

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
OFFICE INTERIOR FURNISHING WORKS AT
INTEGRATED VACCINE COMPLEX, HBL
CHENGALPATTU**

DOCUMENT NO. HBL/TD/IVC/ADMIN/OFF_FURNISH/15-16
REVISION NO. 00
NOV 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 inter alia 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 Contractor 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 AND COMMISSIONING OF OFFICE INTERIOR FURNISHING WORKS AT INTEGRATED VACCINE COMPLEX, HBL CHENGALPATTU

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

Sch.No	Equipment	EMD	Tender fee
1	OFFICE INTERIOR FURNISHING WORKS @ IVC	Rs.12,50,000/-	Rs.3,150/-

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	05-11-2015, at 11:00 HRS
ii.	Pre Bid Meeting Venue	Integrated Vaccine Complex (IVC), HLL Biotech Ltd., Survey No 192 & 195, Thirumani Village, (Landmark – Near Leprosy Institute), Thirumani, Chengalpattu, Kanchipuram Dist, Tamil Nadu. Pin Code – 603 001.
iii.	Closing date & time for receipt of Tender	20-11-2015, at 15:00 Hrs
iv.	Time and date of opening of Technical Bids.	20-11-2015, at 15:30 Hrs
v.	Time and date of opening of Commercial Bids.	Announced after technical Bid Evaluation.
vi.	Venue of Opening of Techno Commercial Tender	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 and Commissioning of Office Interior Furnishing Works at Integrated Vaccine Complex, HBL Chengalpattu”** may be submitted to the address mentioned in Serial no. vi of the above table.

SECTION - II

SCOPE OF WORK

The Office Interior Furnishing work has to be done by the contractor at “**Integrated Vaccine Complex (IVC), HLL Biotech Ltd., Survey No 192 & 195, Thirumani Village, (Landmark – Near Leprosy Institute), Thirumani, Chengalpattu, Kanchipuram Dist, Tamil Nadu. Pin Code – 603 001**”.

The Scope in general covers **Design, Supply, Installation and Commissioning** activities pertaining to Civil Interior works, Office general finishing, Modular furniture, loose furniture, PVC/Vitrified floorings, cafeteria furnishing, false ceiling, Finishes, architecture, Electrical, IT and AV system etc. as per TE BOQ.

TECHNICAL SPECIFICATION:

1. GENERAL FURNISHING:

1.1 BLOCKWORK:

Concrete blocks shall generally conform to IS 2185. Blocks shall be regular in size and shape and shall be of specified strength. Blocks shall be properly cured before they are brought to site. Half or three quarter size blocks are to be used wherever required to makeup length of wall and broken blocks shall not be used.

The texture of the blocks shall be such that plaster will adhere to it. They shall be sound, free from cracks, honeycombs, broken edges and other flaws. They shall have plane rectangular faces with parallel sides and sharp straight angled edges. They shall have a fine, compact, uniform texture and thoroughly dried. The contractor shall supply samples for approval. Blocks supplied shall conform to the approved samples.

A) DIMENSIONS

The size of blocks shall be as specified in the items work. The maximum variation in dimensions shall not be more than +1.5mm in height and breadth and +/- 3mm in length. The blocks shall be 400x200x200mm, 400x200x150mm and 400x200x100mm as called for.

B) HANDLING & STORAGE

The contractor is responsible for transporting hollow concrete blocks in such a manner that the units are adequately protected during transportation. The units shall be handled in a manner, which will prevent soiling, chipping or damage of any kind. Broken, chipped or otherwise damaged units will be rejected and shall not be used in the work. The blocks shall be stored in neat piles free from contact with ground, which shall be located to avoid being disturbed or damaged by construction activities.

C) SAMPLING

Atleast 3 blocks from a lot manufactured in a day or from 1000 blocks whichever is less, shall be tested for dimension and breaking strength. In case the test result is not upto the standards specified in IS 2185 the

entire lot shall be liable for rejection. If solid concrete blocks are used in foundation, plinth or basement wall, the hollows must be filled up with cement concrete 1:3:6. In damp soils, the foundation and basement masonry shall be laid in richer mortar as directed by the Engineer-in-charge. In addition a damp proof course consisting of a 25mm layer of cement mortar 1:2 as an approved type of bituminous course shall be provided.

D) MORTAR

Cement mortar used for jointing and laying of blocks for hollow block masonry shall be as specified in the item of work or as directed by the Engineer-in-charge.

E) PREPARATORY WORK

Wetting of blocks, the blocks need not be wetted before or during laying in the walls. In case the climatic conditions so require, the top and the sides of the blocks may only be slightly moistened so as to prevent absorption of water from the mortar and ensure the development of the required bond with the mortar.

F) LAYING CONCRETE BLOCK MASONRY

Each block shall be set with bedding joints and vertical joints filled thoroughly. The wall shall be taken up truly plumb. All courses shall be laid truly horizontal and vertical joints truly vertical. Vertical joints in alternate courses shall come directly over the other. Thickness of the block courses shall be kept uniform.

Necessary tools comprising of wooden straight edge, mason's spirit level, square, foot rule, plumb line and pins, etc. shall be frequently used by the masons to ensure that the walls are taken up true to plumb line and levels. Both the faces of the walls of thickness greater than 200mm shall be kept in proper plans. All the connecting block masonry work shall be carried out at nearly one level and no portion of work shall be raised more than 1m above the rest of work. Any dislodged block shall be removed and reset in fresh mortar.

The construction of walls may be started either at the corners first or started from one end and proceeding in the other direction. If the corners of the walls are built first, they shall be built four or five courses higher than the centre of the walls. As each course is pre-laid at the corner it shall be checked for alignment, level and plumb to ensure truly straight and vertical walls. Each course in building be stepped back by half block and the horizontal spacing of the block shall be checked by placing a mason's level diagonally across the corners of the block, the mason's line shall be stretched from corner to corner for each course and the top outside edge of each block shall be laid to this line. Handling or gripping the block shall be such as to position the block properly with minimum adjustment.

Mortar shall not be spread too far ahead of actual laying of the block that it tends to stiffen and lose its plasticity.

G) CLOSURE BLOCK

When installing the closure block all edges of the opening and all four vertical edges of the closure block shall be buttered with mortar. The closure block shall be lowered into place. If any of the mortar falls out leaving an open joint the closure block shall be removed, fresh mortar applied and the operation continued.

1.2 SPECIFICATION OF TOUGHNED GLASS

The supplied glass for partitions and laquered glass should be toughened to meet as per following standard and specifications.

Following test shall be also carried out by the contractor at his own cost as per following provisions:-

Thickness - IS-2835- latest

Impact Strength - IS-2553-Part-I

Fragmentation - IS-2553-Part-I

Surface compression - ASTM C-1048-90

Bending strength - DIN 1249-Part-12

1) Float Glass:-

Glass that gives distorted reflections will not be accepted. Reflections due to pressure, paints poor manufacturing process, uneven thickness or poor storage are some of the reasons for distortion. All clear float glass quality should conform to BS-952 and ASTM C 1036-90.

2) Reflective Glass:-

The reflective glass shall have the following properties:-

- i) Max reflectivity allowable as per I.S. specifications.
- ii) Agent for reflections must be part of the glass and not as add-on reflection Sheet.
- iii) Total even reflection.
- iv) Reflective agent must enhance the colour of the glass.
- v) Quality of Reflective Coating:-

a) Uniformity:-

The reflective coating shall have no objectionable mottle or streak when the glass is viewed at angles of 45 deg through 90 deg from a distance of 4m or more.

b) Pinholes:-

Pinholes greater than 1.6mm diameter shall not be allowed and those 1mm to 1.6mm diameter shall be allowed only within 76mm of an edge, or in an area of the glass through which a person

normally would not be looking. Large clusters or close spacing of smaller pinholes shall not be allowed. Glass shall be viewed from a distance of 2m for this purpose.

Normal vision area of the glass is defined as the central area of glass covered by 80% of each dimension e.g., Width, height or diameter. The remaining area is considered the outer area (through which a person normally would not be looking).

c) **Scratches:-**

Viewed from a distance of 3m, scratches not longer than 76mm shall be allowed only within 76mm of an edge, or in an area of the glass through which a person normally would not be looking.

3) Water Tightness:-

No gross leakage shall be observed when subject to test for water penetration as described in BS 4315 Part-1. The test shall be carried out at the cost of contractor.

4) Sealant:-

Use modified silicone sealant for joint subject to movement and in glazing. Surfaces to receive sealant shall be properly prepared, cleaned, primed and excess sealant removed from finished surfaces.

Sealed joints shall be neatly tooled and surface smoothed. Follow the instruction of the sealant manufacturers. Colour of the exposed sealant shall be as approved.

1.3 SPECIFICATIONS OF WORKSTATIONS AND TABLES

Partition: Basic Framework of 75mm Thick partition in powder coated Mild steel. Top rail and vertical rails are made using powder coated Aluminum profiles / MS profiles.

Panelling: Tile based insert system in a combination of Pre-laminated Tiles /fabric covered particleboard with Fabric Soft-board and Laminated Writing Board.

