

HLL Biotech Limited
(A Government of India Enterprise)
(A Subsidiary of HLL Lifecare Limited)
Corporate identity number of HBL: U24290KL2012GOI030732 dtd 12.3.12

TENDER ENQUIRY DOCUMENT
FOR
ENGINEERING WORKS AT HBL OFFICE TICEL
BIOPARK PHASE II CAMPUS, CHENNAI

DOCUMENT NO. HBL/TD/ADMIN/OFF-II/ENGG_WORKS/15-16/02
REVISION NO. 00
MAY 2015

INTRODUCTION OF THE COMPANY

HLL Biotech Limited (HBL) was incorporated as a subsidiary of HLL Lifecare Ltd, a Government of India Enterprise under the Ministry of Health and Family Welfare, Government of India. HBL is conceived to take the lead role in providing products, services and assistance in achieving our country's goals in immunization and eradication of deadly diseases.

HBL is setting up an Integrated Vaccine Complex (IVC) at Chengalpet, an emerging industrial hub in the southern tip of Tamilnadu state. Project outlay for IVC is Rs 6.00 Billion and 75% of the products & services will be designed to meet the targets of the Universal Immunization Policy (UIP) of the country.

This project has been declared as a "Project of National Importance" by the Government of India.

DECLARATION

This Design and Tender document has been prepared keeping in view the frozen process, Aesthetic requirements and project parameters. The Tender is being issued for inviting quotes and selecting the vendor / contractor for the job.

Prospective vendors / contactors are suggested to go through the contents in detail and are requested to come out with their queries / suggested rectifications and / or modifications if any. Such changes / suggestions would be considered if found acceptable according to aesthetic and project requirements already frozen.

This tender shall be the basis and guideline for the scope of job. It may not necessarily be complete in design and details for the execution. The contractor shall follow the execution drawings prepared and distributed hereafter for execution. The design and drawings distributed hereafter shall supersede the details provided in this design & tender document. All the design and drawings prepared by the selected vendors shall need to be submitted to HLL Biotech Limited for the final approval before execution.

INSTRUCTIONS TO BIDDERS

1. Bidder must fill in all blank spaces in the Bill of Quantities of the tender for which quantities have been indicated in near, legible and correct entries, both in figures as well as in words. Alterations, erasures and indistinct figures should be avoided or duly signed if changes are made in the tender document. Failure to quote against all the items could render the tender liable to rejection.
2. The tender should be signed in long hand, dated and witnessed at all places provided therein. Also all pages, drawings, corrections/alterations should be initialed/stamped.
3. Bidder must be careful to deliver a bonafide tender. Any tender which proposes any alterations to any of the conditions laid down which proposes any other conditions or any description whatsoever is liable to be rejected.
4. Intimation of tenders' quotation by a fax will not be considered.

5. Tenders must be accompanied by a certified true copy of the Power of Attorney in favour of the signatory to the tender which should interalia empower him/her to bind the firm to Arbitration Clause given in the Articles of Agreement and Contract conditions.
6. In case a blank tender is being submitted, it should be marked prominently 'BLANK' on the envelope and signed by the authorized person.
7. In view of postal and other delays, the tenders should be posted sufficiently in advance of the last date fixed for receipt of tenders or be sent by a special messenger. Tender received late shall be liable for rejection.
9. It must be clearly understood that the contract is an Item-wise contract.
10. The prices shall be quoted for all items and shall be firm. The amount shall include all plant, layout, materials, all temporary works, supervision, taxes, duties, levies, insurance for all (except supply & erection) and every incidental and contingent cost and charges whatsoever required to complete the item of work in all respects conforming to related specifications, drawings etc.
11. All the pages of the tender document and annexure are to be numbered sequentially.
12. Prices shall be written in ink and shall be entered both in figures and words. In case of discrepancy the figure quoted in words shall be taken as accurate. In case of any discrepancy in the unit and amount, the unit rate shall be taken as accurate.
13. Prices quoted by the bidder shall be firm and valid even if the contract is split in two or more parts among different bidders.
14. The bidder shall be deemed to have been allowed in his rates and prices for the provision, maintenance and final removal of all temporary works of whatsoever nature. No specific item of any or particular temporary shed/work will be measured and paid for separately.
15. The bidder shall include the proposed quality assurance program containing overall quality management and procedural requirements to be adhered during the execution of the contract to maintain effective quality assurance system as outlined by the recognized codes for various works in their offer, along with quality assurance manual, officials responsible for the same and their organizational approach for quality control.
16. Bidder should furnish the following details along with their offer : -
 - Quality Assurance plan
 - Bar chart / Project schedule
 - List of technical persons available
 - List of tools and tackles

- Income Tax clearance certificate
 - Sales Tax clearance certificate
 - List of similar work carried out by them and the work in hand
17. The Contrator should depute separate execution team for each Block

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SECTION - I

Notice Inviting Tender (NIT)

HLL Biotech Ltd.

**INVITES TENDER FOR DESIGN, SUPPLY, INSTALLATION, COMMISSIONING,
TESTING AND DOCUMENTATION OF ENGINEERING WORKS AT HBL TICEL PHASE II
OFFICE, TARAMANI, CHENNAI.**

Tenders are invited from vendors for Design, Supply, Installation, Commissioning, Testing and Documentation of following works:

Schedule. No	Equipment	EMD (Rs)
1	ENGINEERING WORKS	57,500/-

NOTE:

The list may vary (increase / decrease) during order finalization

Details regarding important dates are as follows:

S.No.	Description	Schedule
i.	Pre -bid meeting date & Time	05/06/2015 at 14:30 Hrs
ii.	Closing date & time for receipt of Tender	12/06/2015 at 15:00 Hrs
iii.	Time and date of opening of Technical Bids	12/06/2015 at 15:30 Hrs
iv.	Venue of Opening of Techno Commercial Tender & Pre-bid meeting	HLL Biotech Limited, Ticel Biopark Campus (Module no. 013 - 015), CSIR Road, Taramani, Chennai- 600 113

Interested parties may visit www.lifecarehll.com, www.hllbiotech.com & <http://eprocure.gov.in/cppp> to download the Tender. Subsequent amendments/ addendum if any will be published in these websites; the parties are advised to visit the website regularly for updates. Tenders in sealed envelopes superscribing "Tender for Design, Supply, Installation, Commissioning, Testing and Documentation of Engineering Works at HBL Ticel Phase II Office, Taramani, Chennai" may be submitted to the address mentioned in Serial no. iv of the above table.

SECTION - II
SCOPE OF WORK

The Engineering Works has to be done by the contractor at "Module 406, HLL Biotech Limited, Fourth floor, Tichel Bio park Campus Phase II, CSIR Road, Taramani, Chennai – 600 113".

The Scope in general covers activities pertaining to HVAC Low Side works, Electrical Low Side Works, Fire detection / Alarms system works, Networking and UPS System etc.

1. Salient Features of Scope:

The facility under consideration is for the corporate office of various disciplines and work upon completion should be ergonomic and environmental/User friendly. The approximate build up area of the office is 3370 Sqft including Cafeteria, Conference room, Reception, CEO/Discussion room, 4Nos of Office Cubicles, Stores, 57Nos. of workstations with Mobile pedestals and full/half height storage racks.

The office shall comprise of the following areas:

S.No	Description	Room Code	Area (Sqft)	Remarks
1	Reception	HBLCO001	264	
2	Conference Hall	HBLCO002	404.8	
3	CEO / Discussion Room	HBLCO003	96	
4	Stores	HBLCO004	135.6	
5	Cafeteria	HBLCO005	297.6	
6	Office Workstation	HBLCO006	2172	
7	Cubicle 1	HBLCO007		
8	Cubicle 2	HBLCO008		
9	Cubicle 3	HBLCO009		
10	Cubicle 4	HBLCO010		
Total Builtup Area			3370	

Below is the works to be carried out (but not limited to) by the bidder:

1. HVAC Ducting, Insulation, Dampers.
2. Wall Mounted Split Units.
3. Switches/Sockets and cabling.

4. Light Fixtures and Distribution panels.
5. Unintreptted Power Supply (UPS)
6. Fire Sprinkler and control Panels.
7. Fire Alarming and Hooters.
8. Networking Switches and WIFI Routers.
9. EPABX and Telephone instruments.

2 SYSTEM DESIGN DATA

2.2.1 System Design Climatic Data

Outside Ambient Conditions:

SEASON	Dry Bulb Temp.		Wet Bulb Temp.		Relative Humidity
	F	OC	F	OC	%
SUMMER	103	39.4	82	27.8	42
MONSOON	83	28.3	80	26.7	88
WINTER	65	18.3	57	13.9	60

Reference: ISHARE Data Hand Book

(However contractor shall independently collect the meteorological outside design data and design the system on the basis of the same.)

2.2.2 Design Responsibility:

The design of the entire Finishing/Engineering System is the sole responsibility of the contractor. Therefore, contractor is supposed to design the system and check the operating parameters, capacities of equipment etc. thoroughly before submitting the offer. The contractor will be fully responsible to demonstrate the system performance as per the intent.

The preliminary design calculations have been carried out to facilitate the contractor to quote. However, if contractor feels that the capacity of the system indicated is not adequate, the contractor may submit the calculations for their appraisal.

The Air quantity leakage rate through the doors has been computed on the basis of a gap of 2 to 3mm<maximum> all around the door. The agency supplying and fixing the doors shall ensure that the doors are allowing minimum leakage. The vendor selected for carrying out the furnishing/Engineering works shall coordinate with other suppliers and ensure that the overall facility will function in fulfill manner.

2.2.3 LAYOUT / SCHEMATIC DRAWINGS:

Attached as Annexure - VII

2.2.4 TECHNICAL SPECIFICATION

I. HVAC WORKS

1. AIR COOLED PACKAGED SPLIT / CONDITIONING UNITS

1.1 Scope

The scope of this section comprises the supply, erection, testing and commissioning of Air Cooled Packaged & Split Units conforming to the specifications and in accordance with the requirements of Drawings and Bill of Quantities.

1.2 Capacity

The refrigeration capacity of air conditioning units shall be as shown on Drawings and indicated in Bill of Quantities

1.3 Type

The Units shall consist of hermetically sealed reciprocating / Scroll compressor, motor, strip heaters, integral refrigerant piping and control panel duly wired to compressor and air cooled condenser all mounted on a steel frame.

Indoor unit to be installed within building and shall be housed in insulated cabinet consisting of cooling coil, fan with motor, filter & insulated drain pan.

The Air cooled condenser with fan duly mounted on a common frame shall be installed on the within the building/wall openings with suitable angle iron / channel frame to be provided by contractor. The suitable starters, switches, power control cabling between outdoor unit and indoor unit shall be included by the contractor.

1.4 Compressor & Motor

Compressor shall be hermetic reciprocating / Scroll, serviceable type and shall have dual pressure stat, and an operating oil charge. The motor shall be suction gas cooled and shall be sealed against dirt and moisture. The motor shall be suitable for $415 \pm 10\%$ / volts or $230 \pm 10\%$ volts, 50 Hz, A.C. supply.

1.5 Refrigerant Piping and Controls

Refrigerant piping and fittings interconnecting compressor condenser shall be all copper and valves shall be brass / gunmetal construction.

1.6 Casing

The indoor & outdoor units shall be sectionalized / cabinet construction. Indoor unit shall be consisting of an section, coil section, filter section, and drain pan. Outdoor unit shall consist of condenser coil, fan & compressor. In case of package units, the compressor shall be mounted within the indoor units and in case of

split unit, the compressor shall be mounted with the outdoor units. Each section shall be constructed of thick sheet steel all welded / bolted construction, adequately reinforced with structural members and provided with sufficient access panels for proper maintenance. Base panel shall be constructed of fabricated steel structure provided with an under frame suitably braced. Drain pan shall be constructed of 20 gauge galvanized sheet steel plate. Drain pan shall extend under coil and fan sections with drain connections. Removable panels in fan and coil sections shall provide access to all internal parts.

1.7 Fan Motor and Drive

Fan motor shall be suitable for $415 \pm 10\%$ volts or $220 \pm 10\%$ volts, 50 Hz, A.C. Supply, Single phase, motors shall be provided with permanent capacitor. Motors shall be especially designed for quiet operation and motor speed shall not exceed 1440 rpm.

1.8 Cooling Coil

Cooling coils shall be of fin and tube type having aluminum fins firmly bonded to copper tubes assembled in zinc coated steel frame. Face and surface areas shall be such as to ensure rated capacity from each unit and air velocity across each coil shall not exceed 100 meters per minute. The coil shall be pitched in the unit casing for proper drainage. Each coil shall be factory-tested at 21 Kg. per Sq.cm air pressure under water. Tube shall be mechanically / hydraulically expanded for minimum thermal contact resistance with fins. The number of fins per cm. shall be 4 to 5.

1.9 Vibration Isolators

The indoor and outdoor units shall be provided with ribbed rubber pad vibration isolators.

1.10 Performance testing

The unit shall be selected for the lowest operating noise level. Capacity rating and power consumption with operating points clearly indicated shall be submitted and verified at the time of testing and commissioning of the installation.

2. AIR DISTRIBUTION

2.1 Scope

The scope of this section comprises supply, fabrication, installation and testing of all sheet metal ducts, balancing of all perforated sheets, grilles and diffusers, nuts, bolts, supports, gaskets etc. complete and duly installed conforming to relevant specified standards/codes. For this purpose, it is contractors responsibility to arrange at site all necessary equipment and necessary workforce.

2.2 Factory Fabricated Ducting

A) Duct Material

All Ducting shall be fabricated of LFQ (Lock Forming Quality) grade prime GI raw material furnished with accompanying Mill Test Certificates. Galvanizing shall be Class VIII – light coating of zinc, nominal 120 gm/Sq.m surface area coating on both sides conforming to IS 277 coating grade. In addition, if necessary, samples of raw material, selected at random by engineer-in-charge shall be subject to approval and tested for thickness and zinc coating at contractor's expense.

GI raw material shall be used in coil form (instead of sheets) so as to limit the longitudinal joints irrespective of cross-section dimensions.

B) Fabrication Standards

All ductwork including straight sections, tapers, elbows, branches, show pieces, collars and other transformation pieces shall be factory fabricated. In addition ducts shall be factory fabricated utilizing the following machines to provide the requisite quality of ducts.

- Coil (Sheet metal in Roll Form) lines to facilitate location of longitudinal seams at corners/folded edges only, to obtain the required duct rigidity and leakage free characteristics. No longitudinal seams permitted along any face side of the duct.
- All ducts, transformation pieces and fittings to be made on CNC profile cutter for requisite accuracy of dimensions, location and dimensions of notches at the folding lines.
- All edges to be machine treated using lockformers, flangers and rollers for turning up edges.
- Sealant dispensing equipment for applying built-in sealant in Pittsburgh lock where sealing of longitudinal joints are specified.

