.0	Copper Oxide (Wire form)	1 X 500 gms.
41.0	Copper Sulphate	1 X 500 gms.
42.0	Cuprous Chloride	2 X 500 gms.
43.0	Dextrose	2 X 500 gms.
44.0	Di - phenyl Amine	2 X 500 gms.
45.0	EDTA Di-Sod. Salt	2 X 500 gms

CHEMICALS FOR YADADRI PROJECT		
List of Chemicals		(AR Grade)
S.N.	Chemical's Name	Quantity
46.0	Dimethyl Glyoxime	1 X 5 gms
47.0	Eriochrome Black T	1 X 25 gms.
48.0	Diethyl Ether	2 X 500 ml.
49.0	Ethanol	4 X 500 ml
50.0	Ferrous Ammonium Sulphate	2 X 500 gms.
51.0	Ferric Chloride	2 X 500 gms.
52.0	Ferrous Sulphate	2 X 500 gms.
53.0	Formaldehyde	2 X 500 ml.
54.0	Fuller's Earth	1 X 500 gms.
55.0	Glycerol	4 X 500 ml.
56.0	Hydrazine di-hydrochloride	2 X 100 gms.
57.0	Hydroxyl amine hydrochloride	4 X 100 gms.
58.0	Hydrogen Peroxide (30%)	4 X 500 ml.
59.0	Iodine ample (N/10)	6 X 6 amps
60.0	Iron Standard Solution (100 ppm)	2 X 100 ml.
61.0	Indigo Caramine	1 X 25 gms.
62.0	Iodine, sublimed/Resublimed	1 X 500 gms.
63.0	Kaolin	1 X 2.5 kg.
64.0	Lead Acetate	1 X 500 gms.
65.0	Lead Chromate	1 X 500 gms.
66.0	Litmus, universal	1 X 6 roll/400 Lvs
67.0	Magnesium Chloride	1 X 500 gms.
68.0	Magnesium Oxide	1 X 250 gms.
69.0	Magnesium Sulphate	2 X 500 gms.
70.0	Mercuric Chloride	2 X 500 gms.
71.0	Mercuric Thiocyanate	1 X 250 gms.
72.0	Murexide (Ammonium Perpurate)	1 X 10 gms.
73.0	Mercuric Iodide	4 X 250 gms.
74.0	Methanol	6 X 500 ml
75.0	Methyl Orange powder	2 X 25 gms.
76.0	Morpholine Standard solution	2 X 100 ml
77.0	Methyl Red powder	2 X 25 gms.
78.0	Nitric acid	4 X 2.5 lit
79.0	Para di-methylamine benzaldehyde	2 X 100 gms.
80.0	Petroleum ether (40 - 60)	6 X 500 ml.
81.0	pH Buffer Capsule, 4.0	6 X 10 caps.
82.0	pH Buffer Capsule, 7.0	6 X 10 caps
83.0	pH Buffer Capsule, 9.2	6 X 10 caps
84.0	Phenolphthalein powder	2 X 100 gms.
85.0	Potassium bi-carbonate	4 X 500 gms
86.0	Potassium di-hydrogen Ortho Phosphate	2 X 500 gms
87.0	Potassium Chloride	2 X 500 gms.
88.0	Potassium Hydroxide	4 X 500 gms.
89.0	Potassium Permanganate	2 X 500 gms.
90.0	Potassium Iodide	2 X 500 gms.

CHEMICALS FOR YADADRI PROJECT		
List of Chemicals		(AR Grade)
S.N.	Chemical's Name	Quantity
91.0	Potassium Iodate	1 X 500 gms.
92.0	Potassium Chromate	1 X 500 gms.
93.0	Potassium Dichromate	4 X 500 gms.
94.0	Potassium Dihydrogen Phosphate	1 X 500 gms
95.0	Potassium Persulphate	1 X 500 gms.
96.0	Potassium Nitrate	1 X 500 gms.
97.0	Potassium Acid Phthalate	1 X 500 gms.
98.0	Phenolphthalein	1 X 25 gms
99.0	Phenol	1 X 500 gms.
100.0	Silica/Silicate standard solution, 100 ppb	2 X 100 ml.
101.0	Silica/Silicon Standard Solution , 1000 ppm	2 X 100 ml.
102.0	Silver nitrate ample (N/10)	6 X 6 amps
103.0	Silver Nitrate	2 X 250 gms.
104.0	Sodium carbonate anhydrous	6 X 500 gms
105.0	Sodium chloride anhydrous	6 X 500 gms
106.0	Sodium hydroxide pallets	6 X 500 gms.
107.0	Standard copper solution, 100 ppm	2 X 100 ml.
108.0	Starch, potato	2 X 500 gms
109.0	Sulphuric acid	4 X 2.5 lts.
110.0	Sodium acetate	1 X 500 gms
111.0	Sodium carbonate	1 X 1.0 kg
112.0	Sodium Bicarbonate	1 X 500 gms.
113.0	Sodium Meta Bisulphite	4 X 500 gms.
114.0	Sodium Sulphate	1 X 500 gms.
115.0	Sodium Sulphite	1 X 500 gms.
116.0	Sodium Thiosulphate	4 X 500 gms
117.0	Sodium Nitrate	1 X 500 gms.
118.0	Stop Cock Grease (Silicon)	1 X 250 gms.
119.0	Silica (Quartz, Pulverized)	1 X 500 gms.
120.0	Stannous Chloride	1 X 100 gms.
121.0	Silica Gel (6 - 20 mesh)	1 X 500 gms.
122.0	Toluene	1 X 500 ml.
123.0	Thorin Indicator	1 X 5 gms.
124.0	Universal pH indicator	1 X 500 ml.
125.0	Zinc Sulphate hepta hydrate	2 X 500 gms.
126.0	Zinc Dibenzyl Dithiocarbamate	1 X 100 gms.
Note: Undertaking required for supply of chemicals with manufacturing date not older than 03 Months at the time of dispatch.		

GLASSWARE FOR YADADRI TPS PROJECT				
List of Glasswares (Class-A Certificate)				
1.0	Burettes – Straight bore stopcock, Borosil/Corning/Duran/equivalent Class A with works certificate			
	Capacity (ml)	Graduation Interval (ml)	Tolerance (+/- ml)	Quantity(Nos.)
	100	0.2	0.1	3
	50	0.1	0.05	6
	25	0.1	0.05	6
	10	0.05	0.02	6
2.0	Burettes, Automatic Zero, mounted on reservoir, Borosil Corning/ Duran/ equivalent (Reservoir Capacity – 2000 ml.)			
	Capacity (ml)	Graduation Interval (ml)	Tolerance (+/- ml)	Quantity (Nos.)
	50	0.1	0.1	3
	25	0.1	0.1	3
	10	0.05	0.05	3
3.0	Pipettes, Transfer volumetric, Accuracy as per Class A with works certificate Borosil / Corning/Duran/equivalent			
	Capacity	Tolerance (+/- ml)	Quantity (Nos.)	
	100	0.08	6	
	50	0.05	6	
	25	0.03	6	
	10	0.02	6	
	5	0.015	6	
	2	0.01	4	
1	0.007	4		
4.0	Pipettes (Mohr type). Accuracy as per Class A with works certificate Borosil / Corning/ Duran/equivalent			
	Capacity (ml)	Graduation Interval (ml)	Tolerance (+/- ml)	Quantity (Nos.)
	10	0.1	0.05	12
	5	0.1	0.05	12
	2	0.1	0.01	6
	1	0.1	0.006	4
5.0	Volumetric flasks with stopper. Accuracy as per Class A with works certificate Borosil / Corning/ Duran/equivalent			
	Capacity (ml)	Interchangeable	Tolerance (+/- ml)	Quantity (Nos.)
		Stopper size		
	2000	24/25	0.4	2
	1000	19/20	0.4	4
	500	19/20	0.25	6
	250	14/15	0.15	6
	100	14/15	0.1	12
	50	15/10	0.06	12
	25	15/10	0.04	12