Table Top: shall be provided with 25mm Thk PVC edge banded finished pre-laminated MDF board. Cable outlets are provided for the same.

Cable raceways: shall be provided with 2 level raceways with slots for networking and electrical terminals.

Levelers: Sturdy Levelers are provided for insulation and to counter uneven floor surface.

NOTE: All fixing components like table top support brackets, Levelers etc., will be grey in color.

1.4. SPECIFICATIONS OF MOBILE PEDESTALS:

Body: Pre-laminated MDF board with Edge banding (18mm for Sides, Top and Bottom panelling, 8mm for back panelling).

Drawer Front: 18mm thick pre-laminated MDF board.

Drawers: 22swg powder coated mild steel or Full/half panel metabox of Hettich / Equivalent make.

Movement of Drawers: Smooth sliding powder coated bottom mounted / in case of powder coated MS draws.

Locking: Front Locking.

Mobility: 4Nos Twin Wheel castors of 40kgs capacity.

NOTE: All fixing components like table top support brackets, Levelers etc., will be cool grey in colour.

1.5. SPECIFICATIONS OF PVC VINYL Flooring

STRUCTURE: Material Polyvinyl chloride, Pattern: Scattered, non-directional, Homogenous in construction, EN685 class 34 very heavy duty.

SAFETY CRITERIA: Flammability EN 13501-1 class Bfl -s1, Slip resistance ASR A1.5, Dynamic coefficient of friction EN 13893 class DS, Decontamination ISO 8690 rating good

PERFORMANCE BEHAVIOR : Sheet width EN 426 m 1.83, Sheet length EN 426 m 16-25, Overall thickness EN 428 mm 2.0, Total weight EN 430 kg/m² 3.3.

1.6. GLASS PARTITION

The Glass should be 12 mm thk Toughened Clear Glass in partition panels by using various glass fittings of approved make to be fixed with Powder coated Aluminium profile at top / bottom & Verticals with C channel sections and necessary fittings.

All the above said glass and accessories should be duly finished without giving any load on the false ceiling by using necessary hardware of Approved Make whatever necessary and required numbers to complete the job in all respect.

Contractor is advised to complete as per detail drawing, as specified and as directed by Architect/ Consultant/ Project - In – Charge.

1.7. SPECIFICATION OF PARTICLE BOARDS.

The Particle Board used for manufacturing Tables, Workstations should be top branded in the industry and the same should meet the following technical parameters compulsorily.

The Density of the Particleboard should not be less than 500 to 800 kg/m³. Also the particle board should be approved and in compliance with IS 12823 Standards.

The Particle should have emission free norms and should be in compliance with E1 Emission certified Board. The Bidders should produce the test certificate, IS certification and E1 Certifications to client before supplying the materials to site.

1.8. SPECIFICATION OF GRID FALSE CEILING.

Providing and fixing in true horizontal level false ceiling, grid with 15mm wide flanges, colour all white system using hot dipped galvanized steel sections, exposed surface chemically cleaned capping prefinished in baked polister paint, main "T" of size 15 x 44 x 0.33 mm at every 1200 mm c/c max. and rotary stitched cross "T" of size 15 x 44 x 0.25 mm at every 600 mm c/c max and 600 cross "T" at every 600 mm c/c max parallel to main "T" and 19 x 19 x 0.457 mm wall angle around the wall to form the grid and suspending the grid using 2-3mm G.I rod and adjustable "J" bolt of 3 mm dia and 10 mm hook type anchor fastener at every 1200 mm intervals at the main "T" and laying mineral fibres tile over the formed grid as per drawings.

Rate to include making, cut-outs for light fixtures, smoke detectors and A/c ducts wherever necessary.

1.9. SPECIFICATION OF GYPSUM FALSE CEILING.

Gypsum board false ceiling consisting of 12mm thick gypsum board at levels as shown in the drawing along with G.I. perimeter channels of size 0.55 thick, having a flange of 20mm and 30mm with a web of 27mm screwed to the ceiling, fixed to brick wall/partition with the help of Nylon Sleeves and screws at 610mm centres.

The suspending G.I.intermediate channels of size 45mm,0.9mm thick from the soffit with 1220mm distance with ceiling angle of width 25mm x 10mm x 0.55 thick fixed to soffit with G.I.cleat and steel expansion fasteners at every 610mm c/c.

Ceiling sections of 0.55mm thickness having knurled-web of 51.5mm are then fixed to intermediate channel with the help of connecting clip and in direction perpendicular to the intermediate channel at 457mm,centres. 12.5mm tapered edge Gyp-board is then screwed to the channels using 25mm long screws.

The joints between the sheets of plaster board are to be covered with perforated jointing paper tape and flushed with jointing compound to provide smooth and durable finish. The rates shall include any Verticals along with cut-outs made for light fixtures, smoke detectors& sprinklers, A/c Grills and any security systems .Cost to include hidden measurements also.

The scope of gypsum false ceiling includes wall care, one coat of primer and two coats of Final Emulsion painting as per tender approved make.

1.10. SPECIFICATION OF DESIGN GYPSUM FALSE CEILING:

The design gypsum false ceiling is basically to have any kind of profile/design work in gypsum board including the complete set of necessary frame work, fixtures, supporting accessories. The design work will be chosen by the client as per site condition.

The design gypsum suspended false ceiling using 12.5mm thick as per approved make boards confirming to IS 2095-1982 and GI framework of Gyp steel or approved equivalent comprising of following:

1. GI perimeter channel of 0.55mm thick having one flange of 20mm, another of 30mm and web of 27mm fixed to brick wall partition along periphery of ceiling with the help of nylon sleeves and screws at 610mm c/c
2. GI intermediate channel (size 45mm web, two flanges each of 15mm & thickness 0.9mm) suspended from the soffit / ceiling at 1200mm c/ c spacing.
3. GI ceiling sections of 0.55mm thick having knurled web of 51.5mm and two flanges each of 26mm with leaves of 10.5mm fixed to intermediate channel with the help of connecting clip at direction perpendicular to the intermediate channel at spacing of 600 mm c/c, . GI suspender angle of 25mmx10mm and thk.0.55mm at spacing of 600mm c/c, fixed to the ceiling / soffit using GI cleat angle 25mm x 25mm, 0.55mm thk. Cleat angle to be fixed to the ceiling / soffit using 6mm dia anchor fastener.

Gypsum board to be finished with Jointing tape and Jointing compound including application of one coat primer as Per Gypsum board Manufacturer specification. The rate quoted shall include making cut outs for fixing light fittings, grills, diffusers, speakers, smoke detectors, sprinklers etc. Cut outs have to be made with provision of the frame along perimeter of the cut outs/ opening with channels/ ply to support the ceiling adequately. No extra payment shall be made for making cut outs. Plywood support to be provided for services as required. The cost should include one coat of primer and two coats of final paint.

4. As per architect design contractor to execute with coves as well as design elements in gypsum complete with painting.

The scope of gypsum false ceiling includes wall care, one coat of primer and two coats of Final Emulsion painting as per tender approved make.

1.11. SPECIFICATION OF GRID FALSE CEILING [METAL VECTOR TYPE].

Metal Vector Galvanized Steel Micro perforated metal ceiling System consisting of 600x600mm Vector tiles of galvanized steel in 0.5 mm thickness with perforation of 1.5mm dia and 22% open space with Acoustical fleece at the back for providing sound absorption of 0.7 NRC in powder coated Global White color of 60-80 microns painted to a minimum of 120 gsm (both sides combined) galvanizing to be laid on grid systems with 24mm wide T - section flanges color white having rotary stitching on the Main Runner, 1200 mm & 600 mm Cross Tees. The tile edges should feature detailing like the Spring Kerf, Access Kerf & the reverse regular

Non Engaging Edge to hide the grid, creating a 6mm shadow reveal and also provide downward mountability without any tools. The Vector edge tile shall feature security tabs to prevent unauthorized access.

The tiles shall be in module size of 600 X 600 mm, suitable for Green Building application, with Recycled content of 25%.

The grid should be with 24mm wide T - section flanges color white having rotary stitching on all T sections i.e. the Main Runner, 1200 mm & 600 mm Cross Tees with a web height of 38mm and a load carrying capacity of 15.43 Kgs/M. The T Sections have a Galvanizing of 90 grams per M2 having pull out strength of 100 Kgs.

The Tile & Grid system used together should carry a 10 year warrantee.

INSTALLATION: To comprise main runner spaced at 1200mm centers securely fixed to the structural soffit using GI angles of 25x25x0.5/0.6mm or M8 threaded rods at 1200mm maximum centre. The First/Last suspension system at the end of each main runner should not be greater than 450mm from the adjacent wall.

Flush fitting 1200mm long cross tees to be interlocked between main runners at 600mm centre to form 1200 x 600 mm module. Cut cross tees longer than 600mm require independent support. 600 x 600mm module to be formed by fitting 600mm long flush fitting cross tees centrally between the 1200 mm cross tees.