C) Gauge & Transverse Connectors

All ducts shall be with MS/GI angle Flanges system with built-in sealant. Bracing distance should not be more than 600mm as per IS standard. All ducts shall be fabricated from galvanized steel / aluminium of the following thickness, as indicated as below:

D) Rectangular Ducts

Longest Size of Duct	Minimum Sheet Thickness		Type of Joints / Flange	Bracing / If any
	GI	Aluminium		
1 – 750 mm	0.63 mm (24G)	0.80 mm	25x25x3mm MS epoxy painted with 6mm dia GI nut & bolts at 125mm pitch	25x25x3mm MS epoxy painted
751 – 1500 mm	0.80 mm (22G)	1.00 mm	40x40x3mm epoxy painted MS epoxy painted with 6mm dia GI nut & bolts at 125mm pitch	25x25x3 mm MS epoxy painted
1501 – 2250 mm	1.00 mm (20G)	1.25 mm	50x50x5 mm MS epoxy painted with 6mm dia GI nut & bolts at 125mm pitch	40x40x3 mm MS epoxy painted
2251 mm & above	1.25 mm (18G)	1.80 mm	50x50x6 mm MS epoxy painted with 10mm dia GI nut & bolts at 125mm pitch	40x40x3 mm MS epoxy painted

E) Round Ducts

Duct Diameter (mm)	Minimum Sheet Thickness			
	GI		Aluminium	
	Spiral seam gauge	Longitudinal seam gauge	Spiral seam gauge	Longitudinal seam gauge
Upto 650	26	24	22	20
651 – 900	24	22	20	18
901 – 1250	22	20	18	16
1251 – 1500	20	18	16	14
1501 – 2100	18	16	--	12

2.3 Duct Construction

All ducts shall be fabricated and installed in workmanlike manner, conforming to relevant SMACNA codes.

Duct dimensions shown on drawings, shall be overall sheet metal dimensions inclusive of the acoustic lining where required and indicated in Bill of quantities. The fabricated duct dimensions shall be as per approved drawings and care should be taken to ensure that all connecting sections are dimensionally matched to avoid any gaps.

All fabricated dimensional tolerances shall be within ± 1.0 mm of specified dimension. To obtain required perpendicularity, permissible diagonal tolerance shall be ± 1.0 mm per meter.

Each and every duct piece shall be identified by the color coded sticker which shows specific part numbers, job name, drawing number, duct sizes and gauge etc.

Ducts shall be straight and smooth on the inside. Longitudinal seams shall be airtight and at corners only, which shall be either Pittsburgh or snap button punch as per SMACNA practice, to ensure air tightness.

Air-turning vanes shall be installed in all bends and duct collars designed to permit the air to make the turn without appreciable turbulence.

All ducts shall be rigid and shall be adequately supported and braced where required with standing seams, tees, or angles, of ample size to keep the ducts true to shape and to prevent buckling, vibration or breathing.

Reinforcement of the ducts shall be achieved by either cross breaking or straight beading depending on length of ducts.

Plenums shall be shop/factory fabricated panel type and assembled at site. Fixing of galvanized angle flanges on duct pieces shall be with rivets heads inside i.e. towards GS sheet and riveting shall be done from outside.

Self-adhesive, non-toxic Neoprene rubber / PVC gasket of 5 mm thickness shall be used between duct flanges and between duct supports in all ducting installation.

Ducts and accessories within ceiling spaces, visible from air-conditioned areas shall be provided with two coats of mat black finish paint.

2.4 Flexible ducts

Insulated flexible ducts shall be provided to connect the supply air ducts to all air delivery devices such as grilles and diffusers. The length of the flexible duct shall not exceed 1.0 m. The airflow velocity through the flexible duct shall not be more than 3.0 m/s.

The flexible duct shall be made of triple lamination of aluminum foil, polyester and Metalized Polyester film permanently bonded to a coated spring steel wire helix. The exterior shall be wrapped with 25mm thick 32 kg /m³ fibre glass insulation. The outer insulation jacket / vapor barrier shall be made of fibre glass reinforced Metalized Polyester film laminate. The fire rating of the flexible duct shall conform to BS 476 Parts 5, 6 and 7.

Every branch duct shall have test plugs.

Every duct tap-off from supply and return air duct shall be complete with opposed blade volume contract damper.

The duct leakage rate shall not exceed 1% of full flow and 25% of the ducts shall be tested at site for duct leakage.

2.5 Support System

A completely system consisting of fully threaded GI rods, double L bottom brackets (MS epoxy painted angles), nuts, washers and anchor bolts shall conform to relevant IS standards.

Larger Side of Duct (mm)	Hanger Rod Diameter (mm)	Supporting Angle (mm)	Maximum Spacing between Supports (mm)
Upto 750	10	25x 25 x 3	2000
751 – 1500	10	40 x 40 x 5	2000
1501 – 2250	10	50 x 50 x 5	2000
2251 & above	12	50 x 50 x 6	2000

To provide the required thermal brake effect, Neoprene of 5 mm thickness shall be used between duct supports and duct profiles to avoid heat transfer losses.

2.6 Installation

Following tools and tackles shall be used to give the required duct quality and speed of installation including:

- Electric Pittsburg Seamer – used for closing Pittsburg joints.
- Electric Slitting Shear – to make cut-outs.
- Drilling machine with drill bits – for drilling holes in the sheet metal work.
- Hammer drill machine with drill bits – for drilling holes in the building structure for anchors.
- Hoisting system – for lifting the duct assembly upto mounting heights.

All ducts shall be installed generally as per tender drawings, and in strict accordance with approved shop drawings to be prepared by the Contractor.

The Contractor shall provide and neatly erect all sheet metal work as may be required to carry out the intent of these Specifications and Drawings. The work shall meet with the approval of Owner's site representative in all its parts and details.

All necessary allowances and provisions shall be made by the Contractor for beams, pipes, or other obstructions in the building, whether or not the same are shown on the drawings. Where there is interference / fouling with structural work, plumbing or other pipes, and conduits, the ducts shall be transformed or modified as per actual site conditions.

After the end of the day working, the contractor shall temporarily close all duct openings with PVC foil / polyethylene sheets with tapes to prevent debris / dust entering into ducts and maintain them clean. Opening for grilles shall also be closed in the same manner.

Ducting over false ceilings shall be supported from the slab above, or from beams. In no case shall any duct be supported from false ceiling hangers or be permitted to rest on false ceiling. All metal work in dead or furred down spaces shall be erected in time to occasion no delay to other contractor's work in the building.

Where ducts pass through masonry openings, it shall be provided with thick TF quality expanded polystyrene around the duct. An MS angle of ISA 50 x 50 x 6 shall be riveted to the duct portion passing through wall / opening. The corners of MS frame shall be extended on both sides to serve as fasteners, which shall be grouted in the wall to prevent any leakage between rooms / infiltration of air. The gap between duct surface and MS surface shall be thoroughly sealed with fire barrier mortar for complete sealing.

All ducts shall be totally free from vibration under all conditions of operation. Whenever ductwork is connected to fans, air handling units or blower coil units that may cause vibration in the ducts, ducts shall be provided with a flexible connection, located at the unit discharge.

Duct shall not rest on false ceiling and shall be in level from bottom. Taper pieces shall taper from top.

2.7 Access Doors and Windows

Bolted hinged insulated access doors shall be provided in ducting for fire dampers for servicing. Access doors shall be rigid and shall be provided with food grade silicon sealant (approved by USFDA) to render them air tight.

Minimum size of access doors / windows provided in the ducting shall be as follows:

- 300 mm x 300 mm for attending volume control dampers provided in the bottom horizontal face of Ducts.
- 600 mm x 600 mm for attending fire dampers and/or motorized dampers.

2.8 Dampers

Dampers shall be provided in ducts at every branch supply or return air connection, whether or not indicated on the Drawings, for the proper volume control and balancing of the air distribution system.

All duct dampers shall be of 16 G GI construction and tight fitting. The design, method of handling and control shall be suitable for the location and service required.

Dampers shall be of splitter, butterfly or louver type. Damper blade thickness shall not be less than 1.25 mm and not more than 225 mm wide. Dampers shall be lever operated and with locking device which will permit the dampers to be adjusted and locked in any position and clearly indicating the damper position. The damper

shall be provided with graduated scale for % opening or closing. Linkages shall be extended for motorized operation damper.

2.9 Fire & Smoke Dampers

Dampers shall be automatic or fusible link type as indicated on Drawings and Bill of Quantities. Fire damper shall be multi blade type. The blades and frame shall be of minimum 16 G thickness. Other materials shall include return spring, locking device, solenoid actuator and electronic sensor.

These automatic fire dampers shall be capable of operating automatically on receiving signal from a fire alarm panel. Fire damper shall have its own separate panel connected with remote control to achieve video alarm in case of damper closure.

All supply and return air ducts at AHU room crossings and at all floor crossings shall be provided with Motor operated Fire damper of atleast 1-1/2 or 2 hour rating as per UL555/1995 tested by CBRI.

Fire damper blades shall be one piece folded high strength 16 gage galvanized steel construction. In normal position, these blades shall be gathered and stacked at the frame head providing maximum air passage and preventing passing air currents from creating noise or chatter. The blades shall be held in position through fusible link of temp 70o C.

In case of fire, the intrinsic energy of the folded blades shall be utilized to close the opening. The thrust from the closing of the damper shall operate a limit switch mounted in the bottom frame of fire damper within the duct. Closing of this limit switch shall shut off the power supply to the air handling unit stopping all air flow instantaneously. No hinges or blade linkages shall be permitted which may give way under heat or pressure.

The thrust of suddenly released tension shall instantly drive the blades down without the use of springs, weights other devices subject to failure. Fire damper sleeves and access doors shall be provided within the duct in accordance with the manufacturer's recommendation and applicable codes & regulations.

The electric actuator shall be energized either upon receiving a signal from smoke detector installed in AHU room supply air duct / return air duct or temperature sensor. The fire damper shall also close upon sensing temperature rise in supply air ducts thru the electronic temperature sensor.

Each damper shall be provided with its own control panel, mounted on the wall and suitable for 240 VAC supply. This control panel shall be suitable for spring return actuator and shall have atleast the following features:

- Potential free contacts for AHU fan ON/ Off and remote alarm indication.
- Accept signal from external smoke / fire detection system for tripping the electrical actuator.
- Test and reset facility.
- Indicating lights / contacts to indicate the following status:
 - Power Supply On
 - Alarm
 - Damper open and close position.

Actuators shall be mounted on the sleeve by the damper supplier in his shop and shall furnish test certificate for satisfactory operation of each Motor Operated Damper in conjunction with its control panel. Control panel shall be wall mounted type.

It shall be HVAC Contractor's responsibility to co-ordinate with the Fire Alarm System Contractor for correctly hooking up the Motor Operated Damper to Fire Detection / Fire Management System. All necessary materials for hooking up shall be supplied and installed by HVAC Contractor under close co-ordination with the fire protection system contractor.

HVAC Contractor shall demonstrate the testing of all Dampers and its control panel after necessary hook up with the fire protection / fire management system is carried out by energizing all the smoke detectors with the help of smoke.

HVAC Contractor shall provide Fire retardant cables wherever required for satisfactory operation and control of the Damper.

HVAC Contractor shall strictly follow the instructions of the Damper Supplier or avail his services at site before carrying out testing at site.

Fire/smoke damper shall be provided with factory fitted sleeves; however, access doors shall be provided in the ducts within AHU room in accordance with the manufacturer's recommendations.

2.10 Diffusers & Slot Diffusers

Supply and return air diffusers shall be as shown on the Drawings and indicated in Bill of Quantities.

Ceiling type diffusers shall be of extruded aluminum construction, square & rectangular diffusers with flush or step down face, as specified with fixed pattern and neck. Written approval shall be obtained from engineer-in-charge before procurement.

All supply air diffusers shall be equipped with removable central core and concealed key operated extruded aluminum/GI volume control dampers (specific approval required for GI construction) in black color, with arrangement for adjustment from the bottom.

Linear diffusers shall be of extruded aluminum sections, flush mounted type with single or double direction airflow. The frame shall be of aluminum extruded section only and shall hold the louvers tightly in fixed position.

Slot Diffuser shall be of extruded aluminum construction with diffusion plate and sliding damper.

All diffusers shall be epoxy powder coated, before installation, in approved color by engineer-in-charge.

2.11 Grilles

The supply & return air grilles shall be of extruded aluminum sections as specified in bill of quantities. The supply air grilles shall have single/double louvers. The horizontal and vertical louvers both shall be adjustable type. The return air grilles shall have single horizontal extruded section fixed louvers. Grilles with adjustable louvers shall have adjustable pattern as each grille bar shall be pivotable to provide pattern with 0 to +45 degree horizontal arc and upto 30 degree deflection downwards.

The damper blades shall also be of extruded aluminum/GI (specific approval required for GI construction) in black color. The grille flange shall be fabricated out of aluminum extruded section. Grilles longer than 450mm shall have intermediate supports for the horizontal louvers.

Linear grilles shall be of extruded aluminum sections, with single or double direction airflow. The frame shall be of aluminum extruded section only and shall hold the louvers tightly in fixed position.

Exhaust grilles shall be fabricated from aluminum sections. The exhaust grilles shall be horizontal fixed bar grilles with 15 degree blade inclination. The thickness of the fixed bar louvers shall be minimum 5.5 mm in front and 3.8 mm in rear with rounded edges. Flanges on the two sides shall be 20 mm/30 mm wide as approved by engineer-in-charge.

All grilles shall be epoxy powder coated, before installation, in approved color by engineer-in-charge.

II. FIRE SPRINKLER & ALARM SYSTEM

3 PIPING

3.1 Scope

The scope of this section comprises the supply and laying of pipes, pipe fittings and valves, testing and balancing of all piping works required for the complete installation as shown on the Drawings. All piping work inclusive of fittings and valves shall conform to relevant & applicable Standards and shall be carried out as per the specifications and details given below.

3.2 Pipe Sizes

Pipe sizes shall be as required for the individual fluid flows. Various pipe sizes have been indicated on the Drawings, these are for Contractor's guidance only and shall not relieve contractor of responsibility for providing smooth noiseless balanced circulation of fluids.

3.3 Water Piping

Following material shall be used for pipes and fittings.