GLASSWARE FOR YADADRI TPS PROJECT				
List of Glasswares (Class-A Certificate)				
6.0	Graduated cylinders single Metric scale as per Class A with works certificate Borosil /Corning/Duran/equivalent			
	Capacity (ml)	Graduation Interval (ml)	Tolerance (+/- ml)	Quantity (Nos.)
	2000	20	10	2
	1000	10	5	4
	500	5	2.5	6
	250	2.5	1	6
	100	1	0.5	6
	50	1	0.5	6
	25	0.5	0.25	6
	10	0.2	0.1	6
7.0	Flasks, Erlenmeyer, Conical, Narrow mouth, Borosil/ Corning/Duran/ equivalent			
	Capacity (ml)	O.D X Height (mm x mm) (Approx)	Neck O.D. (mm)	Quantity (nos)
	1000	131 X 220	42	6
	250	85 X 140	34	12
	150	72 X 124	24	12
	100	64 X 105	25	12
8.0	Beakers, Griffin Low Form with spout. Borosil/Corning/Duran/equivalent			
	Capacity (ml)	O.D X Height (mm x mm) (Approx)	Quantity (nos)	
	2000	131 X 190	4	
	1000	105 X 148	12	
	400	77 X 105	12	
	250	68 X 95	12	
	100	50 X 72	12	
	50	42 X 55	12	
9.0	Flasks, Boiling, Round Bottom, Short Neck with Interchangeable Joint. Borosil/ Corning/Duran/ equivalent			
	Capacity (ml)	Size of inter changeable stopper (mm)	Height (mm)	Quantity (nos)
	1000	24/29	188	4
	500	24/29	160	4
10.0	Flasks, distilling with side arm Borosil/ Corning/Duran/ equivalent			
	Capacity (ml)	O.D X Height (mm x mm) (Approx)	Neck O.D. (mm)	Quantity (Nos.)
	500	110 X 250	28	4

GLASSWARE FOR YADADRI TPS PROJECT				
List of Glasswares (Class-A Certificate)				
11.0	Funnels, Plain 60° Long Stem, Borosil/ Corning/ Duran/ equivalent			
	Diameter	Quantity		
	(mm)	(Nos.)		
	50	6		
	75	6		
100	4			
12.0	Funnels, Separating with Stopcock and Interchangeable Stopper, pear shape. Borosil / Corning/Duran/equivalent			
	Capacity (ml)	Stopper Size (mm x mm)	Quantity (Nos.)	
	500	24/25	3	
	250	19/20	10	
13.0	Bottles, Reagent Plain Narrow Mouth and Interchangeable Stopper, pear shape. Borosil/ Corning/ Duran/equivalent			
	Capacity (ml)	O.D X Height (mm x mm) (Approx)	Size of Interchangeable Stopper	Quantity (Nos.)
	2000	126 X 265	34/35	4
	1000	104 X 200	29/32	24
	500	80 X 172	24/29	24
	250	64 X 147	19/26	24
	125	54 X 120	19/26	12
14.0	Bottles, Reagent Amber. Narrow Mouth with interchangeable flat head stopper			
	Capacity (ml)	Approx Height (mm)	Quantity (Nos.)	
	1000	200	6	
	500	172	6	
	250	147	6	
15.0	Dropping Bottles			
	Dropping bottles with suitable			
	Capacity (ml)	Quantity (Nos.)		
	100 or 125	12		
	Dropping bottles clear glass, T.K.			
	Capacity (ml)	Quantity (Nos.)		
	100 or 125	6		
	Dropping bottles, Amber glass, T.K.			
	Capacity (ml)	Quantity (Nos.)		
	100 or 125	6		
	Winchester bottles, with slotted			
	Capacity (ml)	Quantity (Nos.)		
	2500	6		
1000	6			

GLASSWARE FOR YADADRI TPS PROJECT				
List of Glasswares				(Class-A Certificate)
16.0	Bottles, Aspirator with tubular at bottom and connection designed with flexible tubing. Borosil / Corning/ Duran/ equivalent			
	Capacity (Lit.)	Quantity (Nos.)		
	5	2		
	10	2		
17.0	Bottles, wash, complete with interchangeable stopper. Borosil/Corning/Duran/equivalent			
	Capacity (ml)	Quantity (Nos.)		
	1000	4		
18.0	Bottles, weighing with interchangeable stopper. Borosil / Corning/Duran/equivalent			
	Diameter (mm)	Body Height (mm)	Quantity (Nos.)	
	20	40	6	
	40	80	6	
19.0	Watch glasses. Borosil / Corning/Duran/equivalent			
	Diameter (mm)	Quantity (Nos.)		
	75	12		
	100	12		
20.0	Watch glasses, Borosil / Corning/Duran/equivalent			
	Diameter (mm)	Quantity (Nos.)		
	50	6		
	100	6		
21.0	Petri Dishes, Crystallizing, Borosil/ Corning/ Duran/ equivalent			
	O.D. X Height (mm x mm)	Quantity (Nos.)		
	50 X 17	12		
	80 X 17	12		
22.0	Dishes, Evaporating, Flat Bottom with pour out Borosil/ Corning/Duran/ equivalent			
	O.D. X Height (mm x mm)	Quantity (Nos.)		
	80 X 45	6		
23.0	Desiccators with knob top Borosil/Corning/Duran/ equivalent			
	ID of Ground Flange (mm)	Overall Height (mm) (Approx)	Chamber Depth (mm) (Approx)	Quantity (Nos.)
	100 or 120	150	50	4
	150 or 160	225	95	3

GLASSWARE FOR YADADRI TPS PROJECT					
List of Glasswares (Class-A Certificate)					
24.0	Desiccators, Vacuum with cover & sleeve Borosil/ Corning/Duran/ equivalent				
	ID of Ground Flange (mm)	Overall Height (mm) (Approx)	Chamber Depth (mm) (Approx)	Quantity (Nos.)	
	150 or 160	225	95	2	
25.0	Distilling Apparatus with Graham Condenser, Interchangeable Joints, Interchangeable stopper, Borosil / Corning/Duran/equivalent				
	Capacity (ml)	Condenser Jacket (mm)	Interchangable Joint	Quantity (Nos.)	
	500	200	19/26	2	
26.0	Condensers, Liebig Drip Tip, Interchangeable joint and Interchangeable outer joint. Borosil / Corning / Duran / equivalent				
	Jacket length (mm)	Interchangeable Inner	Joint Outer	Quantity (Nos.)	
	300	24/29	24/29	2	

Laboratory Safety Equipment		
Project : Yadadri Power Project site		
Sl.No	Item and Size	Quantity
1	Coat Long Chest size 34", 36", 38"(Men's)	6
2	Rubberized cloth apron 114 (L) x 86 cm (W)	6
3	Asbestos gloves 20 cm (L)	6 pairs
4	Natural rubber gloves Free Size	6 pairs
5	Neoprene gloves Size 7	6 pairs
6	Neoprene gloves Size 8	6 pairs
7	Silicon Rubber Hand Protector	12
8	Respirator for toxic dust complete with filter	6
9	Gas mask suitable against ammonia, chlorine, sulphur dioxide, acid fumes	3
10	Safety goggles to avoid chemical splash, Soft vinyl frame with plastic ventilators, Optical quality, distortion free replaceable lens, with rubber head	6
11	First Aid Cabinet similar to Fisher Catalogue 203 No. 10-020	4
12	Toxic and Hazardous chemicals chart similar to Fisher catalogue 203 No. 10-027-1.	2
13	Laboratory safety chart similar to Fisher Catalogue 203 No. 10-027-10	4
14	Eye/Face wash wall mount similar to Fisher Catalogue 203 No. 91-572	4
15	Safety signs such as eye wash, exit, fire extinguisher, no smoking, first aid kit, acid spillage, etc., displayed in the laboratory.	4