The tile is engaged on the exposed grid system by fully inserting the Spring Kerf. Then the tile is raised into the grid module until it is horizontal and then the tile is slid in the Access Kerf direction to fully position and centers the tile in the grid. For perimeter cut panels Edge caps need to be used.

Perimeter trim to be wall angles of size 3000x19x19mm, secured to walls at 450 mm maximum centres.

1.12. SOUNDScape PANELS

Providing and Fixing Armstrong Sound Scapes - Acoustical clouds which are 30 mm thick, flat glass fiber panels with Humidity Resistance RH 90% & Recycled Content of minimum 30%, come in various shape options like Square / Convex / Concave / Circle / Hexagon / Trapezoid / Parallelogram (Left & Right) / Rectangle (Small & Large) and in standard Traffic White color with LR 90% or in the color specified by the Architect / Engineer in charge (Ivory / Pale Green / Pastel Blue / Traffic Grey / Pale Brown). or in the color specified by the Architect / Engineer in charge (Ivory / Pale Green / Pastel Blue / Traffic Grey / Pale Brown) . The size and sound absorption details are as below:

Sr. No.	Shape	Nominal Size	Sound Absorption – Metric Sabin
1.	Small Rectangle	1200x1800mm	3.77
2.	Large Rectangle	1200x2400mm	5.05

The back of each panel to have embedded square frame bracket system of 610x610mm in which provisions are already made for integration of installation system for suspension of individual or grouped panels.

INSTALLATION:

The panels to be suspended individually using the Armstrong Sound Scapes Deck hanging kit. Each kit to consist of gripper structure anchors with an outer diameter of 16mm and height 23mm, aircraft cables of 1.5mm dia 2.44 LM in length and bottom end cable adjusters of 8.9mm outer diameter. Each panel to be suspended using the aircraft cables which are suspended from the soffit using the gripper structure anchors and its other end passing through the bottom end cable adjuster which are screwed in the 4 corners of the frame bracket system. The height & level of the panels can be adjusted using the bottom end cable adjusters.

1.13. LINEAR WOODWORK WALLPANELS

Woodworks Linear Panels of width 95mm, thickness of 20mm and length of 2440mm with a reveal of 20mm, made of medium density particle board with wood finish as per the approved shade/ species & finish and a 0.3mm veneer balancing layer on the reverse side. Every Panel has a black fabric fleece at the back of the panel to cover the reveal of 20mm to attain NRC of 0.5. The boards shall have a Plain visible surface with no perforations with wooden grains visible on the longer length. The panels shall provide a minimum sag resistance of RH70 and a fire rating Class A as per ASTM E 84. The back of the panels shall be profile-grooved to receive 3.6M long linear carrier with integral factory fitted clips for installation. The panels shall be mounted on special Linear Carrier with integral clips approved by the Architect/ Engineer-in-Charge.

WALL INSTALLATION:

Install wooden battens (provided by others) of section 50mmx50mm or as approved by the Architect on the solid wall horizontally using screws and plugs at spacing of 600mm centre-to-centre. Cut to size and screw the Linear Carrier with integral clips. These carriers should be installed vertically on the wall spaced at 600mm c/c. Install Wood Works Linear Planks one-by-one by inserting the Profile-groove at the back of the panel in the clips fitted on the Linear Carrier. Use Linear Splice accessory by approved brand to join planks more than 2.4M length. Continue installing rows of planks till the actual height/length is achieved. Finish the edges using the Edge banding tape to cover the cut edge of the panel as per approved make.

CEILING INSTALLATION:

Wall molding should be installed with screws at desired height. Linear Carriers with integral clips provided as per approved make must be supported not more than 600mm from the ends and then 1200mm on centre along their lengths. These carriers are to be spaced not more than 150mm from the walls and then 600mm on center across the room space.

Install Wood Works Linear Planks one-by-one by inserting the Profile-groove at the back of the panel in the clips fitted on the Linear Carrier. Use Linear Splice accessory as per approved make to join planks more than 2.4M length. Continue installing rows of planks till the actual length/width is achieved. Place the border panels on the wall moldings for a finished visual. Finish the edges using the Edge banding tape to cover the cut edge of the panel as per approved make.

FACETED/CURVED INSTALLATION:

Wall molding should be installed with screws at desired height for the ceiling installation. Linear Carriers with integral clips as per approved make must be supported not more than 600mm from the ends and then 1200mm on centre along their lengths. These carriers are to be spaced not more than 150mm from the walls and then 600mm on center across the room space.

Prepare the wall by installing wooden battens (provided by others) of section 50mmx50mm or as approved by the Architect on the solid wall horizontally using screws and plugs at spacing of 600mm centre-to-centre. To bend the Linear Carrier directly, a curve, as specified by the Architect, should be drawn on an appropriate background material like plywood. Linear carrier should be partially cut and fixed with RC2 clip as per approved make to maintain the curve. Ceiling side of the linear carrier should be suspended by hanger wire in continuation with the ceiling carriers. These carriers should be installed vertically on the wall spaced at 600mm c/c. Install Wood Works Linear Planks one-by-one by inserting the Profile-groove at the back of the panel in the clips fitted on the Linear Carrier. Use Linear Splice accessory as per approved make to join planks more than 2.4M length. Continue installing rows of planks till the actual height/length is achieved. Finish the edges using the Edge banding tape to cover the cut edge of the panel as per approved make.

1.14. PUR VINYL FLOORING:

PUR (Polyurethane reinforced) homogeneous vinyl sheet flooring 2 metre wide and overall thickness of 2mm. The thickness of wear layer would be 2mm. The product should be homogeneous and single layered 7 chip construction. The wear surface shall consist of impregnated polyurethane homogeneous mixture of PVC with TRUESHIELD technology, Plasticizers without DOP, Urethane, color pigments and filler calendered to form a sheet. Color and pattern details shall be dispersed throughout the thickness of the wear layer. Material shall conform to group "T" wear resistance as per EN 649, Clean Room certified with class 'A' as per ASTM F5100, Flammability resistance of class Bfl-s1 as per GB8624-2006, Dynamic coefficient of friction of class DS as per EN 13893, Thermal Resistance of 0.072m²K/W as per EN 12667, Thermal conductivity of 0.071W/mK as per EN12524, impact sound reduction of 3dB as per ISO 10140, Slip Resistance of class R9 as per DIN 51130, Residual indentation of 0.03mm as per GB/T 4085-2005, Color fastness rating of ≥6 as per ISO 105-B02, total weight being 2.8kg/m² as per EN430. The product shall be suitable for applications in class 23/34/43 areas as per EN685. Product shall exhibit antistatic behaviour, resistance to bacteria, resistance to chemical,

resistance to staining, suitability to castor chair. The product shall be Floor Score certified with no SVHC content published by European Chemicals Agency (REACH). Product shall contribute to LEED points under Indoor environmental quality (LEED EQ) and Material & Resource (LEED MR) category.

INSTALLATION

It is importance of bidder to ensure the subfloor on which the sheet is being laid is smooth, flat, hard and free from moisture, grease etc. In case of uneven subfloor the same should be levelled using self-levelling compound. IPS/Vitrified/ceramic/mosaic tiles do not provide zero levelled sub floor. The moisture present in the subfloor should be less than 8% before installation of the floor. The sheet should be installed as per recommended adhesive. The installation shall be undertaken as per manufacturers' installation instructions.

1.15. ANTISTATIC VINYL FLOORING:

Conductive Vinyl Sheet Flooring 1.83m wide, having a nominal total thickness of 2.2mm. The nominal thickness of the wear layer would be 2 mm. The product should have a conductive backing of 0.2mm. The wear surface shall consist of impregnated polyurethane homogeneous mixture of PVC, Plasticizers, Urethane, color pigments and filler calendared to form a sheet. Colors and pattern detail shall be dispersed throughout the thickness of the wear layer. Conductive vinyl sheet shall conform to Group P of Wear Resistance as per EN 649, Flammability of class Bfl-s1 as per EN 13501-1, Slip resistance of R9 as per BGR 181, Dynamic Coefficient of friction as DS as per EN 13893, Impact sound reduction of 3 dB as per EN ISO 140-8, Residual indentation of 0.05 mm as per EN 433, Color fastness rating ≥ 6 as per ISO 105-B02, Vertical resistance(R1) less than 106Ω as per EN 1081, Static electrical charge of $\leq 2.0\text{kV}$ as per EN 1815, Thermal resistance of $0.01\text{m}^2\text{K/W}$ as per EN 12667, Thermal conductivity of 0.25 W/mK as per EN 12524. conductive vinyl shall exhibit ESD properties as following - Vertical resistance less than $3.5 \times 10^6\Omega$ as per EN 61340-4-1, Static electrical charge - system test less than 100V as per EN 61340-4-5. The class of use of Conductive vinyl is 23/34/43 as per EN 685.

INSTALLATION

It is important to ensure the sub floor on which the sheet is being laid is smooth, flat & hard & free from moisture, grease, etc. In case of uneven sub floor the same should be leveled by self leveling compound. IPS/Vitrified/ceramic/mosaic tiles do not provide zero leveled sub floor. The moisture level present in the subfloor should be less than 8% before installation of the floor. The sheet should be laid using adhesive recommended by Armstrong.