Pipes Nominal size (mm)	Material Specification
< 150	IS 1239 Part-1
200 and above	IS 3589 Gr. FE 410 (8mm thick)
Fittings Nominal size (mm)	Material Specification
< 40	Socket welded, ASTM A105 as per ANSI B16.11
50-150	Butt welded, ASTM A234 Gr. WPB as per ANSI B16.11
> 200	Site fabricated from IS 3589 Gr. FE 410 (8mm)
Flanges Nominal size (mm)	Material Specification
< 150	ASTM A105 as per ANSI B16.5 (#150 class)
> 200	IS 2062 Gr.A, as per ANSI B16.5 (#150 class)

All jointing in the pipe system shall generally be by welding. All welding shall be done by qualified welders and shall strictly conform to BIS Code of practice for manual metal arc, welding of Mild Steel.

All job welding shall be done by the electric arc welding process in accordance with the following:

- Square cut plain ends shall be welded for pipes upto 50 mm dia.
- All pipes 65 mm dia or above shall have 45 degree bevel type, pipe mill-bevelled or machine-bevelled by the contractor.
- All scale and oxide shall be removed with hammer, chisel or file and bevel left smooth and clean.

- Pipe lengths shall line up straight with abutting pipe ends concentric.
- Both conductors from the welding machine shall be extended to locations at which welding work is being done. The leads from welding machine to location of welding work shall be held together with tape or other approved means so as to prevent induced current in structural steel, in piping or in other metals within the building. The ground lead shall be connected to length of pipe through joints in pipe, structural steel of building or steel pipe supports.

All pipes and their steel supports shall be made of steel and shall be adjustable for height and primer coated with black paint, both as approved by engineer-in-charge. The spacing of pipe supports shall not be more than that as specified below:

Nominal Pipe Size (mm)	Spacing between supports (meters)
Upto 25 mm	1.25
32 to 65 mm	2.00
80 to 125 mm	2.50
150 mm & above	3.00

Hangers and Supports shall be provided and piping wherever required or otherwise specified. Wherever necessary, additional hangers and supports shall be provided to prevent vibration or excessive deflection of piping and tubing at bends and heavy fittings like valves to avoid undue stresses on the pipes.

Piping shall be properly supported on, or suspended from, stands, clamps, hangers as specified and as required. The Contractor shall adequately design all the brackets, saddles, anchors, clamps and hangers and be responsible for their structural sufficiency.

Suitably designed RCC / PCC blocks shall be used for resting the pipe which is running on the roof and wherever required.

Auto purge valves shall be provided at all highest points in the piping system for venting air.

The piping shall be installed in a uniform manner, parallel to or perpendicular to walls, ceiling or column lines and all changes in directions shall be made with fittings. The horizontal piping shall run at right angles and shall not run diagonally across rooms or other piping. All piping shall be arranged to provide maximum head room.

Where pipes are to be laid underground, the top of the insulated pipes shall not be less than 750 mm from the ground or as approved by engineer-in-charge. Buried pipes shall be covered on all sides by river sand cushion for a height not less than 200 mm. After pipes have been laid and top sand cushion provided, the trench shall be refilled with excavated soil and any extra soil shall be removed from the site of work by the contractor.

Insulated piping shall be supported in such a manner as not to put undue pressure on the insulation. Premoulded polyurethane pipe sections of 160 Kg/m³ density shall be fixed between pipe and MS support. 10 mm thick MS 'U' clamp with shall be fixed on the pipe so that the pipe is kept in position. All welded piping shall be subject to the approval at site by engineer-in-charge.

All flanges shall be of cast steel plate flanges conforming to relevant standard and shall be Slip-On-Raised-Force (SORF) type, welded to the pipes. The supply of flanges shall form part of piping (not separately identified in Bill of Quantities) and shall also include supply of bolts, washers, nuts and suitable insertion gaskets.

Counter flanges for equipment having flanged connections shall be provided. Flanged pairs shall be provided on all such equipment, which may require to be isolated or removed for service e.g. pumps, refrigeration machines, air handling units etc. All threaded valves shall be provided with nipples and flanged pairs on both sides to permit flange connections, for removal of valves from main lines for repair / replacement.

Gaskets shall be fibre reinforced 3 mm thick insulation rubber suitable for utility temperature as approved by engineer-in-charge.

Fittings shall be malleable casting of pressure rating suitable for the piping system. Fittings used on welded piping shall be of the weldable type. These shall form part of piping and are not separately identified in Schedule of Quantities.

All pipes to be used for make-up, drain, condensate drain and fittings shall be galvanized steel class 'B' (medium class) conforming to relevant BIS Codes.

For proper drainage of AHU Condensate, 'U' trap shall be provided in the drain piping.

All chilled water piping, hot water piping, drain piping and fittings shall be pressure tested, painted and then insulated as described under the section "Insulation".

3.4 Ball and Butterfly Valves

Ball and Butterfly valve conforming to the following specifications shall be provided as shown on Drawings:

Size	Construction	Ends	Type
15 to 40 mm	Brass	Screwed/Flange	Ball
50 mm and over	Body Cast iron	Wafer	Butterfly

Type and requirements shall be as indicated in Bill of Quantities. Valves shall be suitable for PN 16 rating.

All ball valves and ball valves with Y strainer shall be bronze forged body construction with chrome plated bronze ball and handle of stainless steel constructions as identified in Bill of Quantities.

Butterfly valves shall have cast iron body with black insulation rubber seat / EPDM and shall be suitable for PN16 rating. All butterfly valves shall be provided with arrangement for locking in any set position. Valves 200 mm and bigger size shall be gear driven with hand wheel arrangement.

3.5 Non Return Valves

Non return valves shall be dual plate check valve provided as shown on the Drawings, and identified in Bill of Quantities conforming to relevant Codes and in accordance with the following Specifications:

Size	Construction	Ends	Material Specification
Upto 65 mm	Body cast iron, gun metal plate	Flanged	Class 2 of IS 778
80 mm to 350 mm	Body cast iron, Plate carbon steel	Flanged	Class 2 of IS 780/69
350 mm & above	Body cast iron, Plate carbon steel	Flanged	IS 2906/69

The spring and hinge/stop pin shall be SS304. Valves shall be PN 16 rating and shall be provided with certification.

3.6 Pressure Gauges and Temperature Gauge

Pressure gauges and Thermometers shall be provided as shown on the Drawings and included in Bill of Quantities.

Pressure Gauges shall be 100 mm dia & casing made out of SS 304 ranging 0-10 kg per Sq. cm (0-150 psi) pressure. Gauges shall be connected to the pipes by 6 mm diameter Stainless Steel Syphon tube through a ball valve, required for gauge protection. Pressure gauge sockets on insulated pipes and accessories shall be extended upto insulation to avoid damage of insulation for replacement of gauges.

Temperature gauge shall be dial type 100 mm dia with extended stemp. Body shall be SS 304. The casing shall be adjustable sideways for reading from the front. Scale of reading shall be of the range 0°C to 50°C & +32°F to 122°F (for chilled water) and -20°C to 10°C or suitable (for Chilled brine). Graduation of scale shall be 1° in both readings. Temperature gauge shall be with long stem, so that gauge is removable without damaging the insulation

3.7 Balancing

After completion of the installation, all water system shall be adjusted and balanced to deliver the water quantities as specified or as directed.

All control valves shall be set for full flow condition during balancing procedure. Each water circuit shall be adjusted thru balancing valves provided for this purpose; these shall be permanently marked after balancing is completed, so that they can be restored to their correct positions, if disturbed.

Complete certified balancing report shall be submitted for evaluation and approval by engineer-in-charge.

3.8 Valve Identification

Contractor shall provide valve tag schedule and valve chart for each piping system, consisting of schematic drawing of piping layout, along with a valve list, showing and identifying each valve by number, service and location and describing its function.

The contractor shall frame under glass in the air conditioning plant room or as directed by engineer-in-charge copies of layout.

3.9 Measurement for Piping

Unless specified otherwise, measurement for piping for the project shall be on the basis of centre line measurements described herewith.

Piping shall be measured in units of length along the centre line of installed pipes including all pipe fittings, flanges (with gaskets, nuts, and bolts for jointing), unions, bends, elbows, tees, reducers, inspection pieces, expansion loops etc. The above accessories shall be measured as part of piping length along the centre line of installed pipes, and no special multiples of pipe lengths for accessories shall be permitted.

The quoted rates for centre line linear measurements of piping shall include all wastage allowances, pipe supports including hangers, MS channel, PUF supports, nuts, check nuts, vibration isolator suspension where specified or required, and any other item required to complete the piping installation as per the Specifications. None of these items shall be separately measured nor paid for.

However, all valves (gate / ball / check / balancing / purge / butterfly / drain etc), strainers, pressure gauges, thermometers shall be separately counted and paid as per their individual unit rates, which shall also include their insulation as per Specifications. Piping measurements shall be taken before application of the insulation.

III. ELECTRICAL WORKS

The electrical arrangement of the switchgear panel, protection, metering, control, interlocking, inter-tripping, auxiliary power supply etc. shall be as shown in the SLD.

Also panels shall be suitable for operation with system voltage and frequency variations as stated in the SLD.

All components of the Panels shall be rated for the electrical system characteristics shown in the SLD. The rating of the equipment/component shall take full account of all the heat sources and other de-rating factors, non-linear loads within the enclosures. Special reference is to be made in respect of enhanced circuit making requirements and the DC component of fault current at breaking.

The switchgear shall be suitable for operation with system voltage and frequency variations

- | | | | |
|----|---------------------|---|-------|
| a) | Voltage variation | : | ± 10% |
| b) | Frequency variation | : | ± 3% |

Metal treatment & finish:

All steel work used in the construction of the panel should have undergone rigorous metal treatment process.

- Oil, Grease, Dirt and Swarf shall be thoroughly removed by emulsion cleaning.
- Rust and scales shall be removed by pickling with dilute acid followed by washing with running water, rinsing with slightly alkaline hot water and drying.
- After phosphating, finishing shall be carried out with clean water, followed by final rinsing with dilute dichromate solution and oven drying.
- Two coats of finishing powder coating Siemens Grey RAL 7032 paint shall be applied with each coat followed by stoving in the dust free atmosphere. The second finishing coat shall be free from imperfection like pinholes, orange pills etc. The sample sheet for the finishing paint shall be approved by Purchaser/Consultant.
- The final finished thickness of paint film on steel shall not be less than 90 microns.
- Finished painted appearance of equipment shall present aesthetically pleasing appearance, free from dents and uneven surface.

Busbars:

- a. Busbars and connections shall either be manufactured from non-flammable hard drawn tinned copper or high conductivity aluminum/aluminum alloy mounted on non-hygroscopic ceramic or resin cast insulators at sufficiently close interval to prevent busbar sag and shall effectively withstand electromagnetic stresses in the event of short circuit capacity for one second as mentioned in the SLD.
- b. Busbars including branch connections shall be fully insulated except in the cable/busduct compartment(s). FRP/Hylam shrouds shall be provided at joints and tapoffs. Busbars exposed to air shall be silver plated.
- c. Main busbar shall be rectangular cross section and shall have same cross sectional area throughout the length of the switchgear. The current rating of the neutral busbar may be half of the phase busbars. Busbars shall be capable of carrying the rated current at 415 V continuously. The busbars shall be designed to withstand a temperature rise of 40° C above the ambient. A current density of 0.80 Amps/Sq.mm for Aluminum and 1.3 Amps/Sq. mm for Copper Bus Bars shall not be exceeded. Vendor has to submit the Bus bar calculation of each panel along with GA drawing at the time of drawing approval.
- d. The main horizontal busbars shall run throughout the entire length of the panel and shall be accessible for maintenance from the front as well as rear. Busbar chamber shall have separately screwed covers. All busbars, links etc. shall be provided with 3 mm thick FRP sheet/Hylam sheet to prevent accidental contacts.
- e. The busbar shall be arranged such that minimum clearances between the busbar are maintained as below.
 - Between phases : 35 mm min.
 - Between phases and neutral : 25 mm min.
 - Between phases and earth : 25 mm min
 - Between neutral and earth : 23 mm min.
- f. The busbar shall be of three phases and neutral system with separate neutral and earth bar. The busbar and interconnection between busbar and various components shall be of high conductivity, hard drawn, aluminum and High tensile bolts and spring washers shall be provided at all busbar joints.
- g. Busbars and interconnection shall be insulated with heat-shrink sleeves of applicable grade and marked to indicate the phase colouring, which shall be red, yellow, blue and black unless specified otherwise. Necessary de-rating due to insulation shall be considered for sizing the busbars.
- h. Busbars, at bus section switches, shall be arranged to permit safe work with one bus-section de-energized. In addition it shall not be possible for arcs to transfer across a section or coupler.
- i. Branch connections shall be sized as per the circuit breaker / switch rating.
- j. An earthing busbar sized for the full rating of the switchboard shall be provided along the full length of the switchgear structure with provision for earth cable / bar connections at each end. It shall be possible to disconnect the earth cable / bar connection to facilitate meggering, when required. Where frame leakage protection is specified a separate insulated bus bar is required in addition.
- k. Busbars and connections shall be adequately sized, braced and supported to withstand the mechanical forces and thermal effects resulting from the switchgear rated short circuit current and carry certification from a recognized testing authority.

- I. The busbar shall be rated for the frame size of the main incoming breaker /ACB/SDF. Above 63 Amp MCCB/SDF incomer/outgoing shall be considered busbar only.

All bus connections, joints and taps shall be short and as straight as possible, and applied with contact grease in the mating surface

1.0 CABLE TERMINATIONS:

- a. Cable terminating facilities and terminals shall be suitable for the specified cable type and conductor size. Consideration and provision shall be taken by the Vendor on the equipment design for the use of cables with aluminum / copper conductors as mentioned in the SLD / Switchgear schedule.
- b. Panel shall be designed either for top or bottom or combined entries and outgoing which will be confirmed by Purchasers/consultant at the time of drawing approval.
- c. Generous size of cable chambers shall be provided, with the position of cable gland and terminals be such that the cables can be easily and safely terminated. A terminal box or chamber with removable undrilled gland plate shall be provided.
- d. Terminal blocks shall be mounted in a single deck arrangement. Terminal blocks for the connection of external control wiring shall be of the clamp type with a facility to connect two wires on each side of the terminal. A minimum of 20% spare terminals shall be provided in each module and also each control terminal shall be capable for connection of 2 x 2.5 Sqmm standard copper wire.
- e. Cable terminal arrangements for power and control cables may be adjacent provided that they are separated by barriers or the power terminals are fully shrouded.
- f. Sufficient space shall be provided between the terminal box and the cable entry for the spreading and termination of external conductors. A minimum space of 300 mm from the gland plate to the nearest terminal block shall be provided. If it is not possible using the standard design in relation to specified cable size then the Vender shall incorporate an extended cable glanding box within its design.
- g. In MCC Panel wiring shall be in one side of the terminal block only.
- h. Positioning of cable terminations shall avoid obstruction of other cable terminations, removable covers, etc. and provide for easy access for terminating cables.
- i. Multi-way terminal blocks complete with screws, nuts, washers and marking strips shall be furnished for terminating the internal wiring and outgoing cables.
- j. Power terminals shall be washer head screw type or stud type complete with crimping type connectors. Screw type terminals with screws directly impinging on conductor are not acceptable.
- k. Not more than two wires shall be connected to any terminal. If necessary a number of terminals shall be jumpered together to provide wiring points.
- l. Terminal blocks for current transformer secondary lead wires shall be provided with shorting and earthing facility. All external wiring shall be on one side of the terminal block only.
- m. All terminal blocks shall be shrouded or provided with transparent covers. Also shrouds or covers shall permit safe working to the terminals of one circuit without accidentally touching that of another live circuit. Pinch screw type terminals are not acceptable.
- n. Terminals for different voltages shall be separated by partitions.

