

**Annexure:
Additional Scope of
Work**

Refer Chapter 2 of RFP: Detailed scope of work

Annexure 1. - ELECTRICAL LT WORKS APPROVED MAKE LIST

SL. NO.	ITEM / COMPONENT / MATERIAL	APPROVED MAKES
1	Current Transformer	KALPA / KAPPA / VOLTAMPS / PROK DEVICE
2	Digital Panel Meters	ELMEASURE / CONZERV / TRINITY / MECO / CIRCUITOR
3	Moulded Case Circuit Breakers (MCCBs)	ABB / LEGRAND / SCHNEIDER/ SIEMENS/ L&T
4	Miniature Circuit Breakers (MCBs), MPCB, Earth leakage Circuit Breakers, RCBO, SPD	ABB / LEGRAND / SCHNEIDER / HAGER/ SIEMENS
5	MCB Distribution Boards	ABB / LEGRAND / SCHNEIDER / HAGER/ SIEMENS
6	Fabricated Distribution board builders and electrical panel builders	AURA ENTERPRISES/ GREENTECH / VITAL
7	Selector switches/Panel Rotary Switches	ABB / SCHNEIDER / L&T / VAISHNO / SALZER / TEKNIC / KAYCEE
8	Power Contactors	ABB / LEGRAND / SCHNEIDER/ SIEMENS
9	Bi-Metallic Overload Relays	ABB / LEGRAND / SCHNEIDER/ SIEMENS
10	Earth-leakage Relays	PROK DEVICES / VOLTAMP / L&T / ABB/ SIEMENS
11	Auxiliary relay	ABB / SCHNEIDER / L&T / SIEMENS
12	VFD	ABB –ACH 580 / DANFOSS – FC-102 / YASKAWA- HV 600

13	Indicating Lamps / illuminated Push button	ABB / SCHNEIDER / VAISHNO / TEKNIC
14	LT 1.1 KV Power Cables	POLYCAB / KEI / HAVELLS / GEMSCAB
15	LT 1.1 KV PVC Insulated / FR / FRLS Flexible Cables	POLYCAB / KEI / HAVELLS
16	PVC Insulated / FR / FRLS Copper Wires	POLYCAB / KEI / HAVELLS
17	Cable Lugs (Copper)	MULTI / BRACO / CONNECTWELL / DOWELLS
18	Cable Glands (Brass)	SMI / HMI / BRACO / DOWELLS
19	PVC / MS Conduits and accessories	AKG/BEC/POLYCAB/ANCHOR
20	SS-304 Conduits and accessories	PRAKASH / HINDUSTAN INOX / QUALITY / RATNAMANI
21	Light Switches / Power Sockets	NORTHWEST / LEGRAND / MK / HAVELLS
22	Industrial Plug & Socket	LEGRAND / NEPTUNE BALLS / CLIPSAL / BCH
23	LED Light Fixtures	WIPRO / PHILIPS / HAVELLS
24	LED Chips	CREE / NCHIA
25	Lighting controls (DALI, SENSORS)	LUTRON / HALVER / LEVIGHTON
26	PVC Raceway	SCHNEIDER / LEGRAND / MK / OBO
27	Cable trays / Metal raceway	MURPHY
28	ON/OFF, Emergency Push button	HENSEL / SCHNEIDER / L&T
29	Fire Safety equipment	ALERT / MINIMAX / SAFEX/AGNI

30	UPS	EMERSON (VERTIVE)/ SOCOMEC/ NUMERIC-LEGRAND/ FUJI ELECTRIC
31	Isolation Transformer	SERVO INC / KRYKARD / DATSON
32	Fire alarm systems	HONEYWELL/APOLLO/AGNI
33	P A System	HONEYWELL

Annexure 2. Approved MAKE OF MATERIALS - LAB EXHAUST SYSTEM

SL.NO	EQUIPMENT	MAKE.
1	BLOWER	COLASIT/ PLASIFER.
2	MOTOR	ABB/CG/ EQUIVALENT.
3	PP SHEETS FOR EXHAUST DUCTING	MANDHANI/ DUGAR/ KHANNA/ SIMONA/ BECK.
4	ISOPHTHALIC RESIN	MECHEMCO/ KAYSYNTH/ ORSYN/ SIMANA/ CREST/ COMPOSITE.
5	PP DAMPERS	CRYSTAL ENGINEERING/ CORROSION CONTROL.

Annexure 3. Approved Technical Specifications for Exhaust system.

CENTRIFUGAL PP EXHAUST FAN:

1. Type: Centrifugal Corrosion Resistant
2. Capacity: Meet design flow rate against all duct losses
3. Construction: Robust for continuous duty, vibration isolators for reduced transmission
4. Silent Operation: Suitable for outdoor use, max 3000rpm
5. Performance Testing: Comply with ISO 5801 for aerodynamics and ISO 5136.2 for sound levels
6. Material: Polypropylene (PP) construction, suitable for corrosive environments up to 70°C
7. Impeller: Polypropylene (PP) construction, forward-curved blades, balanced per VDI 2060, Q6.3
8. Support: Electro-galvanized stand for corrosive environment.
9. Shaft Protection: Hub seal to prevent corrosive contact.

MS BLOWER DIRECT DRIVE:

1. Type: Centrifugal
2. Capacity: Meet design flow rate against all duct losses.
3. Construction: Robust for continuous duty, vibration isolators for reduced transmission.
4. Material: Mild Steel (MS) construction.

MOTOR AND ACCESSORIES:

1. Motor Type: TEFC electric motor with class 'F' insulation and class 'B' temperature rise.
2. Protection: Suitable for outdoor use with IP55 protection.
3. Electrical Supply: 415V/3Ph/50Hz.
4. Mounting: Flange-mounted (B5) or foot-mounted (B3) based on fan configuration.