Each row of tiles/strip of floor covering must be linked crosswise with a continuous copper strip. Individual rows/strips must be at least 3 m^2 in size and linked to the rest of the area with a copper tape. In rooms of up

to 40 m², connection points for equipotential bonding should be provided in at least one point in the room. In larger rooms, several connection points must be used.

The installation shall be undertaken as per the manufacturer's installation instructions.

1.16. SEALANT AND GASKET APPLICATION.

Sealant and gasket shall be provided wherever shown in the drawings or required for a permanently weather tight installation. The sealing mechanism for each location and use shall be as indicated on drawings. In those locations where a mechanism is necessary but is not indicated, it shall be of type recommended by the sub-contractor and approved by the Engineer.

All adjoining surfaces shall be protected to receive sealants against staining by masking and/or other methods.

Joints and joint surfaces shall be clean, dry, and free of any material that may have an adverse effect on the bonding and/or seal of the sealant and gasket materials.

Apply sealants and gasket under the conditions recommended by the manufacturer(s). Prime all surface to receive sealants and gasket unless recommended otherwise, use no sealant that has started to set in its container or a sealant that has exceeded the self life published by the manufacturer.

Fill all joints continuously and completely with sealant, forming a neat, uniform, concave bead. Finish the material flush with adjoining surfaces unless otherwise shown on the drawings. All sealant surfaces shall be tooled smooth.

Tensile or shear stress in structural silicone sealant joint shall not exceed 1.4 kg./sq.cm.

2. AV SYSTEMS:

2.1 PROJECTOR

2.1.1 CONFERENCE ROOM

The Projector should be 4,000 ANSI Lumens, WXGA Projector, 16:10 Aspect Ratio, 1.6X Manual Zoom, 1280x800 Pixels, 10,000:1 Contrast Ratio, Inputs: HDMI, VGA 1, VGA 2, SVGA, Audio IN 1,2,3, LAN , Serial Port. The Outputs control should have Monitor & Audio In/Out. 10 W Built In Speaker. The Projector should provide with Ceiling mounted kit of 3+3 Heavy duty.

2.1.2 TRAINING ROOM

3100 ANSI Lumens, WXGA Short Throw Projector, 16:10 Aspect Ratio (1280x800) Pixels, DLP Technology, Contrast Ratio 8000:1, Inputs: 1 HDMI, 1VGA, 1 Audio, Outputs: 1 Audio Out.

2.2 SCALING PRESENTATION SWITCHER

Two Input VGA, 4 Input HDMI and 2 Output HDMI (HDCP), Resolution Range 640x480 to 1600x1200 and 1920x1200, NTSC, PAL, SECAM, 480P, 576P, 720P, 1080I, 1080P, 2K, 2 Mic/Line Inputs With ducking and 48 Volt phantom power, HDMI Audio Embedding and De- Embedding, Auto Image Setup.

2.3 CARDIOID MICROPHONE

18 inch Gooseneck Stem, with cardioid microphone capsule of frequency range of 50 to 20000 Hz, Sensitivity of 20 mV/Pa with shock mount, Max SPL 125 DB Equivalent Noise Level 21DB-A, Signal to noise Ratio: 73 DB, Shock Mount Adapter, Impedance ≤ 600 ohm, Programmable mute switch, integrated LED ring status indicator.

2.4 WIRELESS LAPEL MICROPHONE

Wireless Lapel Microphone Set an handle complex antenna systems and up to 8 channel simultaneous wireless channels diversity receiver and Cardioid headset and lapel microphone transmitter. Carrier Frequency range 500-865 MHZ, Audio Band Width: 40-2000 HZ, Signal to noise ratio 105DB (A), THD: $<0.8\%$, Modulation: FM, Audio Out Puts: Balanced XLR and Unbalanced TS 1.4" Jack, Body Pack: RF Output Power= 10 MW Max, Polar Pattern Cardioid.

2.5 DIGITAL SIGNAL PROCESSING

Configurable Signal Processing 12x8 DSP with 12 Analog Inputs (with 48v Phantom Power per Channel) 8 Analog Outputs, 48 Channel, Low Latency, Fault Tolerant Digital Audio Bus, Clear Front Panel LED Indication, 12 Control Inputs and 6 Logic Outputs for GPIO Integration, Bi directional Locate Functionality, Input Impedance: 3.5 Kohm, A/D Latency: 37FS, Dynamic Range: 108 DB Typical.

2.6 SURFACE MOUNTED SPEAKER

Surface mount speaker with frequency range of 70Hz-23kHz with 8 ohms impedance of program power of 200W, nominal coverage 100 degree X 100 Degree, nominal sensitivity 87 db SPL, 1W @ 1m, Max SPL @ 1m, 103 DB Continuous Average music/ Speech, Directivity factor: 4.9, Averaged 500 HZ to 4 KHZ, Transducers- Low Frequency: 130 mm poly Propelline coted paper with weather edge surround, 25 mm voice coil on cap ton former, High Frequency: 20 mm titanium coted PEI.

2.7 CEILING MOUNTED SPEAKER

Ceiling mount speaker with transformer and frequency range of 80 Hz - 20 kHz, Maximum SPL: 102 dB @ 1m, transformer tapping of 30W on 100V or 70V, Power Capacity: 80 Watts Continuous Program Power, Nominal Coverage Angle: 130 Degrees Conical Coverage, Transducers- Low Frequency: 100mm Poly Propelline coted 1 inch coil on Aluminium former, High Frequency: 19mm titanium coted polister.

2.8 CABLES

2.8.1 HDMI CABLES

Flexible HDMI Cable, Supports 4K @ 30 Hz (4096 x 2160), UHD @ 30 Hz (3840 x 2160), and 1080p @ 60 Hz signals

Also supports 4K @ 60 Hz in 4:2:0 color space

Data rates to 10.2 Gbps

Color depth up to 48 bits - 16 bits per color. Length 25 Ft, 30 AWG copper wire construction, Gold-plated contact.

2.8.2 HDMI PATCH CABLES

Ultra Flexible HDMI Cable, Supports 4K @ 30 Hz (4096 x 2160), UHD @ 30 Hz (3840 x 2160), and 1080p @ 60 Hz signals

Also supports 4K @ 60 Hz in 4:2:0 color space

Data rates to 10.2 Gbps

Color depth up to 48 bits - 16 bits per color. Length 6 Ft, 30 AWG copper wire construction, Gold-plated contacts.

2.8.3 BALANCED STEREO OR AUDIO CABLE

Length - Available in reels of 300m (985ft)

Quality Construction - Rugged and flexible jacket with sequential markings every meter.

Easy Stripping - Exceptionally easy to strip because the foil shield is bonded to the inside of the jacket.

Impedance : 40 to 100Ω.

DC Resistance : 34.6Ω/km (10.5Ω/1000ft).

Temperature: -20° to 75°C (-4° to 167°F).

High-quality dual shielded pair style cable designed for routing balanced stereo mic or line level audio signals.

2.8.4 SPEAKER CABLE

Length - Available in reels of 300m (985ft).

DC Resistance: 13.7Ω/km (4.17Ω/1000ft).

Temperature: -20° to 75°C (-4° to 167°F).

Is a high-quality twisted pair cable designed for connecting speakers and amplifiers in commercial or residential AV systems

Quality Construction

Conductors are stranded 16 gauge copper

Conductor jackets are color-coded red/black

Rugged and flexible jacket with sequential markings every meter

Low capacitance due to high strand count, 26/30.

2.8.5 MICROPHONE CABLE

Length - Available in reels of 300m (985ft).

Quality Construction - Conductors and drain wire are stranded 20 gauge tinned copper.

Rugged and Flexible Jacket - With sequential markings every meter.

Easy Stripping - Exceptionally easy to strip because the foil shield is bonded to the inside of the jacket.

Impedance : 40 to 100Ω.

DC Resistance : 34.6Ω/km (10.5Ω/1000ft).

Temperature : -20° to 75°C (-4° to 167°F).

2.8.6 EQUIPMENT RACK

The Equipment Rack should be equipped with IEC socked 10 Nos, Cooling Fan, 4 Shelves.

2.8.7 CONNECTORS

Speakon, XLR (Male & Female). 9 pin D- Connectors, RJ 45 Connectors, RCA connectors- All connectors with Gold plated contacts, Back cover & Hoods.

2.9 LED DISPLAY

55" Full HD, 350 cd/m² Brightness, Contrast Ratio 50,000:1 (AV Mode), Response Time 8 ms (G to G), Input: Analog D Sub, DVI-D, Component, HDMI, Stereo Mini Jack, Out Put: Stereo Mini Jack, External Control RS-232, RJ-45, USB Port.

2.10 HD VIDEO CONFERENCE

HD Videoconference system supports Any high definition display supporting HDMI or DVI-I input. Communications of H.323, SIP 128Kbps - 4.0Mbps (point-point) 128Kbps - 1.5Mbps (multipoint, per call) channel.

Video Standards H.261, H.263, H.263+, H.264 and H.239 compliant Dual Streaming with video bandwidth balance, Built in multipoint facility of (1+3).