- o. Terminal boxes (where specified) shall be suitable for dry type terminations unless otherwise specified.
- p. Cable risers shall be adequately supported to withstand the effects of rated short circuit currents without damage and without causing secondary faults.
- q. Separate cable facilities shall be provided for each cubicle and for power and control cables.
- r. Adequate support arrangement shall be provided for each cable to avoid undue strain on the cable terminations.
- s. Termination of single core cables shall be through gland plate and provision shall be made for bonding and earthing any armour.
- t. The terminal blocks shall be mounted so as not to restrict the movement of withdraw able circuit breakers.
- u. Where bus duct is specified, adequate provision shall be made for supporting and fastening of the bus duct at the switchgear. The terminals shall be provided with a sufficient pre-drilled contact area for accepting flexible connectors, and proper access shall be provided for making off (or disconnections of), the connections while the bus duct remains in place.
- v. In compartment type panel, inter panel wiring within each shipping section shall be Vendor's responsibility. For wiring between shipping sections, Vendor shall provide terminal blocks on adjoining shipping sections and supply suitable connecting (jumping) wires.

1.1 POWER & CONTROL WIRING:

- a. The control wiring shall be carried out with 650/1100 V grade PVC insulated fire retardant stranded copper conductor wires of minimum size 1.5 Sqmm except for electronics wiring. The wiring shall be complete in all respects so as to ensure proper functioning of control, protection and interlocking scheme.
- b. Terminal for both incoming and outgoing cable shall be suitable for 1100 volts grade, aluminum/copper conductor PVC insulated and sheathed, armored cable and shall be suitable for connections of solder less sockets for the cable size as indicated on the drawing.
- c. Control & Power wiring within the switchgear shall be securely held in position (either loomed or run in conduit/trunking) neatly bunched, adequately supported and properly routed to allow easy access and maintenance. Where wiring enters or passes through compartments it shall be suitably protected mechanically protected.
- d. Both control and power wiring shall be brought out in cable alley for ease of external connections, operation and maintenance.
- e. Control & Power wiring layout shall permit alterations to individual circuits without requiring shutdown of the complete panel.
- f. All wiring for external connections shall be brought out to individual terminals on a readily accessible terminal block without joints or tees in their runs. Generally not more than two wires shall be connected to a terminal.
- g. Bus wires for closing, tripping, control, indication, heaters etc. shall be provided and running within the switchgear shall be suitably sized and individually protected. Bus wires for Serial communication shall run in a separate tray with metallic enclosure.

- h. Flexible wires shall be used for connections on door mounted equipment. Wiring shall be loomed, wrapped in flexible PVC conduit and be firmly clamped at both ends to prevent movement at the terminations.
- i. Secondary wiring for CTs, PTs, AC auxiliary supply, DC auxiliary supply and inter panel wiring shall be done by different colours as per standard.
- j. Wiring identification shall be by numbered and/or lettered sleeves, of insulating material adjacent to the terminals. Wires with in switchgear shall be identified by numbered ferrules at the each end. The ferrules shall be of the "T type and of non- deteriorating material. They shall be firmly located on each wire so as to prevent free movement and they shall be indelibly marked and removal without disconnecting the wire from its terminal shall not be possible.
- k. The minimum size of power circuit shall be 4 Sqmm copper in standard phase color and CT secondary circuits shall be wired with 2.5 Sqmm copper conductor.
- l. Control power for the motor starter module shall be taken from the control Bus. Control wiring shall have MCB & neutral link shall be mounted in front of the panel and shall be easily accessible.
- m. Not more than two wires shall be connected to a terminal.
- n. All spare contacts of ACB, Contactors aux. relays and switches shall be wired upto the terminal blocks.
- o. Each of the DC circuit shall be provided with two MCB one in the positive and the other in the negative for 2 wire DC underground system of specified voltage.
- p. Final wiring diagram of Panel's power and control circuit with ferrules number shall be submitted along with panels as one of the documents.
- q. All wiring shall be color coded as follows
 - i. Instrument transformer : Red , Yellow or Blue determined by the AC Circuit's phase with which the wire is associated.
 - ii. AC Phase wire : White
 - iii. AC Neutral : Black
 - iv. DC Circuits : Grey
 - v. Earth Connection : Green
 - vi. Power Wiring : Phase Colour
 - vii. CT wiring : Phase Colour

1.2 AUXILIARY SUPPLIES:

- a. Auxiliary supplies (closing, tripping, control, indication, heaters, etc.) shall be mentioned in the SLD and auxiliary power supply unit shall be the part of the panel.
- b. Where motor charging spring operating mechanism is specified for circuit breaker, it shall be rated for the rated auxiliary control supply operation.
- c. Circuit breaker closing, tripping, control and indication power shall be supplied from suitably rated DC supply units and it shall be part of the panel.
- d. All auxiliary supplies shall be individually protected within each cubicle. Individual protection shall be by suitably rated MCB.

- e. For shunt trip circuits, the protection shall be rated at least 300% of the load.
- f. Anti-condensation heater supplies shall be derived internally from each busbar section.
- g. Incoming Auxiliary Supplies shall be protected by suitably rated MCB at the point of entry to the switchboard. The Vendor shall ensure discrimination with individual circuit MCB. Volt free group contact shall be provided via internal bus wiring for remote common alarm.

1.3 EARTHING:

- a. Aluminum earthing bus shall be provided for the entire length of the panel and shall be rated to carry maximum fault current. Earth busbar shall be located at the bottom/top of the panel. All metallic non-current carrying parts of the switchgear shall be bonded together and connected to the switchgear earth busbar.
- b. All doors shall be bonded to the main structure by means of a flexible copper connection arranged so that it cannot be trapped as the door is opened or closed.
- c. With-drawable parts (e.g. circuit breakers) shall be effectively earthed until they are completely withdrawn with all power and control connections disconnected.
- d. Provision shall be made, for earthing cable screen and armouring to the earth busbar, near the gland.
- e. Provision shall be made for connection from earth busbar to the main earthing busbar coming from the earth pit on both side of the panel.
- f. All control, instrument and communication cables, if any, shall be earthed suitably to prevent any electromagnetic interference and ensure electromagnetic compatibility.
- g. The earth continuity conductor of each incoming and outgoing feeder shall be connected to the earth bar. The armour shall be properly connected with the earthing clamp and the clamp shall be ultimately bounded with the earth bar.
- h. Earth busbar shall be rated to carry the rated symmetrical short circuit current of associated panel for one second and earth busbar shall be supported to withstand stresses induced by the momentary current of value equal to the momentary rating of the associated Panels.
- i. Vendor has to submit earth bus calculation along with GA Drawing at the time of Drawing approval.
- j. Each earthing point shall be marked with letter 'E'.
- k. Provision shall be made for an instrument clean earth.

1.4 TERMINAL BLOCKS:

- a. Terminal blocks shall be of 650 Volts grade of stud type. Insulating barriers shall be provided between adjacent terminals.
- b. Suitable provision shall be made to terminate control/power connections in the respective module.
- c. Terminal blocks shall have a minimum current rating of 10 Amps and shall be shrouded. Provisions shall be made for label inscriptions. The wire terminations to the blocks shall be of screw type suitable for crimp type socket.

1.5 NAME PLATE:

- a. Switchgear cubicles and components shall be identified by labels. Cubicle and compartment label designations (located at front and rear of panel) shall be in accordance with the SLD. All with-drawable components shall have a circuit label.
- b. A main label (Panel designation) shall be affixed in a prominent position on each switchboard giving the following information in bold letter:
 - Manufacturers name and type
 - Switchboard Tag Number
 - System voltage, phases, wires and frequency
 - Rated fault current and duration
 - Busbar rating
 - Year of manufacture
 - Purchasers name
 - Order Item No
 - Characters shall be 14 to 15 mm high.
- a. The name plate for outgoing circuits shall be in two parts. One part shall have the necessary details pertaining to the compartment number of the Switch board. The other part, which shall be removable, shall contain the equipment tag number, Equipment Rating as per the SLD and shall have 5 mm high characters. Blank name plates shall be provided for all spare and vacant feeders.
- b. Labels shall be fitted on front and back of cubicles. When the operating sequence of the equipment is not evident, e.g. mechanical / key interlocking features; instruction labels shall be provided and fixed near the point of operation.
- c. Labels shall be affixed by means of self-tapping screws or rivets at the top of the cubicles. Use of adhesives shall not be accepted.
- d. Labels shall be made out from anodized aluminum and shall have black characters on a white background. Warning / Danger labels shall have White lettering on a red background.
- e. Engraved name plates shall preferably be of 3 ply, (red-white-red or black - white -black) lamicold sheet. However black engraved perplex sheet nameplates shall also be applicable. Engraving shall be done with square groove cutters.
- f. Inside the feeder compartment, the electrical component, equipment, accessories like switchgear, contactor, lamp, relays etc. shall suitably be identified by providing stickers.

1.5.1 DANGER NOTICE PLATE:

- a. The danger plate shall be affixed in a permanent manner on operating side of the panel.
- b. The danger notice plate shall indicate danger notice both in Hindi and English and with a sign of skull and bones.
- c. The danger notice plate in general shall meet the requirements of local inspecting authorities.
- d. Overall dimension of the danger notice plate shall be 200 mm wide and 150 mm high. The danger notice plate shall be made from minimum 1.6 mm thick mild steel sheet and after due pretreatment to

the plate, the same shall be painted white with vitreous enamel paint on both front and rear surface of the plate.

- e. The letter, the figure, the conventional skull and bones shall etc. shall be positioned on the plate as per recommendations of IS : 2551-1982.
- f. The said letter, the figure and the sign of skull and bones shall be painted with white lettering on red color background.
- g. The danger plate shall have rounded corners. Locations of fixing holes for the plate shall be decided to suit design of the panel.
- h. The danger notice plate, if possible, be of ISI certification mark.

1.5.2 SAFETY ARRANGEMENTS:

- a. All terminals, connections, relay and other components, which may be “LIVE” when front access doors are open shall be adequately screened. It shall not be possible to obtain access to an adjacent cubicle when any door is opened.
- b. Where provision is made for the padlocking of components under specific condition (Safety shutters, earthing selectors etc.) one padlock shall be supplied for each cubicle and each shall have a different lock change number with two keys being provided.

1.5.3 DRAWINGS AND MANUALS:

1.5.3.1 At Enquiry stage

- a. Descriptive literature of the various equipment offered with catalogues, if any.
- b. Guaranteed technical particulars of the equipment.
- c. Approximate dimensions and weight and preliminary GA drawings as follows.
- d. General arrangement showing plan, elevation and typical section views particularly typical cross sections to illustrate cable connections.
- e. Foundation plan showing location of fixing channels, floor openings etc.
- f. Schematic wiring diagram.

1.5.3.2 At Order stage

Within two weeks of order, vendor shall submit 4 sets of following documents for Purchasers/Consultant's approval

- a. The manufacturer shall develop his own general arrangement and schematic drawing adding necessary auxiliary devices, accessories, components particular to supplied equipment etc. which are required for safe, convenient, efficient and proper operation of the Panel.
- b. Manufacturer shall submit for Purchaser/consultant's approval the single line diagrams, general arrangement drawings, flooring and mounting detail drawings and schematic diagrams with dead load and impact load, plan, sections and foundation details.
- c. Manufacturer shall submit for Main Bus bar calculation and earth bus calculation of each panel along with GA drawings

- d. Set of General arrangement drawing for each type of panel showing constructional features and space required in the front for withdrawal of breaker and back , power and control cable entry points, location of various devices, terminal blocks, cross sectional details, bus bar supports, number of buses, Power & Control wiring diagram for each cubicle. These diagrams shall show any wiring inside the cubicle starting from the cubicle terminal strips. These diagrams shall be used by the owner for trouble shooting and shall show any device, terminal and wire number, shall be submitted within 15 days from the date of letter of intent for approval.
- e. Drawing and data sheet for each component with design calculation , indicating type , short circuit rating of all electrical components used , busbar size Horizontal as well as Vertical, internal wiring size , terminal size including color and mounting details.
- f. Electrical wiring diagram, inert panel, inter connection wiring diagram including terminal numbers and ferrule numbers.
- g. Bill of Material with Model number, make, type and quantity.
- h. Terminal block arrangement drawing for outgoing feeders with size.
- i. Complete relay technical particulars and recommended settings.
- j. Operation, maintenance and installation manuals, (one set to Consultants).
- k. Technical Catalogues/Leaflets of CTs, meters, lamps, etc. shall be submitted along with drawing.
- l. Purchaser's/consultant's approval for the GA drawings is required before the fabrication of the cubicle is started.
- m. The Purchaser/consultant's approval as the manufacturer's drawings shall not relieve the manufacturer of his responsibility for supplying equipment conforming with the relevant specifications and standards or for any other mistakes, errors or omissions in drawings for proper and correctness of functioning/operation of the system.

1.5.3.3 At Final Order Execution stage

The following shall be submitted after inspection but before dispatch of the equipment

- a. Manufacturer shall submit four sets of as built drawings with soft copy
- b. Routine test certificate (including all brought out components) in 4 sets
- c. Detail operation manuals in 4 sets
- d. Detailed erection , testing and commissioning manuals in 4 sets

A. Deviations:

- a. Deviations from this specification are only acceptable where the Vendor has listed in his technical offer, the requirements he cannot or does not wish to comply with and the Purchaser/Consultant has accepted, in writing, the deviations before order is placed.

If the manufacturer is able to offer alternatives resulting in technical or price advantages they should submit a supplement to the main tender with a separate list of deviations.

- b. In the absence of a list of deviations it will be assumed by the Purchaser/consultant that the Vendor complies fully with this specification.