PP/FRP DUCTING:

1. Duct Material: PPGL with one smooth and one mat finish side, FRP lining on the mat side.
2. Welding: Stitch welding on the inner surface and continuous welding on the outer surface.
3. Resin: Isothelic resin for fire resistance.
4. Flanges: 1.5 times duct thickness up to 750mm, 2 times above 750mm.
5. Fasteners: M8, GI fasteners with proper spacing.
6. Support Distance: Not more than 2500mm.
7. Length Limit: Not more than 3600mm.
8. Frame for Longer Ducts: Required for square/rectangular ducts over 1800mm.
9. Gasket: 5mm Thick Neoprene gasket.

DUCT SUPPORT SYSTEM:

- Complete supporting system with threaded rods, brackets, nuts, washers, clamps, and anchor bolts, varying by duct size.

PP DAMPERS:

- Volume control dampers: Double thickness, lever-operated, with locking devices.
- Blades: 3mm thick PP material, self-lubricating nylon bearings, spaced axles.
- Frame: 300mm diameter with flange for 6 bolts and nuts.

FLEXIBLE HOSE:

- PVC-coated collapsible hose for flexible duct connections.
- Resistant to water and fire.
- Allow for thermal, axial, transverse, and torsional movement.
- Air-tight and capable of absorbing vibrations.

Annexure 4. Technical Specifications for Gas and Utility Distribution system (GDS)

SCOPE OF SUPPLY / WORK**1.1 General Requirements:**

The gas distribution system comprises two independent systems: the Bottled Gas System and the Compressed Air System. The Bottled Gas System supplies process fluids from gas banks to laboratory utility points, while the Compressed Air System is fed from the compressor room.

2 TECHNICAL REQUIREMENTS

2.1 General: The aim of this specification is to provide a high-quality gas distribution system for laboratory use.

2.2 Gas Tubing:

- Tubing sizes 1/8" up to 1/2" OD should be made of seamless SS 316 tube.
- Tubing should contain a minimum of 8% Nickel.
- Tubing should have carbon content < 0.040%.
- The tubing should be supplied with plugged ends.
- Tubing hardness should have a max HRB 80.
- Tubing supplied has material of construction (MOC) of SS 316.

2.3 Tube Fittings:

- Fittings shall be of "Flareless" design, consisting of body, front ferrule, rear ferrule, and nut.
- Tube-to-tube joints and branches are joined via orbital welding.
- Fittings shall be capable of holding the maximum working pressure of the tubing with only one and a quarter-turn pull-up of the nut.
- Nuts for SS fittings shall have silver-plated threads to reduce galling and tightening torque.
- All fittings end connections shall be compatible with tube hardness \leq RB 80.

2.4 PRIMARY CONTROL MODULES

- Supply of Gas Primary Control modules along with associated components for connecting cylinders in gas banks.
- Performance testing of manifolds for purity, flow rate, and leakage.
- The material of construction for the manifold will be SS 316L with a working pressure rating of 250 bar.
- The manifold should be pre-cleaned and certified for 5.0 purity gas application.
- SS 316 double-braided bellow hoses, tested for 300 bar.
- The primary control module specifications include SS 316L body, regulators, inlet/outlet gauges, back mounting support, 1/4" Female NPT connections, integrated relief vent, and helium leak tests.

2.5 ISOLATION VALVES

- Stainless Steel 316 SS, 1/2" ferrule type.
- Teflon gland packing with Silicone base lubricant.
- Valves shall be factory tested at 1000 PSIG.
- Factory leak test shall be performed to a maximum allowable leak rate of 1×10^{-3} cc/sec He.
- Operating pressure: 0-150 Bar.

2.6 PRESSURE GAUGES

- Bourdon type with centre back connection for dropper gauge and bottom connection for Regulator gauge.
- Inlet size: ¼” MNPT with dial size of 50 mm.
- Bourdon and socket material SS 316.
- Accuracy: +/- 1% of FSD.
- Factory Calibration Certificate required.

2.7 FLANGES

- Flanges as per ANSI B 16.5 class 150.
- Socket weld type.

3 SUMMARY OF MATERIAL OF CONSTRUCTION

Tubes: SS 316 Tube fittings: SS 316 Valves: SS 316 Primary Control Modules: SS 316 Tubing Supports: Mild Steel Tube support clamps: Polypropylene Cylinder Bracket: Mild steel Pressure Gauge: SS Bourdon and BLACK Zinc body Gas fixtures: Brass Powder Coated

4.0 INSPECTION AND TESTING

4.1 Performance Test for Gas System:

- Includes Installation Purging Procedures, Pre-Testing Purging Procedure, Pressure Testing Procedure, and Preliminary Testing.
- Ensures the system is purged, pressurized, and tested for leaks, meeting required standards.

5.0 Orbital Welding:

- Orbital welding is used for joining tubes, providing clean and reliable welds.

6.0 SCOPE OF SUPPLY / WORK (DRAIN)

6.1 General Requirements:

- The drain system includes a 4" HDPE main drain pipe, supports, and fittings.
- The system is designed to connect bench sinks and fume hood sinks to the main drain header.

6.2 Drain Layout:

- The main drain line will be installed above the ground floor false ceiling.
- Trench holes will be created in the floor to accommodate the drain system.
- A 3" diameter sub-header line will drop down to connect to the main drain.
- A 2" diameter sub-header line will connect sinks and cups to the sub-header.

7.0 APPLICABLE CODES & STANDARDS

- Refers to ASTM A213/A269 as applicable standards.

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