Maximum resolutions of 1080p@ 30 frames per second, widescreen 16:9 aspect ratio All resolutions progressive scanning All resolutions at 30 frames per second.

Camera of 10x Wide-angle zoom lens with 70 degree field of view, Up to 4x/10x optical zoom Auto focus / Automatic gain control 10 camera presets.

Video input of 1 x HD Camera (720p30) 1 x HD Video In (1080p30/720p60) 1 x DVI-I In (HDMI/VGA enabled) Video Outputs (2 Outputs) 1 x HD Video Out (1080p30/720p60) 1 x DVI-I Video Out (1080p30/720p60) Audio inputs 2 x Stereo Line In (3.5 mm) 1 x Mic In - Two channel (3.5 mm) 1 x HD Video In Audio output of 1 x Stereo Line Output (3.5mm) 1 x HD Video Out Other Supported Standards H.221, H.224, H.225, H.231, H.241, H.242, H.245, H.281, BONDING (ISO13871) RFC 3261, RFC 3264, RFC 2190, RFC 3407, RFC 2833.

2.11 CABLE CUBBY & BRACKET

Cable Cubby with one Multi-Region AC, Includes one unswitched AC power outlet, Cable Pass-Through Bracket for up to four AV cables, UL/c-UL listed and CE compliant, Black powder coat finish.

Cable Pass-Through Bracket for up to four AV cables, UL/c-UL listed and CE compliant, Black powder coat finish.

2.12 BOUNDARY MICROPHONE

High Performance Boundary microphone with polar pattern of super cardioid, High Performance Boundary microphone with polar pattern of super cardioid, Impedance of 150 ohms, Sensitivity of 22 mV/Pa (-30dBV), Maximum SPL -120 dB, Powering of 12 to 48 V phantom power to DIN/IEC.

2.13 WIRELESS HANDHELD MICROPHONE

Wireless Handheld Microphone Set can handle complex antenna systems up to 8 channel simultaneous wireless channels diversity receiver and condenser handheld microphone transmitter.

2.14. ELECTRICAL SYSTEMS

2.14.1 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 compartments shall be provided, with the position of cable gland such that cables can be easily and safely terminated. A Panel with removable undrilled gland plate shall be provided.
- d. Control & Indication 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 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. Multiway 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 be to permit safe working at 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.

2.14.2 POWER & CONTROL WIRING:-

- a. The control wiring shall be carried out with 650/1100 V grade Low Smoke Halogen free 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 on white colour sleeves, of insulating material adjacent to the terminals. Wires with in switchgear shall be identified by white colour sleeves with letters embossed on that sleeve type wiring identification numbering system. 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 colour 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 up to 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 colour coded as follows

Instrument transformer	:	Red, Yellow or Blue determined by the AC Circuit's phase with which the wire is associated.
AC Phase wire	:	White
AC Neutral	:	Black
DC Circuits	:	Grey
Earth Connection	:	Green
Power Wiring	:	Phase Colour
CT wiring	:	Phase Colour

2.14.3 LIGHT FIXTURES

This specification is intended to cover the design, fabrication, assembly & testing at manufacturer's works, properly packed for transportation, supply and delivery at site complete in all respects with all components, fittings and accessories for efficient and trouble-free operation and supervision of erection of light fittings & accessories as per specification listed below.

I. Service condition

The light fittings & accessories will be installed in a air-conditioning /ventilated area and this area bifurcated into:

- a) non hygiene & technical area
- b) office area
- c) hygiene area.

The equipment shall, in all respects, be suitable for operations in service conditions stated in design criteria.

II. Electrical system

The electrical arrangement of the system shall be indicated in the data sheet.

All components of the equipments shall be rated for the electrical system characteristics shown on data sheet.

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

- | | | | |
|----|---------------------|---|---|
| a) | voltage | : | 415 v 3 phase 4 wire 50 hz neutral solidly grounded |
| b) | voltage variation | : | ± 10% |
| c) | frequency variation | : | ± 3% |

III. General information

Light fittings shall be designed, manufactured and equipped with accessories in accordance with this specification and the applicable standards indicated.

The design and workmanship shall be in accordance with the good electrical practice to ensure satisfactory performance and service life.

IV. Codes And Standards

Light Fitting

The design, manufacturing and testing of light fittings shall confirm to the latest applicable standard mentioned below. also this specification shall unless otherwise stated be designed, constructed and tested in accordance with the requirements of the indian electricity act and rules and latest revision of relevant indian or equivalent british or international standards.

STANDARDS	SPECIFICATIONS
IS : 6665-1972	CODE OF PRACTICE FOR INDUSTRIAL LIGHTING.
IS: 1777-1978	INDUSTRIAL LIGHTING FITTINGS WITH METAL REFLECTORS.
IS : 10322-1982	LUMINARIES.
IS : 1947-1980	FLOOD LIGHTS.
IS : 2149-1970	LUMINARIES FOR STREET LIGHTING
IS : 2147-1962	DEGREE OF PROTECTION FOR SWITCH GEAR & CONTROL GEAR.

V. Technical specification of light fittings and accessories

a) General requirements

- Fittings shall be designed for continuous trouble-free operation under hot humid atmospheric conditions, at an ambient of 45°C without reduction in lamp life or without deterioration of materials and internal wiring. Outdoor fittings shall be weatherproof and waterproof type.
- The fittings shall be designed so as to facilitate easy maintenance, including cleaning, replacement of lamps/starters etc.
- Connectors between different components shall be made in such a way that they will not work loose by small vibration.
- For each type of light fitting, the manufacturer/vendor shall supply the utilization factor to indicate the proportion of the light emitted by the bare lamp which falls on the working plane.
- The fittings and accessories shall be designed to have low temperature rise. The temperature rise above the ambient temperature shall be as indicated in the relevant standards.
- All sodium vapour, mercury vapour and metal halide fittings shall be completed with accessories like lamps, ballasts, power factor improvement capacitors, starters/igniters wherever applicable etc. these shall be mounted as far as possible in the fitting assembly only. if these cannot be accommodated inside, then a separate metal enclosed box shall be included to accommodate the accessories and in addition with a fuse and a terminal block suitable for loop-in, loop-out connections by 1100V grade PVC insulated wires up to 4 sqmm.
- Outdoor type fittings shall be provided with outdoor type control gear box. the fittings shall be power factor corrected to 0.95 (maximum)
- Each fitting shall have a terminal block suitable for loop-in, loop-out t-off connection. The internal wiring shall be completed by the manufacturer by means of stranded copper wire and terminated on the terminal block.
- All hardware used in the luminaries, shall be cadmium plated.

b) Earthing

- Each light fitting shall be provided with an earthing terminal suitable for connection to the earthing conductor.
- All metal or metal-enclosed parts of the housing shall be bonded to the earthing terminal so as to ensure satisfactory earth continuity throughout the fixture.

c) Painting / finish

- All surfaces of the fittings shall be thoroughly cleaned and de-greased. the fittings shall be free from scale, sharp edges and burns.
- The housing shall be stove-enameled/epoxy stove-enameled/vitreous enameled powder-coated of anodized as indicated under various types of fitting in the boq's.
- The finish of the fitting shall be such that no bright spots are produced either by direct light source or by reflection.

d) Accessories for light fittings

- Reflectors
 - a) The reflectors shall be made of aluminum mirror finished for light fittings.
 - b) The thickness of Aluminum, shall comply with relevant standards. Reflectors made of mirror finish.
 - c) Reflectors shall be free from scratches or blisters and shall have a smooth and glossy surface having an optimum light reflecting co-efficient such as to ensure the overall light output specified by the manufacturer.
 - d) Reflectors shall be readily removable from the housing for cleaning and maintenance without disturbing the lamps and without the use of tools. They shall be securely fixed to the housing by means of positive fastening device of captive type.
- Lamp / starter holders
 - a) Lamp holders shall comply with relevant standards. they shall have low contact resistance, shall be resistant to wear and shall be suitable for operation at the specified temperature without deterioration in insulation value. They shall hold the lamps in position under normal condition of shock and vibration met within normal installation and use.
 - b) Lamp holder for the fluorescent lamps shall be of the spring loaded bi-pin rotor type. Live parts of the lamp holder shall not be exposed during insertion or removal of the lamp or after lamp has been taken out. The lamp holder contacts shall provide adequate pressure on the lamp cap pins when in working position.