B. Inspection & Tests:

- a. During fabrication, panel shall be subjected for inspection by Purchaser/Consultant or by an agency authorized by the Purchaser. Manufacturer shall furnish all necessary information concerning the supply to inspectors. The Purchaser/ Contractor has right to witness the test carried out on all the equipment.
- b. Tests shall be carried out at the manufacturers' works under his care.
- c. All routine tests on all major components shall be made as per relevant specification.
- d. Type test certificates for the switchgear panel and CB from a recognized testing organization shall be furnished along with the final as built drawing. The supplier shall also submit a list of guaranteed technical particulars with the same.
- e. Inspection of panel including in wiring and electrical operational tests by the Purchaser/consultant before dispatch.
- f. In addition specific tests shall be conducted to check mechanical and electrical operation and panel wiring to this specification and approved schematic drawings.
- g. The tests shall be provisionally conducted at manufacturer's works by providing temporary connection to panel in order to simulate the actual conditions.
- h. Protection operation by secondary injection of current and voltage as required.
- i. Protection operation by primary injection of current as applicable.
- j. Interchangeability test.
- k. Shop tests shall be witnessed by an inspector of Purchaser / Consultant or of an agency authorized by the owner.
- l. The Vendor shall give two weeks' notice for the tests prior to commencement.
- m. The Purchaser reserves the right to inspect switchgear at the Manufacturer's works at any time prior to dispatch to prove compliance with this specification. The Purchaser shall also have the right to carry out intermediate inspection at Vender's works during manufacturing stage.
- n. Acceptance tests shall be as follows:
- A general visual check. This shall cover measurement of overall dimensions, location, number and type of devices, terminal boxes, location and connection of terminals etc.
 - Manual and electrical operation of CB/Relays shall be checked under the worst conditions of auxiliary supply voltage.
 - Dielectric Tests: Insulation of the main circuit that is the insulation resistance of each pole to the earth and that between the poles shall be measured.
 - Insulation resistance Test: Insulation Resistance to earth of all the control wiring should be tested with 1000 V Megger.

- A high voltage test with 2.5 KV for one minute shall be applied between the pole and earth. Test shall be carried out on each pole in turn with the remaining poles earthed. All units racked in position and the breakers closed. Originals test certificate shall be submitted along with panel.
- Insulation test shall be carried out both before and after high voltage test.
- Each switch board will be completely assembled, wired, adjusted and tested for operation under simulated conditions to ensure correctness of wiring and proper functioning of all equipments. Operation check shall be carried out for every control function as per the approved schematic diagrams by manually stimulating the fault conditions and operation of control switches/relays etc.
- All current carrying parts and wiring shall be subjected to a high potential test.
- Type test certificates and results as per relevant Standards (Specification) for all the equipment offered under the scope of this specification shall be furnished.
- The tests shall include but not necessarily limited to the following:
 - Operation under simulated service condition to ensure accuracy of wiring, correctness of control schemes, protection/ metering scheme and proper functioning of the equipment.
 - All wiring and current carrying part shall be given appropriate High Voltage tests.
 - Primary current and voltage shall be applied to all instrument transformers.
 - Routine tests shall be carried out on all the equipment such as circuit breakers, instrument transformers, relays, meters etc. which shall be calibrated in accordance with relevant IS standards.
 - Any other test prescribed by relevant IS shall be carried out upon the Purchaser's request.
- Four copies of test certificates shall be submitted by the vender to the owner for all the items including bought out items.
- For equipment bought from other sub - suppliers certified test reports of tests carried out at the manufacturer's works shall be submitted. Normally, all routine tests as specified in the relevant standards shall be conducted by the sub - supplier at his works.

1.5.4 SHIPPING AND PACKING:

- a. Switchgear shall be shipped in sections to suit ease of handling for transportation and installation.
- b. Each shipping section / wardrobe shall be provided with supports in the form of suitable steel sections, lifting eyes etc. to maintain alignment of parts during shipping, handling, hoisting and installation. Location of lifting points shall be clearly marked on shipping containers and in the drawings. Each shipping section shall have its weight and centre of gravity clearly marked on the container.
- c. With-drawable circuit breakers shall be shipped separate from their housings.
- d. Preparation for shipment shall protect the switchgear auxiliary devices, accessories, etc. against corrosion, dampness, and breakage or vibration injury during transportation and handling.
- e. Each shipping container shall be identified with the contents, purchase order number and item number.

- f. Instructions shall be provided for reassembly of sections in the field.
- g. Where bus wiring has to be reconnected after assembly, pre-terminated and ferruled wiring looms shall be provided.
- h. The Vendor shall comply fully with the 'Packing and Shipping' instructions which form part of the Purchase Order.

1.5.5 HANDLING:

- a. Panels and all its accessories shall be handled carefully in its upright position as indicated in the packing case.
- b. Lifting lugs and jacking pads shall be used for lifting of the switchgear panel. While using jacking pads utmost care shall be taken in proper application of jacks.
- c. Where switchgear panel is dragged or pulled on sleeper or rollers of the traction eyes provided at the bottom frame shall be used with suitable wire ropes and shackles.

1.5.6 STORAGE:

Equipment shall be stored under shelter in a well ventilated, dry place and covered by suitable polythene or tarpaulin covers for protection against moisture.

1.5.6.1 Cables :

The materials covered by this specification shall unless otherwise stated as designed, constructed, manufactured and tested in accordance with latest revisions of the relevant Indian Standards.

STANDARDS	SPECIFICATIONS
IS 1554 (Part I) - 1988	PVC insulated (Heavy duty) Electrical cables for working voltages upto 1100 V.
IS 1554(Part-II) – 1988	Inner sheath dimensions for PVC cables
IS 5831 - 1984	Insulation of cables & sheath of electric cables
IS 7098(Part-I) – 1988	XLPE insulated and PVC sheathed Electrical cables for working voltages upto 1100 V.
IS 7098(Part-I) – 1988	Dimension of Cables.
IS 7098(Part-II)-Latest	Specification for cross-linked polyethylene Insulated PVC Sheathed Cables for working Voltage from 3.3 KV up to and including 33 KV.
IS 3975	Material of Armour (Wires/strips)
IS 8130 - 1984	Conductors for insulated electrical cables.
IS 3961 (Part II) - 1977	Recommended current ratings for PVC insulated and PVC sheathed heavy duty cables.
IS 10810-1984	List of tests on cables.
IS 1255-1967	Code of Practice for installation and maintenance of paper insulated power cables (upto and including 33 KV).

STANDARDS	SPECIFICATIONS
IS 694-1990	PVC Insulated cables for working voltage upto and including 1100V
IS 5571 :2000 & IS 9968 Part-I	Cable use in Hazardous area
IS 8130 :1984	Specification for Conductors for insulated electric cables and flexible cords.
IS 5830 :1984	PVC insulation & sheath of electric cables.
IS 10418 :1982	Cable drum for Electric cables.

Ambient air temperature shall be taken as minimum 45°C for the purpose of designing electrical equipment.

All equipment shall be capable of satisfactory continuous operation under the following conditions:

- a) Voltage variation : $\pm 10\%$
- b) Frequency variation : $\pm 3\%$

2.2.5 LIST OF CODES

The materials and workmanship shall be in accordance with the requirement of the appropriate IS code wherever applicable together with any building regulations or bye-laws governing the works.

The following list is included for guidance only and the omission from the list does not relieve the Contractor from compliance there with:

STANDARDS	SPECIFICATIONS
IS 1554 (Part I) - 1988	PVC insulated (Heavy duty) Electrical cables for working voltages upto 1100 V.
IS 1554(Part-II) - 1988	Inner sheath dimensions for PVC cables
IS 5831 - 1984	Insulation of cables & sheath of electric cables
IS 7098(Part-I) - 1988	XLPE insulated and PVC sheathed Electrical cables for working voltages upto 1100 V.
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STANDARDS	SPECIFICATIONS
IS 1255-1967	Code of Practice for installation and maintenance of paper insulated power cables (upto and including 33 KV).
IS 694-1990	PVC Insulated cables for working voltage upto and including 1100V
IS 5571 :2000 & IS 9968 Part-I	Cable use in Hazardous area
IS 8130 :1984	Specification for Conductors for insulated electric cables and flexible cords.
IS 5830 :1984	PVC insulation & sheath of electric cables.
IS 10418 :1982	Cable drum for Electric cables.
Ducting	SMACNA Standards.

2.2.6 PERFORMANCE TESTING

a) To demonstrate the leak tightness of ducts and pipes, the following minimum tests shall be carried out by the contractor.

- Duct leak test as per SMACNA Standards.
- Hydraulic testing of piping

The reports to be prepared and submitted by the contractor in the formats enclosed herewith.

b) Following minimum performance testing will have to be carried out by the contractor in order to demonstrate the system performance in conformance to the design intent.

- Air Balancing and pressure balancing.
- Temperature and Humidity recording as shown in the format.
- Water Balancing. (Flow shall be checked & demonstrated with Computerized Balancing Instrument (CBI).

Duct Leak Test

1 Objective: To ensure that there is absolutely no leakages from the Air-conditioning Ducts.

2 Pre Requisite:

- Ensure that all Duct Joint Flanges are provided with Proper Gaskets and Galvanized Nut-bolts with plain and spring washers.
- Visually inspect the ducts externally and internally. No damage of ducts or dents should be visible. If any duct is found damaged, the same shall be replaced with a new duct before carrying out the leak test of ducts.

3 Procedure:

3.1 Clean all ducts (from inside) of debris, dust etc.

3.2 Select a length of duct work to be tested and calculate the area of duct

- 3.3 Blank off and seal all joints properly in the selected length of duct. Inspect carefully to ensure that no opening has been overlooked.
- 3.4 Select a test pressure not in excess of the pressure class rating of the duct. (Usually the actual operating pressure as shown in table.)
- 3.5 Calculate the allowable leakage using leakage factors for the duct surface area.
- 3.6 Place the leakage tester on level ground adjacent to the duct selected under test. Provide Dead ends at both ends of the Duct length being subjected to leak testing. Ensure one of the dead ends has the provision for connecting the Leakage tester. Attach the duct adapter plate to the duct and connect the flexible hose to the duct adapter plate and fan outlet spigot, using hose clamps.
- 3.7 Switch the tester power supply ON by means of its power supply using POWER ON/OFF switch provided on control panel.
- 3.8 Slowly increase & adjust the flow meter of blower of leak test machine to achieve required duct static pressure (Pressure can be monitored in Magnehelic guage), for the tested pressure corresponding leakage flow rate/factor shall be obtained. Refer table & chart below.
- 3.9 Adjust blower capacity until steady-state conditions at the test pressure are achieved.

Leakage Class

DUCT CLASS	½", 1", 2' W.G.	3" W.G.	4", 6", 10" W.G.
SEAL CLASS	C	B	A
SEALING APPLICABLE	TRANSVERSE JOINTS ONLY	TRANSVERSE JOINTS & SEAMS	JOINTS, SEAMS & ALL WALL PENETRATIONS
LEAKAGE CLASS			
RECTANGULAR METAL	24	12	6
ROUND METAL	12	6	3

- 3.10 Visually inspect the duct for leakages especially through Seam joints, Flanges, Nuts and bolts etc. Record the airflow (across the orifice) at the steady state condition. This airflow is the CFM leakage of the tested section of the duct.

Formula to calculate- $F = CL * P^{0.65}$

F = Max Leakage (cfm/100 ft²) 2011, CL = Leakage Class (from table above), P = Pressure (in H₂O)

2.2.7 MODE OF MEASUREMENTS

2.2.7.1 Unit Prices in the Schedule of Quantities

The unit price shall include everything necessary to complete the work covered by the item in accordance with the specifications and drawings. The sum total of all the individual item prices shall represent the total price of the Design, supply, installation, commissioning, testing and Documentation of Complete System.

2.2.7.2 The unit price of the various items shall include the following:

- a. All equipment, machinery, apparatus and materials required as well as the cost of any tests, which the consultant/Purchaser may ask for in addition to the tests generally required to prove quality and performance of equipment.
- b. All the labour required to supply and install the complete installation in accordance with the specifications.
- c. Use of any tools, equipment, machinery, lifting tackle, scaffolding, ladders etc. required by the contractor to carry out his work.
- d. All the necessary measures to prevent the transmission of vibration.
- e. The necessary material to isolate equipment foundations from the building structure, wherever necessary.
- f. Storage and insurance of all equipment apparatus and materials.

2.2.7.3 The contractor's unit price shall include all equipment, apparatus (like drilling machine, welding machine, cutting set, lock forming machine, etc.), material (like nut-bolts, gaskets, supports, fasteners, consumables etc.) and labor indicated in the drawings and/or specifications in conjunction with the item in question, as well as all additional equipment, apparatus, material and labor usual and necessary to make in question on its own (and within the system as a whole) complete even though not specifically shown, described or otherwise referred to.

2.2.7.4 Measurements of Sheet Metal Ducts, grilles / Diffusers etc.

A. Sheet Metal Ducts:

1. All duct measurements shall be carried out as per actual outer duct surface area including bends, tees, reducers, collars, vanes and other fittings. Gaskets, nuts, bolts, vibration rotation pads are included in the basic duct items of the BOQ.
2. The unit of measurements shall be the finished sheet metal surface area in square meters. No. extra shall be allowed for laps and wastage.

3. All the guide vanes, deflectors in duct elbows, branches, grille collars, quadrant dampers etc. shall be measured for actual sheet surface and paid for at the same rate as duct of same thickness.
4. The unit duct price shall include all the duct hangers and supports, exposing of concrete reinforcement for supports and making good of the same as well as any materials and labor required to complete the duct frame and installation of same.

B. Grilles / Diffusers / Fire Dampers/Duct Dampers:

Grilles/Diffusers shall be measured as follows:

1. All measurements of grilles/diffusers shall be the actual outlet size excluding the outer flanges.
2. The square or rectangular grilles / diffusers shall be measured in plain SQ.M.
3. All round diffusers shall be measured by their diameters.
4. All linear grilles / diffusers shall be measured as per actual length in meters.

C. Measurements of Piping, fittings Valves, Fabricated items

Pipe: (Including water piping, steam piping, oil piping, IP gas piping, air piping, vacuum piping) etc.