CHEMICAL LABORATORY FURNITURE FOR YADADRI PROJECT

List of Furniture

S. N.	Item	Material of Construction	Qty.	Dimensions (in mm)		
				Length	Width	Height
F1	Fume Chamber	Double skin 20 SWG CRCA Steel with an inner lining of compressed asbestos (1.6 mm) Painted with epoxy paint.	1 No.	1500	750	2350
F2	Working Table	The Bench Tops shall be made from core of block board to which tiles are to be bonded with polyurethane or epoxy compound. The area joined with acid resistant cement.	10 Nos.	1200	750	750
F3	Wall Mounted Chemical Storage Units	20 SWG CRCA with epoxy paint, 2 tier adjustable shelves	10 Nos.	750	300	600
F4	9- Cabinet Island Assembles With Elevated Shelves & End Sink Peninsula type	To be equipped with mixing faucet, plastic p-trap, 2 cold water faucets, 6 double gas/air /vacuum cocks, 2 double faced duplex electrical outlet boxes. The bench top shall be designed as per F2.	1 No.	4860	1500	850
F5	Elevated Shelves	2 tire reagent shelves with polyurethane or epoxy finish. The shelves shall be made of 20 SWG CRCA steel.	10 Nos.	900	300	600
F6	Modular Under-Bench Storage Units	20 SWG Steel with epoxy coated	10 Nos.	700	500	800
F7	Wall Storage Cupboard	The units shall have horizontal sliding glass doors in plastic channels. Two adjustable shelves are to be provided	10 Nos.	750	300	600
F8	Anti-Vibration Instrument Table	Tops shall be furnished in shell white melamine laminate, antivibration rubber pads are to be fixed on surface.	8 Nos.	900	600	700
F9	Working Desk	1 drawer & 1 shutter unit.	10 Nos.	1200	750	750
F10	4- Cabinet Island Assemblies With Elevated Shelves & Center Sink, Peninsula Type	The Top shall be as per F4.	1 No.	2100	1500	900
F11	Steel Racks	Slotted angle steel racks with antirust paintings.	10 Nos.	900	450	1800
F12	Revolving Chairs	As per Fisher Catalogue	12 Nos.			
F13	Revolving Stools	As per Fisher Catalogue	10 Nos.			

NOTE:

The entire furniture module shall comply with the following properties:

1. Chemical Properties: Resistance to acids, alkalis, solvents.
2. Physical Properties: Resistance to heat and temperature Change, Static, Conductivity
3. Mechanical Properties: Impact resistance, surface hardness, workability.
4. All metallic parts of modular furniture shall be epoxy powder coated electro statically. Prior to this, it
5. The Fume Chamber unit shall be provided with a sink in 16 SWG SS 316 grade, 1 x water point, 2 x 5/15 amp. Electrical point at front facia.

The fume chamber shall be inclusive of FRP, centrifugal blower with 1 HP-3 phase electrical motor. The blower is connected through fume chamber by 225 mm dia. HDPE pipe of 2.5 kg/cm² pressure.

GENERAL LABORATORY REQUISITE FOR YADADRI PROJECT		
List of General Laboratory Requisite		
S.No.	General Laboratory Requisite	Quantity
1	Nickel plates steel tongs (lengths - 50 cms)	4
2	Nickel plates steel tongs (lengths - 25 cms)	4
3	Steel Tongs - 25 cms	4
4	Stainless steel beaker tongs - 25 cms	4
5	Stainless steel basin tongs - 25 cms	4
6	Stainless steel flask tongs,length 25 cms.	4
7	Pipette stand Fisher type	6
8	Test tube stand Fisher type	6
9	Double burette stand	12
10	Rectangular retort stand bases with retort stand rods	12
11	Tripod stand, Triangular top Wire gauge	50
12	S Steel spatulas with riveted handles	12
13	Stainless steel spatulas flask with spoon end	12
14	Scissors, stainless steel	6
15	Burette Brushes	12
16	Test tube brushes	12
17	Flask Brushes	12
18	Asbestos Mats- 150 sq. m	24
19	Asbestos Mats- 300 sq. m	24
20	Cork borer sets with borer sharpener	6
21	Velvet corks (assorted size)	100
22	Corks rubber (assorted size)	100
23	Mortar, porcelain with lip, fitted with wood handle	2
24	Agate motor and pastel (dia. 5 cms)	2
25	Agate motor and pastel (dia. 7.5 cms)	2
26	Crucibles, Porcelain with perforated bottom and complete with perforated discs : 4.5 cms x 4.2 cms	6
27	Crucibles, Porcelain with perforated bottom and complete with perforated discs : 4.9 cms x 3.6 cms	6
28	Crucibles Platinum with Lid Capacity : 30 ml, weight: 30 gm approx. Purity: 99.95% with purity certificate in original from authorised certified agency.	4

GENERAL LABORATORY REQUISITE FOR YADADRI PROJECT		
List of General Laboratory Requisite		
S.No.	General Laboratory Requisite	Quantity
29	Combustion boats (50 ml)	6
30	Combustion boats (25 ml)	6
31	Pipe clay triangles iron wire with pipe Clay stalks for holding the above boats	12
32	Glass cutting knives	4
33	Rubber gloves assorted size	12
34	Rubber tubing assorted size	12
35	Bottle trays for acid bottle	10
36	Magnets with keepers (10 cm long)	2
37	Magnifying glass with handle	2
38	Wash bottle polythene (1000 ml capacity)	12
39	Polythene bottle - 1000 ml	12
40	Polythene bottle - 500 ml	12
41	Polythene bottle - 250 ml	12
42	Polythene bottle - 100 ml	12
43	Polythene bottle - 50 ml	12
44	Safety Tray	6

CHEMICAL LAB EQUIPMENTS FOR 5X800 MW YADADRI PROJECT

TECHNICAL SPECIFICATIONS

Other Terms & Conditions

Document:

The O&M manual shall be submitted in form of hard copies (03 nos.) and in the form of CDs (03 nos.).

Two sets shall be packed with the instrument and sent to site and third copy of O&M manuals shall be sent to PCRI- HEEP Haridwar.

Installation and Commissioning: The supplier shall install & commission the equipment at site. Supplier should demonstrate the performance of the Equipment and all its accessories to ensure compliance with complete specifications & parameters quoted by them to the satisfaction of BHEL/end user. Training to chemists at site during installation should be provided for routine maintenance, operation and safety purpose. Failing to comply to the Installation and Commissioning clause, the offer will be rejected straightaway.

Warranty: The equipment shall be warranted for satisfactory performance for a period of 18 months from the date of installation or 24 months from date of dispatch, whichever is later. Failing to comply to the warranty clause, the offer will be rejected straightaway.

Packing & Dispatch: The equipment / accessories shall be packed in a suitable water proof/ vibration proof packing box capable of bearing air and road transit hazards. Packing box shall be properly identified and marked with BHEL's (India) Purchase Order Number. Also, "PCRI HWR" should be written in bold letters on all four sides of the packing box.

Buyer Specific ATC document for Lab Items of Yadadri Project

1.	<p>MDCC (Material dispatch clearance certificate) Clause:</p> <p>Please note that material shall be dispatched only after issue of Material dispatch clearance certificate (MDCC) by BHEL. For issue of MDCC, you are required to submit the set of documents (i.e. Packing list, Guarantee certificate, Complete test reports & Calibration certificate (if applicable)).</p> <p>BHEL will release MDCC within 07 days from the date of receipt of completed documents as detailed above.</p> <p>The delivery period of 90 days is inclusive of 07 days taken by BHEL to issue MDCC.</p>
2.	<p>Quality Requirement:</p> <p>(i) BHEL / Nominated third part inspection agency may do inspection at works of supplier before dispatch of material.</p> <p>(ii) Bidders are requested to submit quality plan in line with technical specification in prescribed format in the event of ordering for approval of customer / BHEL <u>within 15 days of Purchase Order</u>.</p>
3.	<p>Pre-Qualification Requirement (PQR):</p> <p>The Pre-Qualification Requirements have been made part of bid. All the bidders should ensure submission of complete details and documents as called for in the same. The offers submitted by the bidders would be scrutinized with respect to Pre-Qualification Requirements first.</p> <p>Techno-Commercial offer of only those bidders shall be evaluated who meet the Pre-Qualification Requirements.</p>
4.	<p>Technical Specification Requirement:</p> <ol style="list-style-type: none">1. Please quote your valuable offer as per BHEL Specification enclosed with bid documents.2. Bidders to upload signed and stamped copy of BHEL Specifications along with the offer as token of acceptance.
5.	<p>Payment Terms:</p> <ul style="list-style-type: none">• 85% payment after receipt of material at site against submission of PBG @ 10% of Order value valid till entire Guarantee / Warranty period. PBG would be submitted before the negotiation of documents. The PBG will be in BHEL format and from one of the BHEL consortium banks. For name of BHEL consortium bank, please visit our website hwr.bhel.com.• Balance 15% payment after installation and commissioning at site.• Payment will be released by BHEL within:<ul style="list-style-type: none">- 45 days for Micro and Small enterprises- 60 days for Medium enterprises- 90 days for Non MSME enterprises
6.	<p>Delivery Period:</p> <p>The delivery shall be 90 days from the date of QAP approval. This period is inclusive of 7 days for BHEL to arrange dispatch clearance (provided MDCC related documents are complete in all respect).</p>