- c) Lamp holder for incandescent, mercury vapour and metal halide lamps shall be of Edison screw (e.s) type.
- d) Starter holders for fluorescent lamps shall conform to the relevant standards. All material used in the construction of the holder shall be suitable for tropical use.
- e) The starter holder shall be so designed that they are mechanically robust and free from any operational difficulties. They shall be capable of withstanding the shocks met within normal transit, installation and use.
- Ballasts
 - a) The ballasts shall be designed, manufactured and supplied in accordance with the relevant standards. The ballasts shall be designed to have a long service life and low power loss.
 - b) Ballasts shall be mounted using self locking, anti vibration fixings and shall be easy to remove without de-mounting the fittings. They shall be in dust-tight, non-combustible enclosures.
 - c) The ballasts shall be of the inductive, heavy-duty type, low losses, filled with thermosetting insulating, moisture-repellant, polyester compound filled under vacuum. Ballasts shall be provided with tapping to set the voltage within the range specified. End connections and taps shall be brought out in a suitable terminal block, rigidly fixed to the ballast enclosure. The ballast wiring shall be of copper wire that shall be free from hum. Ballasts which produce humming sound shall be replaced free of cost by the vendor.
 - d) Low loss silicon steel lamination shall be wound with super enameled copper wire with class "f" insulation on glass filled nylon bobbin.
 - e) High temperature-resistant interlayer polyester film shall be used for inter layer insulator glass-filled polyester connector should withstand high voltage up to 5 KV.
 - f) One ballast for one fitting shall be provided for multi lamp fittings.
 - g) The ballast for each lamp shall be provided in case of multi lamp fittings.
- Electronics ballast
 - a) Electronics ballast shall be operate between 180 volt to 240 volt voltage range with tolerance for performance +10% to -12%
 - b) Electronic ballast thd should be less than 10%.
 - c) main input frequency for ballast is 50 hz $\pm 3\%$ and typical operating frequency of ballast is > 45 khz and > 0.95 at maximum power
 - d) Ballast shall have to operate earth leakage current < 0.5 ma per ballast and it will take ignition time is <1 second.

- e) Ballast shall be suitable to withstand over voltage protection minimum 48 hrs. at 270 vac. and shut down at 290 ± 10 vac.
- f) ballast shall ignite lamp temperature range is 0°C to 50°C
- g) Noise level for ballast is inaudible.

If dali ballast specified in light fixture boq, it shall be provided with dali ballast

- Starters

- a. Starters shall have bi-metal electrodes and high mechanical strength. Starters shall be replaceable without disturbing the reflector or lamps and without the use of any tool. Starters shall have brass contacts and radio interference capacitor.
- b. The starters shall generally conform to the relevant standards.

- Capacitors

- a. The capacitors shall have a constant value of capacitance and shall be connected across the supply of individual lamp circuits.
- b. The capacitors shall be suitable for operation at supply voltage as specified and shall have a value of capacitance so as to correct the power factor of its corresponding lamp circuit to the extent of 0.95 lag.
- c. The capacitors shall be hermetically sealed preferably in a metal enclosure to prevent seepage of impregnate and ingress of moisture.

- Lamps

- a) Incandescent (GLS) lamps shall be of "clear" type unless otherwise specified. The fluorescent lamps shall be "cool day light" type unless otherwise specified and shall be provided with features to avoid blackening of lamp ends. The fluorescent lamps shall have a high lumen output. The lamp shall have triple coil electrode with an anode ring and a triband phosphor coating.
- b) Mercury vapour lamps shall be of high pressure, colour corrected type, with a luminous efficiency of 50 lumen/watt. The discharge tube shall be made of high grade quartz.
- c) Sodium vapour lamps are of high pressure type.
- d) Metal halide lamps shall be provided with internal diffuse coating, the lamp voltage shall not exceed 100V for 250W and 128 V for 400W. The colour rendering index of the lamp shall be 93. The lamp shall be suitable for universal burning position and for use in open type luminaries. The lamps shall be suitable for operating on a sodium vapour control gear.
- e) A "compact fluorescent lamp" ("CFL"), also known as a "compact fluorescent light" or "energy saving light" (or less commonly as a "compact fluorescent tube" ["CFT"]), compact florescent lamp (CFL)

shall be of two types (4 pin and 2 pin), 2 pin type CFL shall have base with a housing incorporating the special instant starter and capacitor. radio interface, suppression capacitor shall be installed inbuilt in cfl and cfl is possible for dimming purpose. Upto 23 W CFL light shall be 2 pin type and integral electronics ballast and 26 w cfl shall be 2 pin type and separate convention copper ballast or electronic ballast to be provided and type of ballast mentioned in the light fixture description. 4 pin type CFL shall have base without starter and capacitor. radio interface, suppression capacitor shall be separately provided for 4 pin cfl and cfl is possible for dimming purpose. Above 26 w CFL lamp, CFL shall be 4 pin type and separate convention copper ballast or electronics ballast to be provided and type of ballast mentioned in the light fixture description.

- f) The lamps shall be capable of withstanding small vibrations and the connections at lead in wires and filaments/electrodes, shall not break under such circumstances.
- g) Lamps/tubes shall conform to relevant standards and shall be suitable for supply voltage and frequency specified.
- e) Test certificates
 - Test certificates and results as per relevant standards (specification) for all the equipment offered under the scope of this specification shall be furnished.
 - All routine tests on all major components shall be made as per relevant specification.
 - Six copies of test certificates shall be submitted by the seller to the employer for all the items including bought out items.

f) Deviations

Deviations from this specification are only acceptable where the vendor has listed in his quotation the requirements he cannot, or does not wish to comply with and the purchaser has accepted, in writing, the deviations before the order is placed. if the vendor is also to offer alternatives resulting in technical or price advantages he should submit a supplement to the main quotation.

in the absence of a list of deviations, it will be assumed by the purchaser that the vendor complies fully with this specification.

g) Packing & transport

The fitting shall be wrapped around honeycomb paper in plastic and surrounded by paper / thermocol filling and all this housed in corrugated box and box shall be nylon straps. Preparation for shipment shall protect the fitting against corrosion, dampness, and breakage or vibration injury during transportation or handling. Each corrugated box shall be marked with particulars of type of fitting, qty. gross weight and top direction etc.

Note: After order being placed GA drawing of light fitting with cutout dimensions & fixing dimensions / arrangement shall be furnished within 7 days.

2.14.4 CONDUITS, WIRING & ACCESSORIES:-

➤ General

This conduiting shall be applicable for wiring for lighting, single phase, 2 wire 230 volts, 50 Hz, ac supply and low voltage system.

➤ Rigid steel conduits & accessories -Wherever rigid steel conduits is specified it shall be comprised as follows:

- MS. conduit
 - a. MS conduits shall be of electrical resistance welded and screwed sheet steel construction.
 - b. Conduits shall be with protection against corrosion, stove enameled jet black inside and outside
 - c. The MS. conduits for electrical wiring threaded at both ends 'isi' marked to is 9537(part 2) and shall conform to the requirements of relevant latest is standard in all respects.
 - d. The class of conduits shall be for medium mechanical stresses as per is standard.
 - e. The conduits shall have uniform wall thickness/cross section throughout.
- Rigid MS conduits:
 - a) 19, 25 & 32 mm - 16 gauge.
 - b) 38 mm & above - 14 gauge.
- Conduits shall bear the name, trade mark of the manufacturer and size of conduit on each length.
- Cut end of conduit pipes shall have neither sharp edges nor any burrs left to avoid damage to the insulation of conductor while pulling them through such conductors.
- All conduits shall be of ample size for easy 'draw in' and 'draw out' of all the wires in the conduits.
- The conduits shall be suitably packed in bundle for safe transit & handling duly covered at both ends up to 300mm length with hessian cloth.
- The conduits shall be delivered to the site in original bundles.
- Conduit accessories.
 - a. All conduit accessories such as bends, inspection bends, tees, inspection tees, elbows, reducers junction boxes etc. shall be made out of minimum 16 gauge thick ms enclosures threaded type and under no circumstances pin grip type or clamp grip type accessories shall be used.
 - b. Boxes shall have internally tapped spouts, junction boxes/inspection boxes shall be internally tapped table covers.
 - c. Bends, couplers etc. shall be solid type in recessed type of works and surface type of works.

➤ **PVC FRLS heavy duty conduit & accessories**

Wherever PVC FRLS heavy duty conduits are specified it shall be comprised as follows:

- PVC FRLS conduits
- The PVC FRLS heavy duty conduits to be supplied shall conform to the requirements of relevant latest standard in all respects.
- All rigid conduit pipes shall be of PVC FRLS and be ISI marked too.
- The wall thickness of the conduits shall not be less than 2.0 mm for conduits up to 32 mm dia. and not less than 2.2 mm for conduits above 32 mm dia.
- PVC conduits shall be solid drawn through out the length and one end shall be expanded type.
- Conduits shall be black colour inside and outside.
- The conduits shall have uniform wall thickness/cross section throughout. Conduits shall bear the name, trade mark of the manufacturer and size of conduit on each length.
- All conduits shall be of ample size for easy 'draw in' and 'draw out' of all the wires in the conduits.
- Conduit accessories.
 - a. All conduit accessories such as bends, tees, elbows, reducers junction boxes etc. shall be of PVC FRLS type, and under no circumstances pin grip type or clamp grip type accessories shall be used.
 - b. Bends, couplers etc. shall be solid type in recessed type of works and surface type of works.

➤ **Spacers and Saddles**

Saddles for surface conduit work on wall shall not be less than 0.55 mm (24 gauges) for conduits up to 25 mm dia. and not less than 0.9 mm (20 gauges) for larger diameter.