1. All pipes shall be measured in linear meter (to the nearest cm) along the axis of the pipes and rates shall be inclusive of all fittings e.g. Tees, bends, reducers, elbows etc. Deductions shall be made for valves in the line.
2. Exposing reinforcement in wall and ceiling and floors of possible and making good the same or installing anchor fasteners and inclusive of all items as specified in specifications and schedule of quantities.
3. Rates quoted shall be inclusive of providing and fixing vibration pads and wooden blocks, wherever specified or required by the project coordinator.
4. Flexible connections, wherever required or specified shall be measured as part of straight length of same diameter, with no additional allowance being made for providing the same.
5. The length of the pipe for the purpose of payment will be taken through the centerline of the pipe and all fittings (e.g. Tees, bends, reducers, elbows, hangers, structural supports etc.) as through the fittings are also presumed to be pipe lengths. Nothing extra whatsoever will be paid for over and above for the fittings for valves and flanges, section 3.2 below applies. Rate quoted shall be inclusive of all supports; hangers etc. and no additional measurement would be taken.

D. Measurement of Duct & Pipe Insulation

1. Duct Insulation:

Duct Insulation shall be measured along the axis of the duct and the length so measured shall be multiplied by outer perimeter of insulated duct.

2. Pipe Insulation:

Pipe Insulation will be measured along the axis of the pipe and no extra allowance will be given for insulated valves & fittings.

2.2.8 APPROVED MAKES

LIST OF APPROVED MAKES - ENGINEERING WORKS		
S.NO	ITEM	DETAILS
1	MS Piping	Tata/Jindal
2	Flow Switch	System Sensor/Potter/Rossmount
3	Butterfly valve	Audco/Honeywell/Advance
4	Fire Dedectors	Ravel/Honeywell/Cooper/Apollo
5	Manual Call Station	Ravel/Honeywell/Cooper/Apollo
6	Horn/Strobe	Ravel/Honeywell/Cooper/Apollo
7	GI Sheets	Jindal/TATA/SAIL
8	Grilles/Fire Damper/Diffuser	Caryaire / System Air/ Ruskin
9	Duct Insulation (Nitrile Rubber)	Armaflex / Kflex
10	Split Units	Daikin / Hitachi / O General / Carrier
11	EPABX	Avaya OS 500 / Aastra BP250 / NEC SL1000
12	Network Switches	AT-GS 950/24 or Cisco 2960x ts-l
13	Network Racks	Netrack/APW/Rittal
14	Networking cables & Accessories	Systimax/Corning/seimon
15	Digital Telephone Instrument	Avaya/Aastra/NEC (Same make as EPABX)
16	WIFI Router	Cisco/Aruba
17	Switches & Sockets	Anchor Roma/Legrand
18	Copper wires / Cables	Havell's/Finolex/Polycab
19	Distribution board	Havells/Scheinder/Legrand
20	MCB	Havells/Scheinder/Legrand
21	Light fixtures	CG/Havells/Wipro
22	UPS	Legrand / APC / Numeric

Note: For any other item required to be incorporated, prior approval required from Employer.

2.2.9 PREAMBLE TO SCHEDULE OF QUANTITIES

GENERAL NOTES

- The Bill of Quantities shall be read in conjunction with the Instructions to Bidders, General and Special Conditions of Contract. Specification and Drawings.
- The quantities given in the Bill of Quantities are approximate and are given to provide a common basis for bidding. It shall be definitely understood that these are the estimated quantities only and are liable to alteration by omission, deductions or additions at the discretion of the Owner without affecting the Terms of Contract. The basis of payment shall however, be the actual quantities of work executed at site as

measured by the Contractor and verified by the Consultant valued at the awarded rates and prices. No claim whatsoever shall be entertained due to variations in quantities.

- The rates and prices in the priced Bill of Quantities shall, except, insofar as it is otherwise provided under the Contract, include all Constructional Plant, labour, supervision, materials, erection, maintenance, insurance, profit, taxes and duties, together with all general risks, liabilities and obligations set out or implied in the Contract.
- A rate or price shall be entered against each item in the priced Bill of Quantities, whether quantities are stated or not. The cost of Items against which the Contractor has failed to enter a rate or price shall be deemed to be covered by other rates and prices entered in the Bill of Quantities.
- The whole cost of complying with the provisions of the Contract shall be included in the items provided in the priced Bill of Quantities, and where no items are provided the cost shall be deemed to be distributed among the rates and prices entered for the related items of Work.
- General directions and descriptions of work and material are not necessarily repeated nor summarized in the Bill of Quantities. Reference to the relevant sections of the Contract documenting shall be made before entering prices against each item in the priced Bill of Quantities.
- The method of measurement of completed work for payment shall be in accordance with the modes stipulated in the Bill of Quantities and specification.
- Errors will be corrected by the Consultant for the arithmetic errors in computation or summation as follows: -
 - Where there is a discrepancy between amount in figures and in words, the amount in words will govern.
 - Where there is a discrepancy between the unit rate and the total amount derived from the multiplier of the unit price and the quantity, the unit rate quoted will govern, unless in the opinion of Consultant, there is an obviously gross misplacement of the decimal point in the unit price in which the total amount as quoted will govern and the rate will be corrected

PS: THESE NOTES SHALL BE READ ALONG WITH THE COMMON SPECIFICATIONS AND THE DETAILED ITEM SPECIFICATIONS:

Unless otherwise specified, the rates quoted for all items shall include the cost of following.

- Cost of all materials, fabrication, transportation and labor.
- Work at all levels, heights and locations.
- Providing and removing scaffolding, platforms, ladders.
- Fixing with necessary Plugs and chrome plated brass screws and /or anchor fasteners/bolts as directed either in masonry or in concrete opening.
- Breaking the floor/concrete slab to fix frames, floor springs, etc and making of smooth surface.
- Protecting the sections with tape and or grease from cement.
- Unless otherwise specified sections shall be powder coated finish to a minimum thickness of 40 micron.
- Clips Gaskets for sealing the weather strips.

- Door shutter shall consist of concealed mortise locks of approved make, concealed tower bolts, locking arrangements and peg stays.
- Cleaning the frames, Glass grills and floor and leaving the premises clean and tidy.
- Providing flawless glass without waviness, bubbles, scratches, etc;
- Receiving all materials at site, unloading and storing.
- Hire charges for necessary hoisting equipments like crane, chain pulley blocks, derricks, winches, screw jacks, hooks, wire ropes, etc;
- All necessary fixtures like anchor fasteners, bolts, washers and nuts.
- Approved quality welding electrodes.
- Welding at all heights, levels, conditions and situations.
- Cost of safety belts, goggles, helmets and other necessary safety equipments.
- Preparing the surfaces for painting and also for welding.
- Cost of fabrication and supports for erection of panels pass boxes etc.
- Painting with two coats of primer and topcoats to the supporting members.

SECTION - III

General Instruction to Bidders

1. Instruction to Bidders

- 1.1 The bids are invited on two stage bidding process basis. The bid will constitute of Technical bid and Financial bid. Technical bid and financial bid to be submitted in separate sealed envelope. Technical bid cover along with EMD cover & Financial bid cover should be kept in a separate single cover superscribing with tender reference number and item quoted. The technically qualified parties financial bid only be opened for financial evaluation.
- 1.2 The bid is invited for “Design, Supply, Installation, Commissioning, Testing and Documentation of Engineering Works at HBL Ticel Phase II Office, Taramani, Chennai” as per specification and other details given in the bid document. All bidders who qualify the eligibility conditions as detailed in the bid document are eligible to participate except in the case of firms who are blacklisted / barred by competent agencies or HLL in participation and award of such contracts.
- 1.3 Bidders can send their queries and clarifications to address given in clause 1.4, upto three days prior to the due date of bid submission. There is no bid document fee.
- 1.4 Bids shall be addressed in the name of **The Chief Executive Officer, HLL Biotech Limited, TICEL Bio-park Campus (Module no. 013-015), CSIR Road, Taramani, Chennai- 600 113 Contact No: 044 22544949/68.** Email: ceo@hllbiotech.com & sureshs@hllbiotech.com. Due date of submission of the bid will be on **12.06.2015 upto 15:00 Hrs.** The technical bid will be opened on the same day at **15:30 Hrs.** The financial bid of only those bidders who are qualifying the minimum eligibility criteria & technical specification will be opened. The date & time of financial bid opening shall be intimated separately to the technically qualified parties.
- 1.5 Bids shall be valid for 120 days from the date of opening.
- 1.6 The bids should contain complete technical specification along with detailed illustrations and diagrams (if any) to facilitate evaluation.

2. Mode of submission of Bids

Documents to prove the eligibility criteria should be submitted in a separate sealed envelope marked “Technical Bid”.

I. Technical bid should consist of the following:

- a. **EMD (Earnest Money Deposit)** in the form of crossed **demand draft/ banker’s cheque** in favor of “HLL Biotech Limited” payable at Chennai, has to be submitted separately as per the value mentioned in section-I, NIT, which shall be valid for 90 days from the date of tender opening or in the form of **Bank Guarantee from any scheduled Commercial bank** which shall be valid for 45 days beyond the validity period of tender i.e 165 days.

MSE units who are registered and also will continue to remain registered during the tender validity period with NSIC are exempted from payment of Bid security (EMD) and other benefits as applicable, but authenticated copy of the valid **NSIC certificate** for tendered item(s) should be submitted along with Technical bid of the Tender to qualify for such exemptions and other benefits.

- b. Bid document bearing signature and seal of the bidder in all pages
- c. **Section: II** (Scope of Work, Technical specification, technical brochures/datasheets/drawings/Model no)
- d. **Section: V** (Bid Data sheet)
- e. **Section: VI** (Past experience, including performance certificate from clients).

All other supporting documents (mentioned in section II, clause 3) and certificates substantiating the bidder's eligibility shall be attached.

II. The financial bid should contain the following

The financial bid should be put in a separate envelope, sealed and marked "Financial Bid".

- a. **Section: VII** (Bid form) – duly filled, stamped and signed.
- b. **Section: VIII** (Price Schedule - Financial bid in the prescribed format given in the bid document) - duly filled, stamped and signed.

2.1 The bids shall be enclosed in a sealed envelope super scribing "**Tender for Design, Supply, Installation, Commissioning, Testing and Documentation of Engineering Works at HBL Ticel Phase II Office, Taramani, Chennai, tender ref no. HBL/TD/ADMIN/OFF-II/ENGG_WORKS/15-16/02 dtd 02.06.2015**" and shall be addressed to the,

**HLL Biotech Limited,
TICEL Biopark Campus (Module no. 013-015),
CSIR Road, Taramani, Chennai- 600 113
Contact No: 044 22544949/72, Fax: 044 22540101.**

Note: The Bidder can send the Bid Document by Courier to our address mentioned in the Tender Document or directly drop the same in the Tender Box kept in HBL office reception. It is the responsibility of the bidder to take an acknowledgment from HBL, when the bid document is dropped in the tender box in person.

2.2 Any bid received after the stipulated time period shall be considered as **late tender** and will be rejected.

3. **Minimum Eligibility Criteria**

- a. Net worth of the company shall be positive during the last three financial years. **The balance sheet , profit and loss account for last three financial years (FY2011-12, FY 2012-13, FY 2013-14) certified by a Chartered Accountant shall be submitted.**

- b. Turnover of the company minimum Rs.1.5 Millions in the last 3 Financial years.
- c. The bidder should have successfully designed and executed atleast 5 similar projects in the last 5 financial years covering Design, Supply, Installation, Commissioning, Testing and Documentation.
- d. The bidder should have executed during the last 5 years ending the last day of the month of May'2015.
“at least three projects, of worth not less than INR 1.14 Million each”
(or)
Two projects worth not less than INR 1.44 Million each
(or)
a single project of worth not less than INR 2.30 Million
(The work order and completion certificates should be attached)

4. Country of Origin

4.1 Deleted

5. Bid Evaluation

Bid determined to be substantially responsive will be checked by HBL for any arithmetic errors and the same will be corrected as follows:

- a. Where there is a discrepancy between the rates in figures and in words, the rates in words will prevail.
- b. Where there is a discrepancy between the unit price and the total price resulting from the multiplying the unit price by the quantity, the unit price as quoted shall prevail.
- c. The tenderer supplying indigenous goods or already imported goods shall quote only in Indian Rupees.

6. Tender Price & Documents

I. Prices in the corresponding price schedule shall be entered separately in the following manner:

- a) The price of the goods should be quoted on FOR Consignee Site basis with the detailed breakup of ex-factory/ ex-showroom/ ex-warehouse/ off-the-shelf, as applicable, including all taxes and duties like sales tax, CST/VAT, CENVAT, Custom Duty, Excise Duty etc. already paid or payable on the components and raw material used in the manufacture or assembly of the goods quoted ex-factory etc. or on the previously imported goods of foreign origin quoted ex-showroom etc;
- b) Any sales or other taxes and any duties including excise duty, which will be payable on the goods in India, if the contract is awarded.

- c) Charges towards Packing & Forwarding, Inland Transportation, Insurance (local transportation and storage) would be borne by the Supplier from ware house to the consignee site for a period including 3 months beyond date of delivery, Loading/Unloading and other local costs incidental to delivery of the goods to their final destination as specified in the List of Requirements and Price Schedule.

Documents:

Within 24 hours of despatch, the supplier shall notify the purchaser/consignee, and others concerned if mentioned in the contract, the complete details of despatch and also supply the following documents to be submitted as per the instruction of purchaser:

- I. Along with the original invoice, two copies of supplier's invoice showing contract number, goods description, quantity, unit price and total amount.
- II. Two copies of packing list identifying contents of each package.
- III. Inspection certificate issued by the nominated Inspection agency, if any.
- IV. Insurance Certificate
- V. Manufacturers/Supplier's warranty certificate & In-house inspection certificate (wherever required)

7. Exemptions/Forms

- I. No exemption certificate will be provided by the consignees for customs duty, central Excise duty etc.
- II. C' Form will be issued for the interstate sales

8. Rejection of bids

Notwithstanding the above conditions, HBL reserves the right to accept or reject any offer, and to annul the tender process and reject all offers, at any time prior to award of Contract without thereby incurring any liability to the affected Bidder or Bidders or any obligations to inform the affected Bidder or Bidders of the grounds for HBL's action.

9. Notification of Award

- 9.1 Prior to the expiry of the period of offer validity prescribed by HBL, HBL will notify the successful Bidder by Tele-fax or e-mail, to be confirmed in writing by registered post/ by courier, that his offer has been accepted. The purchase order will be issued to the successful bidder. No correspondence will be entertained by HBL from the unsuccessful Bidders.
- 9.2 Upon selection of the successful bidder (technically qualified L1 party) HBL will promptly notify the same to successful Bidder through an LOI/Purchase Order.

- 9.3 EMD's of unsuccessful bidders will be returned only after finalizing the L1 Party and EMD's of technically non-responsive bidders will be returned after financial bid opening.
- 9.4 **Paying Authority:** The payment for the supplies of stores / goods / equipment which including agency commission, turnkey, installation and commissioning and any other payment mentioned in the tender enquiry will be made by "HLL Biotech Limited".