7.	<p>Evaluation criteria:</p> <p>Evaluation will be done on the basis of Total Landed cost up to Yadadri project site considering all items together (Total value wise evaluation).</p> <p>Bidders are requested to quote for all 62 items as per specification. Offer of bidders not quoting for all items covered in tender specification will be rejected straightaway.</p> <p>In case, a bidder has quoted for all 62 items, however, their offer is technically not accepted even for one item, in such scenario, complete offer of the bidder will be rejected by BHEL.</p>
8.	<p>Document:</p> <p>O&M manual in English language giving complete technical information for operation and maintenance of the equipment is required.</p> <p>All O&M Manuals shall be furnished by supplier in 3 Sets. Out of these 03 sets, Two sets shall be packed with the instrument and sent to site and third copy of O&M manuals shall be sent to PCRI-HEEP Haridwar.</p> <p>The O&M manual shall be submitted in form of hard copies (03 Nos.) and in the form of CDs (03 Nos.)</p>
9.	<p>Price Basis:</p> <p>Please confirm that prices have been quoted on F.O.R. Yadadri site basis.</p>
10.	<p>Installation and Commissioning:</p> <p>The supplier shall install & commission the equipment at site. Supplier should demonstrate the performance of the Equipment and all its accessories to ensure compliance with complete specifications & parameters quoted by them to the satisfaction of BHEL/end user.</p> <p>Training to chemists at site during installation should be provided for routine maintenance, operation and safety purpose.</p> <p>Cost of Installation and Commissioning should be inclusive in the quoted prices.</p> <p>Installation and Commissioning will be done at following address:</p> <p>ASST DIVISION. ENGINNER-STORES CONST. DIVI, 5 X 800MW YADADRI TPS VEERLAPALEM VIL. DAMERACHERLA MANDAL, DIST-NALGONDA-508207</p> <p>Failing to comply to the Installation and Commissioning clause, the offer will be rejected straightaway.</p>
11.	<p>Guarantee / Warranty:</p> <p>The equipment shall be guaranteed / warranted for satisfactory performance for a period of 24 months from the date of dispatch or 18 months from the date of installation & commissioning, whichever is later.</p> <p>Failing to comply to the Guarantee / Warranty clause, the offer will be rejected straightaway.</p>
12.	<p>Packing & Dispatch:</p> <ol style="list-style-type: none"> The equipment / accessories shall be packed in a suitable water proof / vibration proof packing boxes capable of bearing air and road transit hazards. Packing box shall be properly identified and marked with BHEL's (India) Purchase Order Number. Also, "PCRI HWR" and Name of the Item/Items should be written in bold letters on all four sides of Packing box.

13. **EARNEST MONEY DEPOSITE (EMD)**

13.1 Interested vendors must submit their offer along with the following Earnest Money Deposit (EMD) in a separate sealed envelope:

Details	Amount In INR	Amount in Foreign Currency	Type
EMD	INR 2,00,000/- (INR Two Lac Only)	Equivalent Foreign currency	Refundable

13.2 EMD shall not carry any interest.

13.3 Modes of deposits will be as per General Terms and Conditions (GTC) GeM_GTC_4.0_v1.5_09 Oct22.

The demand draft shall be in favor of "BHEL Haridwar". E-Payment is also acceptable. For e-payment, RTGS details are as mentioned below:

Bank Details	SWIFT Details of bank	Contact Details of Banker
STATE BANK OF INDIA RANIPUR BRANCH, OPP: BHEL MAIN GATE, SECTOR-5, RANIPUR, HARIDWAR, UTTRAKHAND, INDIA PIN CODE : 249403	SWIFT NO : SBININBB225 CC ACCOUNT NO : 10667995458 IFSC CODE : SBIN0000586	Chief Manager (IBD) Contact No. +91 1334 224201 +91 1334 226125 Fax: +91 1334 226512

13.4 MSE Suppliers / Central / State – PSUs / Government departments, who are the manufacturer of all 62 items as per specification are exempted from submission of the EMD.

13.5 EMD exemption will be allowed as per criteria laid down in General Terms and Conditions (GTC) GeM_GTC_4.0_v1.5_09 Oct22.

13.6 Bids not accompanied with requisite EMD or bids accompanied with EMD of inadequate value shall be liable for rejection, wherever exemption is not allowed.

13.7 The bidder whose bid is technically not accepted will be informed & EMD wherever submitted shall be refunded after the finalization of the contract. EMD shall be forfeited in the event of bidder opting out after tender opening (PART-I).

14. **Risk Purchase:**

In case of abnormal delays (beyond the maximum late delivery period as per LD clause) in supplies / defective supplies or non-fulfillment of any other terms and conditions given in Purchase Order, BHEL may cancel the Purchase Order in full or part thereof, and may also make the purchase of such material from elsewhere / alternative source at the risk and cost of the supplier. BHEL will take all reasonable steps to get the material from alternate source at optimum cost. If bidder does not agree to the above Risk Purchase Clause, BHEL reserves the right to reject the offer. In case for compelling reasons BHEL accepts the offer without acceptance of this clause by the bidder and in the eventuality of Risk Purchase, appropriate action will be taken as per BHEL extant rules. This will be without prejudice to any other right of BHEL under the contract or under General Law.

Action against Bidders / vendor / supplier / contractor in case of default:

In order to protect the commercial interests of BHEL, BHEL shall take action against supplies /

contractors by way of suspension of business dealings, who either fail to perform or are in default without any reasonable cause, cause loss of business/ money/ reputation, indulge in malpractices, cheating, bribery, fraud or any other misconduct or formation of cartels so as to influence the bidding process or influence the price etc.

Suspension of Business Dealings could be in the form of “Hold” or “Banning” a supplier/ contractor or a bidder and shall be as per “Guidelines for Suspension of Business Dealings with Suppliers/ Contractors” available at BHEL’s website “<https://www.bhel.com/guidelines-suspension-business-dealings-supplierscontractors>”.

15. Arbitration Clause:

In case of any dispute arising out of as in connection with this contract, the same shall be referred to arbitration under Arbitration & Conciliation Act 1996 of a sole arbitrator who shall be appointed by mutual consent of the parties. The seat & venue of arbitration shall be Haridwar.

The proceedings shall be conducted in English. The Governing law of contract shall be the substantive law of India.

16. Integrity Pact:

(a) IP is a tool to ensure that activities and transactions between the Company and its Bidders/ Contractors are handled in a fair, transparent and corruption free manner. Following Independent External Monitors (IEMs) on the present panel have been appointed by BHEL with the approval of CVC to oversee implementation of IP in BHEL.

Sl.	IEM	Email
1.	Shri Otem Dai, IAS (Retd.)	iem1@bhel.in
2.	Shri Bishwamitra Pandey, IRAS (Retd.)	iem2@bhel.in
3.	Shri Mukesh Mittal, IRS (Retd.)	iem3@bhel.in

(b) The IP as enclosed with the tender is to be submitted (duly signed by authorized signatory) along with techno-commercial bid (Part-I, in case of two/ three part bid). Only those bidders who have entered into such an IP with BHEL would be competent to participate in the bidding. In other words, entering into this Pact would be a preliminary qualification.