The minimum width and the thickness of clamps (gi) used for fixing conduits shall be as under:

S.No	Size of Conduit	Thickness
1	Up to 32mm	1.8mm(16swg)
2	Above 32mm	2.1mm(14swg)

➤ **Wiring conductors**

All wiring conductors shall be frls pvc insulated, copper conductors of 1100 v grade, and shall conform to is: 694 part ii (latest edition).

Wiring conductors shall be in red, blue, yellow, black and green colours for easy identification of wires.

The wires shall be in sealed coils in standard lengths and shall bear manufacturer's trade mark, name, voltage grade etc.

S.No	Size of Wire	Standard Length
1	up to 2.5mm ²	90/270 meter
2	4.0 mm ²	180 meter
3	6.0 mm ²	180 meter

➤ **Switches, Sockets and Accessories**

- CRCA box shall be concealed/surface type shall be made out from metal sheet enclosure galvanized – prevent from rusting, top, bottom and back side knock out for conduit entry from any direction . Possible to break open knock out without any special tool, sliding clamp for vertical adjustment, adjustment bracket are taped to prevent cement ingress.
- CRCA box minimum wall thickness shall be 1.6 mm in all sides except in the front.
- Depth of boxes shall not be more than 47 mm.
- The boxes shall be provided with suitable earthing screw/studs and no welding spot, free from the rust.
- Metal flush boxes shall be of 1/2/3/4/6/8/12 module as per schedule.
- General control switches shall be from 6 to 20 amp rating and shall be flush mounting modular type.
- Switches should be ISI marked as per the latest is 3854: 1997.
- Switches shall be provided with finger proof terminals with tunnel for guiding screw captive screws.
- It shall be possible to remove mechanism from front without opening frame and shall have laser marking on mechanisms.
- Arrow shall be showing the correct orientation of the mechanism and shall be shrouded internal mechanism under the rocker preventing visibility of sparks.
- All the switches and sockets shall be of flush mounting modular type.
- All sockets shall be 6/16 amp ratings and shall be of flush mounting modular type with separate control switches of the same rating as that of the sockets.
- All 6A & 16A- 2/3 pin combined shuttered socket (2 modules), shall have laser marking on mechanisms. arrow showing the correct orientation of the mechanism. twin shutters for 2/3pin socket. Stripping template – no exposure of live terminal.

- All combined 6/16A - 5 pin combined (2 module) isi marked as per is 1293: 1988, stripping template – no exposure of live terminal. t barrier for 6/16a socket for preventing short circuit.
- All 6/16A sockets outlet shall be of 5 pin type.
- All sockets, 6A and 16A ratings shall be of flush mounting modular type with combined control switches of the same rating as that of the sockets. All 6A and 16A sockets outlet shall be of 3 pin type.
- Fan regulators shall ISI marked as per is 11037: 1984 and shall be flush type and earthed with earth continuity conductor.
- The fan regulator shall be of electronic stepped type 0 to 5 steps Minimum.
- The fan regulator shall finger proof terminals with tunnel for guiding screwdriver and shall comprise of stripping template from stripping exact length of insulation , hum free.
- Modular plate shall have superior finish, screw less curved look, supported by metal frame behind for solid strength, shall possible to adjust in horizontal or vertical directions, when flush is tilted.
- Modular plate shall be supplied with 30mm long screws for perfect fixing if wall box is over flushed.
- Modular plate shall be made of from high grade polycarbonate material, curved smooth finish screw less appearance, no accumulation of dust.
- Modular plate shall be of 1 / 2 / 3 / 4 / 6 / 8 / 12 module as per schedule.
- All switches and sockets outlets shall have integral poly carbonate mounting plates and poly carbonate front cover plate of minimum 4.5 mm thick for normal area installation and 1.6 mm ss 304 matt finish for clean room area installation.
- Colour of the switches/sockets shall be in white colour or as per purchaser approved color shed.

➤ **Lamp holders, ball sockets, ceiling roses etc.**

- An accessory for light outlets such as lamp holders, ceiling roses, etc. shall be in conformity with requirements of relevant is specification.
- Screwed holder shall be used in brackets and pendants, light fittings shall have brass holders on t.w. round blocks.
- Ceiling roses for recessed system of wiring shall be porcelain make and flush type. for surface type of wiring this shall be bakelite.
- All ball sockets shall be made out of 16 gauge thick ms enclosures threaded type and under no circumstances pin grip type or clamp grip type accessories shall be used.

2.14.5 SPECIFICATION FOR CABLE TRAYS

➤ General

This specification covers the design, supply, fabrication fixing, aligning, and painting of cable trays and other steel frame works at site as required.

➤ Specification for pre-fabricated GI cable trays and gi cable tray covers

- The cable trays/covers shall be designed and fabricated out of crca sheet.
- Before fabrication, the CRCA sheet shall be properly straightened & cleaned properly to remove rust if any.

All materials used for fabrication of cable trays shall conform to IS 226.

- After fabrication the cable trays and accessories shall be free from sharp edges, corners, burrs and unevenness.
- Cable tray shall be hot dipped galvanized and minimum thickness of GI coating is 90 to 100 microns.
- Thickness of cable tray sheet steel
 - 50 mm to 450 mm cable tray = 2.0 mm thick.
 - 600 mm to 900 mm cable tray = 2.5 mm thick.
- Cable tray shall be either perforated or ladder type mentioned in the BOQ.
- Minimum height of the perforated cable tray is 50 mm and ladder type is 100 mm.
- Cable tray shall be in different widths and shall be in standard length 2500 mm long and suitable to couple two cable trays with coupler.
- Cable tray shall be supplied with coupler and all hardware such as passivated bolts, nuts washers and other consumable required.

2.14.6 SPECIFICATION FOR EARTHING SYSTEM

Earthing system

➤ General

This specification covers the requirements of supply, installation, testing and commissioning of earthing and lightning protection system. The work shall be carried out in accordance with relevant layout drawings, typical drawings and installation notes etc. This specification will cover the minimum requirement of earthing and lightning protection system for IVC facility.

All metal conduits, cable sheathes, switchgear, distribution boards, light fixtures, fan and all other metal parts forming part of the work shall be bonded together and connected by two separate and distinct conductors to earth electrodes.

➤ **Standard**

The earthing systems and lightning protection system shall comply with all currently applicable standards, regulations and safety codes of the locality where the installation is to be carried out. Nothing in this specification shall be construed to relieve the contractor of this responsibility.

Standards	Specifications
IS 3043	Code of practice of earthing
IS 2309	Practice for protection of building and allied structure against lightning
IEEE 80	Guide for safety in alternate current substation grounding indian electricity rules.
	Indian electricity rules 32, 61, 67 and 68 of ie rules 1956

➤ **General requirements**

- The HT & LT substation and each block shall be provided with a complete earthing system, compressing earth electrodes in conjunction with buried earth grid. the earthing system shall be designed as per is 3043.
- Fault level to be considered for sizing earth mat as short circuit calculation of each blocks and substation :
- However, the purchaser shall also get exact fault levels projected over 20 years from the electricity board.
- The effective earthing resistance shall not exceed 1 ohm. the soil resistivity, in the proposed be 150 ohm- meter. however, after the award of the contract, the electrical contractor shall measure the resistivity at his cost and based on this earthing system shall be designed. the soil treatment with salt charcoal etc. shall be done, if necessary, to bring down the soil resistivity to the required level to achieve required earthing resistance..
- All buried conductors shall be of gi with earthing electrodes of cast iron pipe.

➤ **Design basics for Earthing**

- Time duration for conductor sizing : 1 sec
- Earthing system designed : as per is 3043
 - Earthing conductors in outdoor areas shall be buried at least 600 mm. below finished grade level unless stated otherwise.
 - Minimum spacing between rod electrodes shall be provided unless stipulated otherwise.

- c. wherever earthing conductors cross cable trenches, underground service ducts, pipes, tunnels, etc., it shall be laid minimum 300 mm. below and shall be rerouted in case it fouls with equipment / structure foundations.
- d. tap-connections from the earthing grid to the equipment to be earthed shall be terminated on the earthing terminals of the equipment and structures, if the equipment is available at the time of laying the cover of 'earth riser' with temporary wooden equipment foundation / pedestal for future connections to the equipment earthing terminals.
- e. earthing conductors along their run on cable trench ladder columns, beams, walls, etc. shall be supported by suitable welding / cleating at intervals of 750 mm. earthing conductors along cable trenches shall be on the wall nearer to the equipment. cable trays and supports shall be connected to the earth mat at every 30 meters interval. wherever it passes through walls, floors, etc. galvanized iron sleeves shall be provided for the passage of the conductor.
- f. Reference drawing to earthing jointing,

S.No	Title	Drawing no.	Rev.
1	Typical detail for earthing jumper detail	NPI/120310/ELC(STD)/S1/08	00

- g. Earthing conductor around the building shall be buried in earth at a minimum distance of 150 mm. from the outer boundary of the building. in case high temperature is encountered at some location, the earthing conductor shall be laid minimum 1500 mm. away from such location.