SECTION - IV

TERMS AND CONDITIONS

1. DEFINITION:

- 1.1 For the purpose of this contract, the following words and expressions shall have the meaning hereby assigned to them except where the context otherwise requires:-
- i. "HBL" means HLL Biotech Limited, which expression shall unless excluded by or repugnant to the context include HBL's representative.
 - ii. "Consignee" means the organization/person to whom the goods are required to be delivered as specified in the Contract. If the goods are required to be delivered to a person as an interim consignee for the purpose of despatch to another person as provided in the Contract then that "another" person is the consignee, also known as ultimate consignee. Consignee is BCGVL, Guindy"Contractor/ Bidder" Means successful lowest bidder.
 - iii. "Earnest Money Deposit" (EMD) means Bid Security/ monetary or financial guarantee to be furnished by a tenderer along with its tender.
 - iv. "Performance Security" means monetary or financial guarantee to be furnished by the successful tenderer for due performance of the contract placed on it. Performance Security is also known as Security Deposit.

2. PAYMENT SCHEDULE:

a) Advance

An advance of 20% of the contract value shall be released against Bank guarantee equivalent to 110% of the advance amount and submission of 10 % of the contract value as Security Deposit/ Performance Security in the form of Bank Guarantee from any scheduled commercial bank. The advance bank guarantee shall be valid for a period upto the completion of the contract.

Payment shall be made within 15 days as specified in the contract in the following manner:

- b) 60 % of the contract price shall be paid on receipt of goods in good condition and upon the submission of the following documents :
- (i) Along with the original invoice, Two copies of supplier's invoice showing contract number, goods description, quantity, unit price and total amount;
 - (ii) Consignee Receipt Certificate as per Annexure IV in original issued by the authorized representative of the consignee;
 - (iii) Two copies of packing list identifying contents of each package;

- (iv) Despatch Clearance from Purchaser or authorized agent
- (v) Inspection certificate issued by the nominated Inspection agency, if any.
- (vi) Insurance Certificate
- (vii) Test/calibration certificate (if any)

c) On Final Acceptance Certificate issued by Client/ Purchaser:

Balance 20 % payment would be made against 'Final Acceptance Certificate' as per the proforma mentioned in Annexure VI of this tender document to be issued by the consignee/ purchaser subject to recoveries, if any, either on account of non-rectification of defects/deficiencies not attended by the Supplier or otherwise.

Payment for services:

In case of separate service order issued to the vendor, the payment terms shall be as below.

- a) 50% of service order value against installation
- b) 30% of service order value against commissioning
- c) Balance 20% of service order value against Final Acceptance Certificate Purchaser

3. TAXES AND OTHER LEVIES

The quoted price shall be inclusive of all applicable taxes and duties.

- I. However pursuant to the constitution (forty-sixth amendment) Act, 1982, if any further tax or levy is imposed by statute, after the last date of receipt of tenders, and the contracts thereupon necessarily and properly pays such taxes/levies, the contractor shall be reimbursed the amount so paid, provided such payment, if any, is not in the opinion of the Engineer-in-charge (whose decision shall be final and binding) be attributable to delay in execution of work within the control of the contractor.
- II. In case of statutory variation in regard to taxes/levies, within the stipulated date of completion of individual agreement, the same shall be paid or recovered as per the actual against documentary proof. However beyond this period HBL will take advantage of any reduction in taxes/levies but will not pay extra on account of increase in taxes/levies.

4. PERFORMANCE SECURITY

- 4.1 The successful bidder has to furnish performance guarantee from any scheduled commercial bank in the form of a bank guarantee in the name of HLL Biotech Limited on receipt of Purchase order. The performance bank guarantee valid up to a period of 2 years (till completion of warranty) beyond the completion of work with additional claim period of 2 months (initially valid for a period of minimum 28

months from the date of Purchase Order) for 10% of total contract value (Purchase Order & Service Order value) has to be submitted within 15 days from the date of Purchase Order. The EMD Paid shall be returned after receipt of Performance Bank Guarantee.

4.2 Failure of the successful Bidder to furnish the required Performance Security shall constitute sufficient grounds for the annulment of the award of Contract and shall forfeit the EMD. The Purchaser/Consignee will release the Performance Security without any interest to the supplier on completion of the supplier's all contractual obligations including the warranty obligations & after receipt of bank guarantee for CMC security.

4.3 Forfeiture of Performance Security

In case, the Contractor/ Bidder fails to complete the work, HBL, without prejudice to rights and remedies available under the contract, shall forfeit and en-cash the Performance Guarantee.

4.4 In case, the bank goes in liquidation or for any reason is unable to make payment against the said Bank Guarantee, the loss caused thereby shall be borne by the Contractor/ Bidder. The Contractor/ Bidder forthwith, on demand from HBL, shall make good the deficit.

5. ADDITIONS/DELETIONS

5.1 HBL shall have the right to direct in writing for changes, additions, modifications or deletions in the design and drawings or any part of the work and to request in writing additional work in connection therewith and the Contractor/ Bidder shall comply with such directions.

5.2 The Contractor/ Bidder shall not make any deviations, alterations, additions, to or omissions from the work shown/described and awarded to the Contractor/ Bidder except through and with proper approval of HBL.

6. TIME SCHEDULE

6.1. The day of commencement of project will be reckoned from the date of issue of Purchase order.

6.2 The Furnishing work should be completed within **45 days** from the date of issue of purchase order.

6.3 The Final Acceptance Certificate shall be issued on completion of the entire scope of work by the vendor.

6.4 The work shall be carried out with all due diligence and as per the time schedule specified above. In case of any delay/default, of the Contractor/ Bidder to adhere to the agreed time schedule. HBL shall recover the liquidated damages from the Contractor/ Bidder at the rate of 0.5% (Zero point Five percent) of the total amount of fee per week of delay of any activity subject to a maximum of 5% (Five percent) of the total order value. However if there is a purposeful delay by the Contractor/ Bidder, HBL reserves all rights to terminate the contract and get the full work executed at his risk and cost.

7. EXTENSION OF TIME

- 7.1 To adhere to the above mentioned time schedule the Contractor/ Bidder shall provide on demand necessary documents, information and certificates/undertakings to HBL. Any delay in supplying the requisite documents and delay due to any other cause beyond the control of the Contractor/ Bidder shall be considered for grant of extension of time. If the Contractor/ Bidder require extension of time, they shall intimate in writing to HBL within 3 days of the occurrence of such hindrance/delay, along with proper documents.
- 7.2 HBL after satisfying itself about the reasonableness of grounds may grant extension of time, if it is justified and communicated the same in writing. Whenever such extension of time is granted, it would be without prejudice to the rights of HBL for any penal action to the extent of the delay attributable to the Contractor/ Bidder. Any extension of time granted as stated above shall neither entitle the Contractor/ Bidder to any claim for increase in their fees nor shall it release him from any of the obligations under the said agreement.

8. ABANDONMENT OF WORK

- 8.1 If the Contractor/ Bidder/ supplier abandons the work for any reason whatsoever or becomes incapacitated as aforesaid, HBL shall forfeit/en-cash the Performance Guarantee. HBL shall be at liberty to make full use of all or any of material supplied by the Contractor/ Bidder/ supplier. The Contractor/ Bidder/ supplier shall also be liable to refund all the charges paid to him up to date plus such damages as may be assessed by HBL including the recovery of liquidated damages.
- 8.2 Provided, however, that in the event of the termination of the agreement under proper notice as provided in the clause hereinafter, the Contractor/ Bidder shall be liable to refund any excess payment made to him over and above which is due to him in accordance with the terms of this agreement, for the work executed by him till the date of termination of agreement.

9. WARRANTY

- 9.1 The bidder shall give comprehensive warranty of all the equipment which includes testing as per technical/ service /operational manual of the manufacturer, labour and spares for a period of minimum Two Years (24 months) from the date of final acceptance certificate from HBL. HBL shall grant right of access to the Contractor/ Bidder, of this portion of the work claimed to be defective for inspection and rectification.
- 9.2 HBL may recover the loss from the dues of the Contractor/ Bidder in case of failure to comply with the above clause.

10. DETERMINATION AND RESCISSION OF TERMS & CONDITIONS

- 10.1. When the Contractor/ Bidder have made himself liable for action under any of the clauses aforesaid, HBL shall have powers:
- To rescind the agreement.
 - To engage another Contractor/ Bidder to carry out the balance work debiting the Contractor/ Bidder the extra amount, if any, so spent for getting the balance work done. This amount would be in addition to the recovery of liquidated damages.

11. GENERAL

- 11.1 The Contractor/ Bidder shall be fully responsible for the technical soundness of the material and also ensure that the material is supplied as per the specifications.
- 11.2 The Contractor/ Bidder hereby agrees that the charges to be paid as provided herein will be in full discharge of functions to be performed by him and no claim whatsoever shall be made against HBL in respect of any proprietary rights or copy right on the part of any other party relating to plans, models and drawings.
- 11.3 The Contractor/ Bidder shall indemnify and keep indemnified HLL Biotech Ltd against any such claims and all costs and expenses paid by HBL in defending such claims to be borne by the Contractor/ Bidder.
- 11.4 The Contractor/ Bidder hereby agrees that HBL shall have the right to take out any of the activities, which in the opinion of HBL is not being performed by the Contractor/ Bidder with due diligence, and within the agreed time schedule, and which can be performed independently. The fees or the expenses incurred shall be debited to the Contractor/ Bidder.

12. ARBITRATION

If any dispute, difference, question or disagreement arises between the parties hereto or their respective representatives at any time in connection with construction, meaning, operation, effect, interpretation or out of the contract or breach thereof, the parties shall seek to resolve such a dispute or difference by mutual consultation within a period of 30 days from the date on which the party raising the dispute, first communicated the same in writing to the other party. The existing directions, classifications, measurements, drawings and certificates of the Employer shall be final and binding upon the contractor during the progress of the works and shall not be set aside on account of non-observance of any formality, any omission, delay or error in proceeding in or about the same or on any other ground or for any reason.

In case the dispute is not settled by mutual consultation, then either party may refer the same to Arbitration by an Arbitral Tribunal consisting of three arbitrators. Each party shall appoint an arbitrator and the arbitrators so appointed shall appoint a third arbitrator who will act as presiding arbitrator.

The reference to arbitrator shall specify the matters which are in question, dispute or difference and only such dispute or differences of which the demand has been made be referred to arbitration. Notwithstanding the reference to arbitration, the contractor shall continue to duly perform his obligations under the contract.

The Award of the Arbitral Tribunal shall be final, conclusive and binding on the parties. The Arbitration shall be conducted in accordance with the provisions of Arbitration and Conciliation Act, 1996. The venue of the arbitration shall be at Chennai. The fees of the arbitrators shall be borne by the parties nominating them and the fee of the Presiding Arbitrator, costs and other expenses incidental to the arbitration proceedings shall be borne equally by the parties.

The place of Arbitration is at Chennai.

SECTION- V
BID DATA SHEET

S.No	Description	Details
1.	Bid reference number	HBL/TD/ADMIN/OFF-II/ENGG_WORKS/15-16/02 dated 02.06.2015
2.	Name & Address of bidder	
3.	Year of establishment	
4.	Type of the firm	Public Ltd/Pvt Ltd./Partnership/Regd firm
5.	Name & Address of Manufacturer	
6.	Bank Account details	
7.	PAN Number	
8.	Contact person name & Designation	1. 2.
9.	Mobile Number	1. 2.
10.	Email	1. 2.
11.	Contact Phone-Office	
12.	Fax number	

SECTION- VI
DETAILS OF CLIENTS/PROJECTS

The details of similar works completed in the last five (5) years.

Sl. No.	Name and address of the Client	Project Details		Completion Date
		Details of the items supplied	Order Value Rs. Lakhs	
1				
2				
3				
4				
5				
6				

Satisfactory completion certificate from the client to be attached.

SECTION - VII

BID REF No: HBL/TD/ADMIN/OFF-II/ENGG_WORKS/15-16/02 dtd 02.06.2015
BID FORM

(Item –wise separately to be enclosed)

Item:.....

Having examined the bidding documents, including amendments of which is hereby acknowledged, we, the undersigned, offer to execute the contract including the supply and service of the goods (FOR HBL Site) in full conformity with the said bidding documents for the sum of:

In Fig:
IN WORDS

(Hereinafter called “the Total Bid Price”) or such other sums as may be determined in accordance with the terms and conditions of the Contract. The above amounts are in accordance with the Price Schedules attached herewith and are made part of this bid.

We undertake, if our bid is accepted, to execute the contract in accordance with the delivery schedule specified in the schedule of requirements.

If our bid is accepted, we undertake to provide a performance security in the form, in the amounts, and within the times specified in the Bidding Documents.

We agree to abide by this bid, for the Bid Validity Period specified in the Tender Enquiry Document and it shall remain binding upon us and may be accepted by you at any time before the expiration of that period.

Until the formal final Contract is prepared and executed between us, this bid, together with your written acceptance of the bid and your notification of award, shall constitute a binding Contract between us. We understand that you are not bound to accept the lowest or any bid you may receive.

Dated:

Signed by:
In the capacity of

SECTION VIII
PRICE SCHEDULE

Refer Annexure – VI BOQ attached

NOTE: -

1. If there is a discrepancy between the unit price and total price, then the unit price shall prevail.
2. No exemption certificate will be provided for excise duty/Customs duty etc.,
3. C'Form Shall be provided for interstate sales
3. The quoted price should include all technical specifications in the date sheet.

Unit price shall be written in figures and words

Total Tender price in Rupees: _____

IN WORDS:

Name : _____

Business Address: _____

Place : _____

Date : _____

Signature of Tenderer : _____

Seal of the Tenderer : _____

**SECTION –IX
CHECKLIST**

NAME OF TENDERER:

NAME OF MANUFACTURER:

SI No.	Activity	Yes/ No/ NA	Page No. in the TENDER document	Remarks
1. a.	Have you enclosed EMD (Amount & Validity) of required amount for the quoted schedules?			
2. a.	Have you enclosed duly filled Bid Form as per format in Section VII?			
b.	Have you enclosed Power of Attorney in favour of the signatory?			
3.	Are you a SSI unit, if yes have you enclosed certificate of registration issued by Directorate of Industries/NSIC			
4. a.	Have you enclosed clause-by-clause technical compliance statement for the quoted goods vis-à-vis the as per Scope of Work Section II?			
b.	In case of Technical deviations in the compliance statement, have you identified and marked the deviations?			
5. a.	Have you submitted copy of the purchase/work orders and successful completion certificate from the previous clients for the supply & installation of similar equipment in last 5 years for which bid is submitted?			
6.	Deleted			
7.	Have you submitted rates in the Price Schedule for BOQ as per Section VIII?			
8.	Have you kept validity of 120 days from the Technical bid Opening date as per the TE document?			
9.	Have you fully accepted payment terms as per TE document?			
10.	Have you fully accepted delivery period as per TE document?			
11.	Have you submitted the certificate of origin if any			
12.	Have you accepted the warranty as per TE document?			
13.	Have you accepted terms and conditions of TE document?			