Please refer Section-8 of IP for Role and Responsibilities of IEMs. In case of any complaint arising out of the tendering process, the matter may be referred to any of the above IEM(s). All correspondence with the IEMs shall be done through email only.

Note:

No routine correspondence shall be addressed to the IEM (phone/ post/ email) regarding the clarifications, time extensions or any other administrative queries, etc. on the tender issued. All such clarification/ issues shall be addressed directly to the tender issuing (procurement) department's officials whose contact details are provided below:

Details of contact person(s)-

Mr. Shashi Pal Designation: A. E. (PCRI-BOI) Pollution Control Research Institute HEEP, BHEL, Haridwar- 249403 Uttarakhand, India Email ID: palsh@bhel.in Tel: +91 1334 28 1941	Mr. Deshraj Yadav Designation: Dy. Manager (PCRI-BOI) Pollution Control Research Institute HEEP, BHEL, Haridwar- 249403 Uttarakhand, India Email ID: deshraj@bhel.in Tel: +91 1334 28 1187
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17. **Customer Approval:**

At present, you are not a customer approved bidder. For arranging approval from end customer, following credentials are required to be submitted:

- (i) Company profile
- (ii) Supply experience with BHEL Haridwar as well as other Customer, End user certificate, Copy of ISO certification,
- (iii) Manufacturing and testing facilities, etc.

In case, the make offered by the bidder is rejected by customer, the bidder will have to offer the item from another reputed make / preferred list given below, for approval of customer without any financial implication, failing to which, **complete offer will be rejected by BHEL.**

BHEL will open the price bid of only those bidders who are finally approved by end customer.

Item-wise list of bidders preferred by customer is given below:

Sr. No.	Name of Item	Preferred make / bidders by customer
1	Conductivity Meter	1. Lab India Instruments Pvt. Ltd. 2. Environmental & Scientific 3. Toshniwal Instruments 4. DKK-TOA Corporation 5. Metrohm AG
2	Conductivity Meter (portable)	1. Lab India Instruments Pvt. Ltd., 2. Environmental & Scientific 3. Toshniwal Instruments Manufact, 4. DKK-TOA Corporation 5. Metrohm AG
3	pH meter	1. Lab India Instruments Pvt. Ltd., 2. Environmental & Scientific 3. Toshniwal Instruments Manufact, 4. DKK-TOA Corporation 5. Metrohm AG
4	pH meter (Portable)	1. Lab India Instruments Pvt. Ltd., 2. Environmental & Scientific 3. Toshniwal Instruments Manufact, 4. DKK-TOA Corporation 5. Metrohm AG
5	Turbidity meter	1. Analytical Technologies Limited 2. Environmental & Scientific 3. Analytica Equipments (I) Pvt. Ltd
6	Flame Photometer	1. Analytical Technologies Limited 2. Environmental & Scientific. 3. Bibby Scientific Ltd. 4. Usha Instruments & Chemicals.
7	Jar Test Apparatus	1. Testing instruments, 2. Yorco sales pvt ltd, 3. Macro scientific works

8	Analytical balance	<ol style="list-style-type: none"> 1. Merck Specialist Pvt. Ltd 2. Analytical Technologies Limited 3. CAS weighing India Pvt. Ltd, 4. Analytica Equipments (I) Pvt. Ltd 5. Tula Digital (I) Pvt. Ltd, 6. Vortex Electronics Pvt. Ltd, 7. Avon Corporation Ltd, 8. Precisa Gravimetrics AG 9. Shimadzu (Asia Pacific) PTE Ltd
9	Apparatus for oxidation stability test	<ol style="list-style-type: none"> 1. Culture Instruments 2. Hindustan Apparatus Mfg. Co.
10	Redwood viscometer for oil analysis	<ol style="list-style-type: none"> 1. Hamco (Hindustan Apparatus Mfg. Co.) 2. Petroleum Instruments (India) Pvt Ltd
11	Interfacial tension apparatus	<ol style="list-style-type: none"> 1. Culture Instruments
12	Automatic Flash Point Apparatus	<ol style="list-style-type: none"> 1. Hindustan Apparatus Mfg. Co. 2. Yorco Sales Pvt. Ltd. 3. Macro Scientific Works (Regd.).
13	Penetrometer for grease testing	<ol style="list-style-type: none"> 1. Petroleum Instruments (India) Pvt Ltd.
14	Dean & stark moisture determination apparatus	<ol style="list-style-type: none"> 1. Reputed Indigenous make
15	Explosimeter	<ol style="list-style-type: none"> 1. Endee
16	Centrifuge	<ol style="list-style-type: none"> 1. REMI 2. Usha Instruments & Chemicals. 3. Yorco Sales Pvt. Ltd. 4. Macro Scientific Works (Regd.). 5. Vortex Electronics Pvt Limited.
17	Automatic K-F (Karl- Fisher) Titrimeter	<ol style="list-style-type: none"> 1. Spectra lab Instruments Pvt. 2. Labindia Instruments Pvt. Ltd. 3. Toshniwal Instruments Manufact. 4. Analytica Equipments(I) Pvt. L. 5. Merck Specialitics Pvt. Ltd. 6. Metrohm AG.
18	Orsat apparatus	<ol style="list-style-type: none"> 1. Jain Scientific Glass Works. 2. Vikas Scientific Works. 3. Labco
19	Hydrogen Purity apparatus	<ol style="list-style-type: none"> 1. ENDEE 2. Honeywell Automation India. 3. Yokogawa India Limited. 4. Nova Analytical Limited
20	Muffle Furnace	<ol style="list-style-type: none"> 1. Usha Instruments & Chemicals. 2. Jain Scientific Glass Works. 3. Yorco Sales Pvt. Ltd. 4. Narang Scientific Works Pvt. 5. Macro Scientific Works(Regd.). 6. Hindustan Apparatus Mfg. Co.
21	Oven	<ol style="list-style-type: none"> 1. Usha Instruments & Chemicals. 2. Jain Scientific Glass Works. 3. Yorco Sales Pvt. Ltd. 4. Narang Scientific Works Pvt. 5. Macro Scientific Works (Regd.). 6. Vortex Electronics Pvt Limited. 7. Hindustan Apparatus Mfg. Co. 8. JHPL

22	Lab Pulveriser	<ol style="list-style-type: none"> 1. Testing Instruments. 2. S.D. Instruments & Equipments. 3. Usha Instruments & Chemicals. 4. Yorco Sales Pvt. Ltd. 5. Macro Scientific Works (Regd.).
23	Sieve Shaker	<ol style="list-style-type: none"> 1. Testing Instruments. 2. S.D. Instruments & Equipments. 3. Usha Instruments & Chemicals. 4. Yorco Sales Pvt. Ltd. 5. Macro Scientific Works (Regd.).
24	Jaw Crusher	<ol style="list-style-type: none"> 1. Testing Instruments. 2. S.D. Instruments & Equipments. 3. Usha Instruments & Chemicals. 4. Yorco Sales Pvt. Ltd. 5. Macro Scientific Works (Regd.).
25	Roll Crusher	<ol style="list-style-type: none"> 1. Testing Instruments. 2. S.D. Instruments & Equipments. 3. Usha Instruments & Chemicals. 4. Yorco Sales Pvt. Ltd. 5. Macro Scientific Works (Regd.).
26	Humidity Oven	<ol style="list-style-type: none"> 1. Usha Instruments & Chemicals. 2. Jain Scientific Glass Works. 3. Yorco Sales Pvt. Ltd. 4. Narang Scientific Works Pvt. 5. Macro Scientific Works (Regd.). 6. Vortex Electronics Pvt Limited. 7. Hindustan Apparatus Mfg. Co. 8. JHPL
27	Coal Sample Riffler	<ol style="list-style-type: none"> 1. Testing Instruments. 2. S.D. Instruments & Equipments. 3. Usha Instruments & Chemicals. 4. Yorco Sales Pvt. Ltd. 5. Macro Scientific Works (Regd.).
28	Furnace for determination of Volatile Matter	<ol style="list-style-type: none"> 1. Usha Instruments & Chemicals 2. Jain Scientific Glass Works. 3. Yorco Sales Pvt. Ltd. 4. Narang Scientific Works Pvt. 5. Macro Scientific Works (Regd.). 6. Hindustan Apparatus Mfg. Co.
29	Abrasive/Erosive index machine	<ol style="list-style-type: none"> 1. Testing Instruments. 2. S.D. Instruments & Equipments. 3. Usha Instruments & Chemicals. 4. Yorco Sales Pvt. Ltd. 5. Macro Scientific Works (Regd.).
30	Laboratory plate mill	<ol style="list-style-type: none"> 1. Testing Instruments. 2. S.D. Instruments & Equipments. 3. Usha Instruments & Chemicals. 4. Yorco Sales Pvt. Ltd. 5. Macro Scientific Works (Regd.).

31	Laboratory mini mill	<ol style="list-style-type: none"> 1. Testing Instruments. 2. S.D. Instruments & Equipments. 3. Usha Instruments & Chemicals. 4. Yorco Sales Pvt. Ltd. 5. Macro Scientific Works (Regd.).
32	Analytical balance	<ol style="list-style-type: none"> 1. Merck Specialist Pvt. Ltd, 2. CAS weighing India Pvt. Ltd, 3. Analytica Equipments (I) Pvt. Ltd, 4. Tula Digital (I) Pvt. Ltd, 5. Vortex Electronics Pvt. Ltd, 6. Avon Corporation Ltd, 7. Precisa Gravimetrics AG, 8. Shimadzu (Asia Pacific) PTE Ltd
33	Ordinary balance	<ol style="list-style-type: none"> 1. Merck Specialist Pvt. Ltd, 2. CAS weighing India Pvt. Ltd, 3. Analytica Equipments (I) Pvt. Ltd, 4. Tula Digital (I) Pvt. Ltd, 5. Vortex Electronics Pvt. Ltd, 6. Avon Corporation Ltd, 7. Precisa Gravimetrics AG, 8. Shimadzu (Asia Pacific) PTE Ltd
34	Weather Monitoring System	<ol style="list-style-type: none"> 1. Envirotech Instruments Pvt.Ltd. 2. Virtual Hydromet Pvt Ltd. 3. Aimil Ltd. 4. Netel (India) Limited. 5. Novalynx 6. Orlab
35	Autoclave	<ol style="list-style-type: none"> 1. Jain Scientific Glass Works. 2. Yorco Sales Pvt. Ltd. 3. Narang Scientific Works Pvt. 4. Macro Scientific Works (Regd.).
36	BOD incubator	<ol style="list-style-type: none"> 1. Merck Specialitics Pvt. Ltd. 2. Usha Instruments & Chemicals 3. Yorco Sales Pvt. Ltd. 4. Narang Scientific Works Pvt. 5. Macro Scientific Works (Regd). 6. Vortex Electronics Pvt Limited. 7. Hindustan Apparatus Mfg. Co. 8. JHPL
37	COD reactor	<ol style="list-style-type: none"> 1. Merck Specialitics Pvt. Ltd., 2. Jain Scientific Glass Works, 3. Spectralab Instruments Pvt., 4. Yorco Sales Pvt. Ltd., 5. Macro Scientific Works (Regd.) , 6. Hindustan Apparatus Mfg. Co.
38	Inoculation chamber	<ol style="list-style-type: none"> 1. Reputed Indigenous make
39	Dew Point Meter	<ol style="list-style-type: none"> 1. Endee Engineers Pvt.Ltd. 2. Virtual Hydromet Pvt Ltd. 3. Techmark Engineers 4. Orlab
40	Dial type barometer	<ol style="list-style-type: none"> 1. Scientific Works 2. HTC

41	Maximum & Minimum Thermometer	1. Zeal 2. Vikas Scientific Works.
42	Dry & Wet Bulb Thermometer	1. Vikas Scientific Works.
43	Stack Monitoring Kit	1. Vayubodhan Upkaran Pvt.Ltd. 2. Netel (India) Limited. 3. Polltech Instruments Pvt Ltd.
44	Flue gas analyzer	1. Aimil Ltd. 2. Kane International Ltd. 3. MRU Gmbh 4. Endee 5. Testo
45	Kipps apparatus	1. Borosil Glass Works Limited. 2. Wishwani Scientific Traders. 3. Jain Scientific Glass Works.
46	Photometer	1. ORLAB
47	Potentiometric Titration Apparatus	1. Merck Specialitics Pvt. Ltd. 2. Analytica Equipments(I) Pvt. L. 3. Spectralab Instruments Pvt. 4. Metrohm AG. 5. Hach
48	Gas heating assembly	1. Reputed Indigenous make
49	Stop Watch	1. Reputed Indigenous make
50	Constant temperature bath	1. Reputed Indigenous make
51	Water distillation assembly	1. Reputed Indigenous make
52	Vacuum pressure pump	1. Usha Instruments & Chemicals. 2. Macro Scientific Works (Regd.).
53	Heating Mantel	1. Yorco Sales Pvt Ltd. 2. Macro Scientific Works (Regd.). 3. Hindustan Apparatus Mfg. Co.
54	Magnetic Stirrer cum Hot plate	1. Usha Instruments & Chemicals. 2. Jain Scientific Glass Works. 3. Yorco Sales Pvt. Ltd. 4. Narang Scientific Works Pvt. 5. Macro Scientific Works (Regd.).
55	Refrigerator	1. Reputed Indigenous make
56	Hot Plate	1. Usha Instruments & Chemicals. 2. Jain Scientific Glass Works. 3. Yorco Sales Pvt. Ltd. 4. Narang Scientific Works Pvt. 5. Macro Scientific Works (Regd.).
57	Magnetic Stirrer	1. Usha Instruments & Chemicals. 2. Jain Scientific Glass Works. 3. Yorco Sales Pvt. Ltd. 4. Narang Scientific Works Pvt. 5. Macro Scientific Works (Regd.).
58	Chemical (As per Annex-A of spec)	1. Reputed Indigenous make
59	Glassware (As per Annex-B of spec)	1. Reputed Indigenous make
60	Safety Equipment (As per Annex-C of spec)	1. Reputed Indigenous make
61	Furniture (As per annex-D of spec)	1. Reputed Indigenous make
62	General Lab. Requisite with 4 Nos of Platinum Crucibles (As per annex-E of spec)	1. Reputed Indigenous make

18. **Price Break-up:**

All bidders are requested to provide item-wise price break-up (including everything such as Packing, Forwarding, Freight, GST or other taxes, Installation and commissioning etc.) in percentage (%) of total quote value in below table:

Sr. No.	Name of Item	Qty (No) Stage-I	Qty (No) Stage-II	Item price for total quantities in percentage (%) of total quoted value
1	Conductivity Meter	2	2%
2	Conductivity Meter (portable)	1	1%
3	pH meter	2	2%
4	pH meter (Portable)	1	1%
5	Turbidity meter	1	1%
6	Flame Photometer	1	1%
7	Jar Test Apparatus	1	1%
8	Analytical balance	1	1%
9	Apparatus for oxidation stability test	1	1%
10	Redwood viscometer for oil analysis	1	1%
11	Interfacial tension apparatus	1	1%
12	Automatic Flash Point Apparatus	1	1%
13	Penetrometer for grease testing	1	1%
14	Dean & stark moisture determination apparatus	2	2%
15	Explosimeter	1	1%
16	Centrifuge	1	1%
17	Automatic K-F (Karl- Fisher) Titrimeter	1	1%
18	Orsat apparatus	1	1%
19	Hydrogen Purity apparatus	1	1%
20	Muffle Furnace	1	1%
21	Oven	1	1%
22	Lab Pulveriser	1	1%
23	Sieve Shaker	1	1%
24	Jaw Crusher	1	1%
25	Roll Crusher	1	1%
26	Humidity Oven	1	1%
27	Coal Sample Riffler	1	1%
28	Furnace for determination of Volatile Matter	1	1%
29	Abrasive/Erosive index machine	1	1%
30	Laboratory plate mill	1	1%
31	Laboratory mini mill	1	1%
32	Analytical balance	1	1%
33	Ordinary balance	1	1%
34	Weather Monitoring System	1	1%
35	Autoclave	1	1%
36	BOD incubator	1	1%
37	COD reactor	1	1%
38	Inoculation chamber	1	1%