SI No.	Activity	Yes/ No/ NA	Page No. in the TENDER document	Remarks
14.	Have you furnished documents establishing your minimum eligibility criteria (Section III, clause 3) as per TE documents?			
15.	Have you furnished Annual Report (Balance Sheet and Profit & Loss Account) for last three years prior to the date of Tender opening?			
16.	Have you furnished latest IT return (FY 2013-14)?			
17.	Have you furnished Copy of MOA/partnership deed/Registration?			
18.	Have you furnished copy of PAN card?			
19.	Have you enclosed the TE document duly stamped and signed in all the pages?			
20.	Have you enclosed the Bid Data Sheet Duly filled, stamped and signed?			

N.B.

1. All pages of the Tender should be page numbered and indexed.
2. The Tenderer may go through the checklist and ensure that all the documents/confirmations listed above are enclosed in the tender and no column is left blank. If any column is not applicable, it may be filled up as NA.
2. It is the responsibility of tendered to go through the TE document to ensure furnishing all required documents in addition to above, if any.

(Signature with date)

(Full name, designation & address of the person duly authorised sign on behalf of the Tenderer)
For and on behalf of

(Name, address and stamp of the tendering firm)

SECTION - X
SCHEDULE OF FISCAL ASPECTS

S No.	Particulars	Description
1	Submission of completed Tender	On or before 12/06/2015 at 15:00 Hrs
2	Opening of Technical Bid	12/06/2015 at 15:30 Hrs
3	Time period for Completion	The Design, Supply, Installation, Commissioning, Testing and Documentation should be completed within 45 days from the date of issue of purchase order.
4	Payment terms	Refer Section IV, Clause 2
5	Liquidated damages per week	0.5% per week inclusive of Sundays & Holidays upto a maximum of 5% of Contract Value
6	Warranty Period	24 (Twenty Four) months from the date of Completion and Final Acceptance Certificate
7	Earnest Money Deposit	Rs.57,500/- (Rupees Fifteen Thousand and Five Hundred Only)
8	Refund of Earnest Money Deposit to unsuccessful bidders	On award of contract to successful bidder
9	Transportation & Insurance	On account of Contractor
10	B.G/ DD to be in favor of	HLL Biotech Ltd., Chennai
11	All queries / communication to be addressed to	The Chief Executive Officer, HLL Biotech Limited, Ticel Biopark Campus (Module no. 013-015), CSIR Road, Taramani, Chennai- 600 113 Email: ceo@hlbiotech.com , sureshs@hlbiotech.com , Contact No: 044 22544949-78, Fax – 044 22540101
(Contractor)		(Employer)

ANNEXURES

Annexure - I

BANK GUARANTEE FORM FOR EMD

Whereas _____ (hereinafter called the "Tenderer") has submitted its quotation dated _____ for the supply of _____ (hereinafter called the "tender") against the purchaser's tender enquiry No. _____ Know all persons by these presents that we _____ of _____ (Hereinafter called the "Bank") having our registered office at _____ are bound unto _____ (hereinafter called the "Purchaser) in the sum of _____ for which payment will and truly to be made to the said Purchaser, the Bank binds itself, its successors and assigns by these presents. Sealed with the Common Seal of the said Bank this _____ day of _____ 20____. The conditions of this obligation are:

1. If the Tenderer withdraws or amends, impairs or derogates from the tender in any respect within the period of validity of this tender.
2. If the Tenderer having been notified of the acceptance of his tender by the Purchaser during the period of its validity:-
 - a. fails or refuses to furnish the performance security for the due performance of the contract.
Or
 - b. fails or refuses to accept/execute the contract.
Or
 - c. if it comes to notice that the information/documents furnished in its tender is incorrect, false, misleading or forged

We undertake to pay the Purchaser up to the above amount upon receipt of its first written demand, without the Purchaser having to substantiate its demand, provided that in its demand the Purchaser will note that the amount claimed by it is due to it owing to the occurrence of one or both the two conditions, specifying the occurred condition(s).

This guarantee will remain in force for a period of forty-five days after the period of tender validity and any demand in respect thereof should reach the Bank not later than the above date.

(Signature of the authorised officer of the Bank)

Name and designation of the officer

Seal, name & address of the Bank and address of the Branch

Annexure - III

BANK GUARANTEE FORM FOR PERFORMANCE SECURITY (ON NON JUDICIAL PAPER OF APPROPRIATE VALUE)

**To
HLL Biotech Limited**

1. In consideration of HLL Biotech Limited (hereinafter called "HBL") having agreed under the terms and conditions of Order No..... dated..... made between (Here in after called "the said contractor(s)") for the work (herein after called "the said agreement") for compliance of his obligation in accordance with the terms and conditions in the said agreement.

We (indicate the name of the Bank) (Herein after referred to as "Bank") hereby undertake to pay to the HBL and amount not exceeding Rs..... (Rupees..... only) on demand by HBL.

2. We (Indicate the name of the Bank) do hereby undertake to pay the amount due and payable under this Guarantee without any demure, merely on a demand from HBL stating that the amount claimed is required to meet the recoveries due or likely to be due from the said contractor(s). 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..... (Rupees..... only).

3. We undertake to pay to HBL 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 made by us under this guarantee shall be valid discharge of our liability for payment to thereunder and the contractor(s) shall have no claim against us making such payment.

4. We (Indicate the name of Bank) further agree that the guarantee 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 HBL under or by virtue of the said agreement have been fully paid and its claims satisfied or discharged or till Engineer-in-charge on behalf of HBL Certified that the terms and conditions of the said Agreement have been fully and properly carried out by the said contractor(s) accordingly discharges this guarantee.

5. We..... (Indicate the name of Bank) further agree with HBL that HBL shall have the fullest liberty without our consent and without affecting any manner our obligations hereunder to vary any of the terms and conditions of the said agreement or to extend time of performance by the said contractor(s) from time to time or to postpone for any of the powers exercisable by HBL against the said contractor(s) and to forebear or enforce any of the terms and conditions relating to the said agreement we shall not be relieved from our liability by reasons of any such variation or extension being granted to the said contractor(s) or for any forbearance act of omission on that part of the HBL or any indulgence by HBL to the said contract(s) or by any such matter or thing whatsoever which under the law relating to sureties would, but for this provision, have effected or so relieving us.

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

7. We..... (indicate the name of Bank) lastly undertake not to revoke this guarantee except with the previous consent of HBL in writing.

8. This guarantee shall be valid up to unless extended on demand by HBL. Notwithstanding anything mentioned above our liability against this Guarantee is restricted to Rs..... (Rupees.....only) and unless a claim in writing is lodged with us within six months of the date of expiry or the extended date of expiry of this guarantee, all our liabilities under the Guarantee shall stand discharged.

Dated the day of 20....

For
(Indicate the name of Bank)

Annexure – IV
BANK GUARANTEE FORM FOR ADVANCE
(ON NON JUDICIAL PAPER OF APPROPRIATE VALUE)

Ref.....

Date.....

Bank Guarantee No....

To

HLL Biotech Ltd.,
Module 013-015,
Ticel Biopark Campus,
CSIR Road, Taramani,
Chennai – 600 113.

Dear Sirs,

In consideration of the HLL Biotech Ltd., hereinafter referred to as 'HBL', which expression shall unless repugnant to the context or meaning thereof include its successors, executors, administrators and assigns, having awarded to M/s. _____ having its registered office at _____

hereinafter referred as the 'Contractor', which expression shall unless repugnant to the context or meaning thereof, include its successors, Administrators, executors and assigns, a contract hereinafter referred to as the 'Order' for _____ referred to as the 'works' on terms and conditions set out, inter-alia in the HBL's Order No. _____ dated _____ valued _____ at _____ (in words & figures) and as the HBL having agreed to make a payment against the above ORDER, to the Contractor amounting to Rs. _____ (in words & figures) as an advance against Bank Guarantee to be furnished by the Contractor, the said advance to be adjusted against the Contract to be performed by the Contractor, we _____ hereinafter referred to as the 'Bank' which expressions shall, unless repugnant to the context or meaning thereof, include its successors, administrators, executors and assigns having our office at _____ do hereby undertake to give the irrevocable and unconditional guarantee and do hereby undertake to pay the HBL on first demand without any demur, reservation, contest recourse and protest and without reference to the Contractor any and all monies payable by the Contractor by reason of any breach by the said Contractor of any of the terms and conditions of the said order to the extent of Rs. _____ (in words & figures) till the said advance is adjusted as aforesaid at any time up to _____. We agree that the guarantee herein contained shall continue to be enforceable till the sum due to the HBL on account of the said advance is adjusted/recovered in full as aforesaid or till the HBL discharges this guarantee.

The HBL shall have the fullest liberty without affecting in any way the liability of the Bank under this guarantee, from time to time vary the advance or to extend the time for performance of the Contract by the Contractor. The Bank shall not be released from its liability under these presents by any exercise of the HBL of the liberty with reference to the matter aforesaid.

The HBL shall have the fullest liberty, without reference to Contractor and without affecting this guarantee to postpone for any time or from time to time the exercise of any powers vested in them or of any right which they might have against the Contractor, and to exercise the same at any time in any manner, and either to enforce or to forebear to enforce any power, covenants contained or implied in the order between the HBL

and the Contractor or any other course or remedy or security available to the HBL and the Bank shall not be released of its obligations under these presents by any exercise by the HBL of its liberty with reference to matters aforesaid or any of them or by reason of any other act or forbearance or other acts of omission or commission on the part of the HBL or any other indulgence shown by the HBL or by any other matter or thing whatsoever which under law would, but for this provision, have the effect of relieving the Bank Guarantee.

The right of HBL to recover the outstanding sum of advance with applicable costs up to Rs. _____ from the bank in the manner aforesaid will not be affected or suspended by reason of the fact that any dispute or disputes is or are pending before any officer, tribunal or court and any demand made by HBL on the Bank shall be conclusive and binding.

The Bank further undertakes not to revoke this guarantee during its currency without prior and written consent of the HBL and further agrees that the guarantee contained shall continue to be enforceable till the HBL discharges this guarantee.

The Bank also agrees that the HBL shall at its option is entitled to enforce this guarantee against the bank as principal debtors, in first instance, notwithstanding any other security or guarantee that HBL may have in relation to the Contractor's liabilities of the said advance.

Notwithstanding anything contained herein above, our liability under this guarantee is restricted to as Rs. _____ (in words & figures) and it will remain in force up to and including _____ (date of completion of Contract) and shall be extended from time to time for such periods as may be advised by M/s..... on whose behalf this guarantee has been given.

Therefore, we hereby affirm that we are guarantors and responsible to you on behalf of the Contractor up to a total amount of _____ (amount of guarantees in words and figures) and we undertake to pay you, upon your first written demand declaring the Contractor to be in default under the purchase order and without caveat or argument, any sum or sums within the limits of (amount of guarantee) as aforesaid, without your needing to prove or show grounds or reasons for your demand or the sum specified therein.

This Guarantee is valid until _____ day _____.

We have power to issue this guarantee in your favour under Memorandum and Articles of Association and the undersigned has full power to do under the Power of Attorney / Resolution of Board of Directors dated.....granted to him by the Bank.

Dated.....this.....day of.....2015

Place:

Signed by

(Person duly authorized by Bank)

Witness:

Annexure – IV
CONSIGNEE RECEIPT CERTIFICATE
(To be given by consignee's authorized representative)

The following store (s) has/have been received in good condition:

- 1) Contract No. & date : _____
- 2) Supplier's Name : _____
- 3) Consignee's Name & Address with telephone No. & Fax No. : _____
- 4) Name of the item supplied : _____
- 5) Quantity Supplied : _____
- 6) Date of Receipt by the Consignee : _____
- 7) Name and designation of Authorized Representative of Consignee : _____
- 8) Signature of Authorized Representative of Consignee with date : _____

Seal of the Consignee : _____

Annexure – V
Final Acceptance Certificate by the Consignee

No _____

Date _____

To
M/s _____

Subject: Certificate of commissioning of equipment/plant.

This is to certify that the equipment(s)/plant(s) as detailed below has/have been received in good conditions along with all the standard and special accessories and a set of spares (subject to remarks in Para no.02) in accordance with the contract/technical specifications. The same has been installed and commissioned.

- a) Contract No _____ dated _____
- b) Description of the equipment(s)/plants: _____
- c) Equipment(s)/ plant(s) nos.: _____
Quantity: _____
- d) Bill of Loading/Air Way Bill/Railway
Receipt/ Goods Consignment Note no _____ dated _____
- e) Name of the vessel/Transporter: _____
- f) Name of the Consignee: _____
- g) Date of commissioning and proving test: _____

Details of accessories/spares not yet supplied and recoveries to be made on that account.

S.No	Description of Item	Quantity	Amount to be recovered

The proving test has been done to our entire satisfaction and operators have been trained to operate the equipment(s)/plant(s).

The supplier has fulfilled its contractual obligations satisfactorily ## or

The supplier has failed to fulfil its contractual obligations with regard to the following:

- He has not adhered to the time schedule specified in the contract in dispatching the documents/drawings pursuant to 'Technical Specifications'.
- He has not supervised the commissioning of the equipment(s)/plant(s) in time, i.e. within the period specified in the contract from date of intimation by the Purchaser/Consignee in respect of the installation of the equipment(s)/plant(s).

- The supplier as specified in the contract has not done training of personnel.

The extent of delay for each of the activities to be performed by the supplier in terms of the contract is:

The amount of recovery on account of non-supply of accessories and spares is given under Para no.02.

The amount of recovery on account of failure of the supplier to meet his contractual obligations is _____ (here indicate the amount).

Signature

Name

Designation with stamp

Explanatory notes for filling up the certificate:

He has adhered to the time schedule specified in the contract in dispatching the documents/drawings pursuant to 'Technical Specification'.

He has supervised the commissioning of the equipment(s)/plant(s) in time, i.e. within the time specified in the contract from date of intimation by the Purchaser/Consignee in respect of the installation of the equipment(s)/plant(s).

Training of personnel has been done by the supplier as specified in the contract

In the event of documents/drawings having not been supplied or installation and commissioning of the equipment(s)/plant(s) having been delayed on account of the supplier, the extent of delay should always be mentioned in clear terms.