39	Dew Point Meter	1	1%
40	Dial type barometer	1	1%
41	Maximum & Minimum Thermometer	2	2%
42	Dry & Wet Bulb Thermometer	2	2%
43	Stack Monitoring Kit	1	1%
44	Flue gas analyzer	1	1%
45	Kipps apparatus	1	1%
46	Photometer	1	1%
47	Potentiometric Titration Apparatus	1	1%
48	Gas heating assembly	1	1%
49	Stop Watch	1	1%
50	Constant temperature bath	1	1%
51	Water distillation assembly	1	1%
52	Vacuum pressure pump	1	1%
53	Heating Mantel	1	1%
54	Magnetic Stirrer cum Hot plate	1	1%
55	Refrigerator	2	2%
56	Hot Plate	2	2%
57	Magnetic Stirrer	1	1%
58	Chemical (As per Annex-A of spec)	1 Set	1 Set%
59	Glassware (As per Annex-B of spec)	1 Set	1 Set%
60	Safety Equipment (As per Annex-C of spec)	1 Set	1 Set%
61	Furniture (As per annex-D of spec)	1 Set	1 Set%
62	General Lab. Requisite with 4 Nos of Platinum Crucibles (As per annex-E of spec)	1 Set	1 Set%
Total Quoted value in percentage (%)				100%

Note: This price break-up will not be used for price evaluation purpose. Evaluation will be done on the basis of total quoted value.

19. **General Clause:**

All other commercial terms and conditions will be governed by General Terms and Conditions (GTC) GeM_GTC_4.0_v1.5_09Oct22.

Certificate

In line with Government Public Procurement Order No. P-45021/2/2017-BE-II dt. 15.06.2017 & P-45021/2/2017-PP (BE-II) dated 28.05.2018, we hereby certify that we M/s _____(supplier name) are local supplier meeting the requirement of minimum local content (50%) as defined in above orders for the material against Enquiry No. _____

Details of location at which local value addition will be made is as follows:

We also understand, false declarations will be in breach of the Code of Integrity under Rule 175(1)(i)(h) of the General Financial Rules for which a bidder or its successors can be debarred for up to two years as per Rule 151 (iii) of the General Financial Rules along with such other actions as may be permissible under law.

Seal and Signature of Supplier

BANK GUARANTEE BOND

WAM 28

(Paragraph 4.9.6 of – Works Accounts Manual)

1. In consideration of the Bharat Heavy Electricals Limited, Siri Fort, New Delhi through HEEP Hardwar Division (hereinafter called ‘the Company’) having agreed to exempt _____ (hereafter called ‘the said Contractor’ which term includes ‘Suppliers’ for the purpose of this Bond) from the demand under the terms and conditions of an Agreement dt. _____ made between _____ and _____ for (hereafter called ‘the said Agreement’) of Security Deposit for the due fulfillment by the said Contractor of the terms and conditions contained in the said Agreement, on production of a Bank Guarantee for Rs. _____ (Rupees _____ only) we,

_____ (Indicate the name of the Bank)
(hereinafter referred to as ‘the Bank’) at the request of _____

Contractor(s) do hereby undertake to pay to the Company an amount not exceeding Rs. _____ against any loss or damage caused to or suffered or would be caused to or suffered by the Company by reason of any breach by the said Contractor(s) of any of the terms and conditions contained in the said Agreement.

2. We, _____ do hereby undertake (indicate the name of the Bank) to pay the amounts due and payable under this guarantee without any demur, merely on a demand from the Company stating that the amount claimed is due by way of loss or damage caused to or would be caused to or suffered by the Company by reason of breach by the said Contractor(s), of any of the terms or conditions contained in the said Agreement or by reason of the contractor(s), failure to perform the said Agreement. Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs. _____ .

3. We undertake to pay to the Company any money so demanded notwithstanding any dispute or disputes raised by the Contractor(s) in any suit or proceeding pending before any Court or Tribunal relating thereto our liability under this present being absolute and unequivocal.

The payment so made by us under this bond shall be valid discharge of our liability for payment thereunder and the Contractor(s) shall have no claim against us for making such payment.

4. We _____ further agree that the Guarantee
(Indicate the name of the bank)

herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Agreement and that it shall continue to be enforceable till all the dues of the Company under or by virtue of the said Agreement have been fully paid and its claims satisfied or discharged or till _____ Office / Department / Division of Bharat Heavy Electricals Limited certifies that the terms and conditions of the said Agreement have been fully and properly carried out by the said contractor(s) and accordingly discharges this guarantee. Unless a demand or claim under this guarantee is made on us in writing on or before the _____, we shall be discharged from all the liability under this guarantee there after.

5. We, _____, further agree with the company that
(Indicate the name of the bank)

the Company shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Agreement or to extend time to performance by the said contractor(s) from time to time or to postpone for any time or from time to time any of the powers exercisable by the company against the said contractor(s) and to forbear or enforce any of the terms and conditions relating to the said Agreement and we shall not be relieved from our liability by any reason of any such variation or extension being granted to the said contractor(s) or for any forbearance, act or omission on the part of the company or any indulgence by the company to the said contractor(s) or by any such matter or thing whatsoever which under the law relating to sureties would but for this provision have effect of so relieving us.

6. This guarantee will not be discharged due to the change in the constitution of the Bank or the contractor(s)

7. We _____ lastly undertake not to revoke
(Indicate the name of the bank)

this guarantee during its currency except with the previous consent of the Company in writing.

Dated the _____ day of _____

For _____
(Indicate the name of the Bank)

List of Consortium Banks * (wef 22.03.2016)

Nationalised Banks		Nationalised Banks	
1	Allahabad bank	19	Vijaya Bank
2	Andhra bank		Public Sector Banks
3	Bank of Baroda	20	IDBI
4	Canara Bank		Foreign banks
5	Corporation bank	21	CITI Bank N.A
6	Central bank	22	Deutsche Bank AG
7	Indian Bank	23	The Hongkong and Shanghai Banking Corporation Limited
8	Indian Oversea Bank	24	Standard Chartered Bank
9	Oriental bank of Commerce	25	J P Morgan
10	Punjab National Bank		
11	Punjab & Sindh Bank		Private banks
12	State Bank of India	26	Axis Bank
13	State Bank of Hyderabad	27	The Federal Bank Limited
14	Syndicate Bank	28	HDFC
15	State Bank of Travancore	29	Kotak Mahindra Bank
16	UCO Bank	30	ICICI
17	Union Bank of India	31	Indusind Bank
18	United Bank of India	32	Yes Bank

INTEGRITY PACT

Between

Bharat Heavy Electricals Ltd. (BHEL), a company registered under the Companies Act 1956 and having its registered office at "BHEL House", Siri Fort, New Delhi - 110049 (India) hereinafter referred to as "The Principal", which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the ONE PART

and

_____, (description of the party along with address), hereinafter referred to as "The Bidder/ Contractor" which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the OTHER PART

Preamble

The Principal intends to award, under laid-down organizational procedures, contract/s for

_____. The Principal values full compliance with all relevant laws of the land, rules and regulations, and the principles of economic use of resources, and of fairness and transparency in its relations with its Bidder(s)/ Contractor(s).

In order to achieve these goals, the Principal will appoint Independent External Monitor(s), who will monitor the tender process and the execution of the contract for compliance with the principles mentioned above.

Section 1- Commitments of the Principal

1.1 The Principal commits itself to take all measures necessary to prevent corruption and to observe the following principles:-

1.1.1 No employee of the Principal, personally or through family members, will in connection with the tender for, or the execution of a contract, demand, take a promise for or accept, for self or third person, any material or immaterial benefit which the person is not legally entitled to.

1.1.2 The Principal will, during the tender process treat all Bidder(s) with equity and reason. The Principal will in particular, before and during the tender process, provide to all Bidder(s) the same information and will not provide to any Bidder(s) confidential/ additional information through which the Bidder(s) could obtain an advantage in relation to the tender process or the contract execution.

1.1.3 The Principal will exclude from the process all known prejudiced persons.

1.2 If the Principal obtains information on the conduct of any of its employees which is a penal offence under the Indian Penal Code 1860 and Prevention of Corruption Act 1988 or any other statutory penal enactment, or if there be a substantive suspicion in this regard, the Principal will inform its Vigilance Office and in addition can initiate disciplinary actions:

Section 2 - Commitments of the Bidder(s)/ Contractor(s)

- 2.1 The Bidder(s)/ Contractor(s) commit himself to take all measures necessary to prevent corruption. He commits himself to observe the following principles during his participation in the tender process and during the contract execution.
- 2.1.1 The Bidder(s)/ Contractor(s) will not, directly or through any other person or firm, offer, promise or give to the Principal or to any of the Principal's employees involved in the tender process or the execution of the contract or to any third person any material, immaterial or any other benefit which he/ she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract.
- 2.1.2 The Bidder(s)/ Contractor(s) will not enter with other Bidder(s) into any illegal or undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.
- 2.1.3 The Bidder(s)/ Contractor(s) will not commit any penal offence under the relevant Indian Penal Code (IPC) and Prevention of Corruption Act; further the Bidder(s)/ Contractor(s) will not use improperly, for purposes of competition or personal gain, or pass on to others, any information or document provided by the Principal as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.
- 2.1.4 Foreign Bidder(s)/ Contractor(s) shall disclose the name and address of agents and representatives in India and Indian Bidder(s)/ Contractor(s) to disclose their foreign principals or associates. The Bidder(s)/ Contractor(s) will, when presenting his bid, disclose any and all payments he has made, and is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract.
- 2.2 The Bidder(s)/ Contractor(s) will not instigate third persons to commit offences outlined above or be an accessory to such offences.
- 2.3 The Bidder(s)/ Contractor(s) shall not approach the Courts while representing the matters to IEMs and will await their decision in the matter.

Section 3 - Disqualification from tender process and exclusion from future contracts

If the Bidder(s)/ Contractor(s), before award or during execution has committed a transgression through a violation of Section 2 above, or acts in any other manner such as to put his reliability or credibility in question, the Principal is entitled to disqualify the Bidder(s)/ Contractor(s) from the tender process or take action as per the separate "Guidelines on Banning of Business dealings with Suppliers/ Contractors", framed by the Principal.

Section 4 - Compensation for Damages

- 4.1 If the Principal has disqualified the Bidder from the tender process prior to the award according to Section 3, the Principal is entitled to demand and recover the damages equivalent Earnest Money Deposit/ Bid Security.
- 4.2 If the Principal has terminated the contract according to Section 3, or if the Principal is entitled to terminate the contract according to section 3, the Principal shall be entitled to

demand and recover from the Contractor liquidated damages equivalent to 5% of the contract value or the amount equivalent to Security Deposit/ Performance Bank Guarantee, whichever is higher.

Section 5 - Previous Transgression

- 5.1 The Bidder declares that no previous transgressions occurred in the last 3 years with any other company in any country conforming to the anti-corruption approach or with any other Public Sector Enterprise in India that could justify his exclusion from the tender process.
- 5.2 If the Bidder makes incorrect statement on this subject, he can be disqualified from the tender process or the contract, if already awarded, can be terminated for such reason.

Section 6 - Equal treatment of all Bidders/ Contractors / Sub-contractors

- 6.1 The Principal will enter into agreements with identical conditions as this one with all Bidders and Contractors. In case of sub-contracting, the Principal contractor shall be responsible for the adoption of IP by his sub-contractors and shall continue to remain responsible for any default by his sub-contractors.
- 6.2 The Principal will disqualify from the tender process all bidders who do not sign this pact or violate its provisions.

Section 7 - Criminal Charges against violating Bidders/ Contractors /Subcontractors

If the Principal obtains knowledge of conduct of a Bidder, Contractor or Subcontractor, or of an employee or a representative or an associate of a Bidder, Contractor or Subcontractor which constitutes corruption, or if the Principal has substantive suspicion in this regard, the Principal will inform the Vigilance Office.

Section 8 - Independent External Monitor(s)

- 8.1 The Principal appoints competent and credible Independent External Monitor for this Pact. The task of the Monitor is to review independently and objectively, whether and to what extent the parties comply with the obligations under this agreement.
- 8.2 The Monitor is not subject to instructions by the representatives of the parties and performs his functions neutrally and independently. He reports to the CMD, BHEL.
- 8.3 The Bidder(s)/ Contractor(s) accepts that the Monitor has the right to access without restriction to all contract documentation of the Principal including that provided by the Bidder(s)/ Contractor(s). The Bidder(s)/ Contractor(s) will grant the monitor, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his contract documentation. The same is applicable to Sub-contractor(s). The Monitor is under contractual obligation to treat the information and documents of the Bidder(s)/ Contractor(s) / Sub-contractor(s) with confidentiality in line with Non- disclosure agreement.
- 8.4 The Principal will provide to the Monitor sufficient information about all meetings among the parties related to the contract provided such meetings could have an impact on the contractual relations between the Principal and the Contractor. The parties offer to the Monitor the option to participate in such meetings.

- 8.5 The role of IEMs is advisory, would not be legally binding and it is restricted to resolving issues raised by an intending bidder regarding any aspect of the tender which allegedly restricts competition or bias towards some bidders. At the same time, it must be understood that IEMs are not consultants to the Management. Their role is independent in nature and the advice once tendered would not be subject to review at the request of the organization.
- 8.6 For ensuring the desired transparency and objectivity in dealing with the complaints arising out of any tendering process, the matter should be examined by the full panel of IEMs jointly as far as possible, who would look into the records, conduct an investigation, and submit their joint recommendations to the Management.
- 8.7 The IEMs would examine all complaints received by them and give their recommendations/ views to CMD, BHEL, at the earliest. They may also send their report directly to the CVO and the Commission, in case of suspicion of serious irregularities requiring legal/ administrative action. IEMs will tender their advice on the complaints within 10 days as far as possible.
- 8.8 The CMD, BHEL shall decide the compensation to be paid to the Monitor and its terms and conditions.
- 8.9 IEM should examine the process integrity, they are not expected to concern themselves with fixing of responsibility of officers. Complaints alleging mala fide on the part of any officer of the organization should be looked into by the CVO of the concerned organisation.
- 8.10 If the Monitor has reported to the CMD, BHEL, a substantiated suspicion of an offence under relevant Indian Penal Code/ Prevention of Corruption Act, and the CMD, BHEL has not, within reasonable time, taken visible action to proceed against such offence or reported it to the Vigilance Office, the Monitor may also transmit this information directly to the Central Vigilance Commissioner, Government of India.
- 8.11 The number of Independent External Monitor(s) shall be decided by the CMD, BHEL.
- 8.12 The word 'Monitor' would include both singular and plural.

Section 9 - Pact Duration

- 9.1 This Pact shall be operative from the date IP is signed by both the parties till the final completion of contract for successful bidder and for all other bidders 6 months after the contract has been awarded. Issues like warranty / guarantee etc. should be outside the purview of IEMs.
- 9.2 If any claim is made/ lodged during currency of IP, the same shall be binding and continue to be valid despite the lapse of this pact as specified above, unless it is discharged/ determined by the CMD, BHEL.

Section 10 - Other Provisions

- 10.1 This agreement is subject to Indian Laws and jurisdiction shall be registered office of the Principal, i.e. New Delhi.

10.2 Changes and supplements as well as termination notices need to be made in writing. Side agreements have not been made.

10.3 If the Contractor is a partnership or a consortium, this agreement must be signed by all partners or consortium members.

10.4 Should one or several provisions of this agreement turn out to be invalid, the remainder of this agreement remains valid. In this case, the parties will strive to come to an agreement to their original intentions.

10.5 Only those bidders / contractors who have entered into this agreement with the Principal would be competent to participate in the bidding. In other words, entering into this agreement would be a preliminary qualification.

For & On behalf of the Principal

(Office Seal)

Place-----

Date-----

Witness:_____

(Name & Address) _____

For & On behalf of the Bidder/

Contractor

(Office Seal)

Witness:_____

(Name & Address) _____