➤ **Equipment and structures earthing**

- a. Earthing pads shall be provided by the supplier of the apparatus / equipment accessible position. the connection between earthing pads and the earthing grid shall be made by short and direct earthing lead free from kinks and splices. In case earthing pads are not provided on the item to be earthed, same shall be provided in consultation with purchaser/consultant.
- b. Whether specifically shown in drawings or not, steel / rcc columns metallic stairs etc. shall be connected to the nearby earthing grid conductors by two earthing lead. Electrical continuity shall be ensured by bonding the different sections of handrails and metallic stairs.
- c. Metallic pipes, conduits, and cable tray sections for cables installations shall be bonded to ensure electrical continuity and connected to earthing conductors at regular interval. apart from intermediate connections, beginning points shall also be connected to earthing system. Metallic conduits shall not be used as earth continuity conductor.

- d. Wherever earthing conductor crosses or runs along metallic structures such as water, conduits, pipe, etc. and steel reinforcement in concrete it shall be bonded to the same.
- e. Light poles, junction boxes on the poles, cables and boxes / glands lockout switches etc. shall be connected to the earthing conductor running along with the supply cable which, in turn, shall be connected to earthing grid conductor at minimum two points, whether specifically shown or not or separate earthing shall be provided as specified in boq.
- f. Metallic sheaths and armour of all multi core power cables shall be earthed at both equipment and switch gear end.
- g. Sub-station gates shall be connected to the gate rod by 65 sq.mm. 600 mm. long copper flexible braids and the gate post in turn shall be connected to the main mat. Alternative fence post shall be connected to main earthing conductor by separate earth conductor.

➤ **Specific requirement for earthing systems**

- a. If transformer neutral earthing specified in boq it shall be comprising like each earthing lead from the neutral of the transformers shall be directly connect to two electrodes treated earth pit which, in-turn, shall be connected to station earthing grid. all electrodes shall have cement concrete pit with a cast iron cover hinged to a cast iron frame to have an access to the joints.
- b. Earthing terminal of each lightning arrestor, power transformer and lightning down conductors shall be directly connected to earth electrodes which, in-turn, shall be connected to station earthing grid.
- c. Transformer neutral earthing connections shall be made through copper conductors and the joints shall be carried out through brazing.
- d. All earth electrodes in scope shall be provided with ½" water pipes & steel / brass taps, for watering the earth pits.

➤ **Jointing**

- a. Earthing connections with equipment earthing pads shall be bolted type. Contact surface shall be free from scale, paint, enamel, grease, rust or dirt. Two bolts shall be provided for making each connection. Equipment bolted connections, after being checked and tested shall be painted with anti-corrosive paint / compound.
- b. Connection between equipment earthing lead and main earthing conductors and between main earthing conductors shall be welded / brazed type. The welds should be treated with red lead and afterwards thickly coated with bitumen compound to prevent corrosion and shall be covered with jute material.
- c. Steel to copper connection shall be brazed type or with bi-metal connection and shall treated to prevent moisture ingress.

- d. Resistance of the joint shall not be more than the resistance of the equivalent length of the conductor.
- e. All ground connections shall be made by electric arc welding. all welded joints shall be allowed to cool down gradually to atmospheric temperature before putting any lead on it. artificial cooling shall not be allowed.
- f. Reference drawing to earthing jointing:

S.No	Title	Drawing No.	Rev.
1	Typical detail for earthing jointing detail	NPI/120310/ELC(STD)/S1/09	00

➤ **Control room earthing**

- An extension of earthing conductor from the station earthing shall be supplied and installed by the electrical contractor.
- The contractor shall be supplied and installed all required earthing for control and relay panel. Switch gears, local Pbs, distributors boards, etc. the metallic cases of all instruments, relays control switches mounted on the cubicle and panels shall be connected to the cubicle for panel earth busbar.

➤ **Conventional earthing electrodes:-**

I. Earthing electrodes

Earthing electrodes shall be as per the requirements of IS 3043 and lightning protection earthing shall be as per the requirements of IS:2309.

II. Plate electrode

Plate electrodes shall be made of copper plate of 3.15 mm thick and 600 x 600 mm size and of galvanized plate of 6.3 mm thick and 600 mm x 600 mm size .

The plate shall be buried vertically in ground at a depth of not less than 2.5 mtrs. to the top of the plate, the plate being encased in powdered charcoal to a thickness of 15 cms. around. river sand shall not be used.

Earth leads to the electrode shall be laid in a medium grade GI pipe and connected to the plate electrode with brass bolts, nuts and washers. The GI pipe of 40 mm dia. shall be placed vertically over the plate and terminated in a funnel of 10 cms above the ground. The funnel shall be enclosed in RCC chamber. The chamber shall be provided with ci frame and CI cover and chamber shall be also made by electrical contractor. The earth station shall also be provided with a suitable permanent identification label/tag.

Reference drawing to earthing jointing,

S.No.	Title	Drawing No.	Rev.
1	Typical drawing for copper plate earth electrodes	NPI/120310/ELC(STD)/S1/01	00
2	Typical drawing for GI plate earth electrodes	NPI/120310/ELC(STD)/S1/02	00

III. Pipe Electrode

Pipe electrode shall comprise of 100 mm dia. GI pipe class B or CI pipe , perforated type and not less than 3.0 meter long as per is 3043 and shall be without joints. CI/GI pipe shall be with removable cap/funnel and test link as per is 3043.

The pipe electrode shall be buried vertically in a pit of 350x350 mm size and filled with alternate layers of charcoal and salt and pipe with a funnel at the other end, clamped to the pipe electrode with brass bolts, nuts and washers.

GI pipe electrodes shall be cut tapered at the bottom and provided with holes of 12 mm dia. drilled not less than 75mm from each other up to 2 mtrs. length from bottom. The top end of the pipe shall be threaded and provided with GI cap. A hole shall be provided at 100 mm from the top end to receive a 13 mm bolt with double nuts and washers. The funnel and the earth lead connections shall be enclosed in a RCC chamber/inspection pit. The chamber shall be provided with CI frame and CI cover. A proper permanent identification tag/label/earth cable marker shall be provided for each electrode.

- Galvanization of GI items shall conform to IS 4736 class IV.
- The pipe electrodes, CI cover, air termination and test terminals shall be as per the drawing enclosed and shall conform to the relevant is specification
- Reference drawing to earthing jointing

S.No	Title	Drawing No.	Rev.
1	Typical drawing for GI pipe earth electrodes	NPI/120310/ELC(STD)/S1/03	00

IV. Chemical Earthing Electrodes

Chemical Earth Electrodes – (earth plus, ashlok or equivalent)

➤ Ashlok make chemical earth electrodes

- Primary electrode shall be made of smaller diameter mild steel pipe and secondary electrode shall be made from larger than of mild steel pipe. Primary electrode fitted into secondary electrodes.

- Both the electrodes either hot dip galvanized with high coating of zinc on outer and inner pipes or copper coated. Both the electrodes are tightly packed with high conductive, anti-corrosive mixture call crystalline conductive mixture (ccm) and top and bottom properly sealed.
- Pipe in pie technology and the super conductive crystalline compound shall protect the primary electrode from corrosion and also shall increase the surface area for enhanced conductivity.
- 300 to 450 mm dia 3200 mm long bore to made and place the electrode into bore and filled with back filling material. Back filling material shall be required eco-friendly and moisture retaining capacity.
- It shall be three level protection from corrosion comprising of
 - a) Pipe in pipe electrodes with end to end sealing
 - b) Layers of super conductive crystalline compound inside the pipe.
 - c) Backfilling material supplied separately in bags
- For normal good soil resistivity soil – make 300 mm dia bore in ground and place the electrodes in centre of the hole and filled earthing back filling compound around the electrodes. hard rock , rocky area , literate soil make 450 mm drill or auger a hole in the ground ,then fill the 150 mm dia. bore with black cotton soil than balance 300 mm dia bore shall be filled with chemical earth electrodes.
- The earthing electrodes are comprising 50 mm dia or 80 mm dia. pipe in pipe mild steel coated with hot dip GI or copper coated , 3048 mm long completely filled with the super conductive crystalline compound filled inside the pipe completely encloses the primary conductor.
- The backfill material should have high electrical conductivity, which should be constant and unaffected by changes in temperature and moisture. It should permanently remain embedded and should not dissolve in and swept away by water. It should have the ability to absorb large amount of water and retain the same over a long period of time. Finally, it should not cause or accelerate the corrosion of the earth electrode metal. SMI-280 C.
- The earth lead connections shall be enclosed in a masonry precast chamber/inspection pit. The chamber shall be provided with C.I frame and C.I cover. A proper permanent identification tag/label/earth cable marker shall be provided for each electrode.
- Reference drawing to earthing jointing,

S.No	Title	Drawing No.	Rev.
1	Typical drawing for GI pipe chemical earth electrodes (50 mm dia.)	NPI/120310/ELC(STD)/S1/04	00
2	Typical drawing for copper coated pipe chemical earth electrodes (50 mm dia.)	NPI/120310/ELC(STD)/S1/05	00

S.No	Title	Drawing No.	Rev.
3	Typical drawing for GI pipe chemical earth electrodes (80 mm dia.)	NPI/120310/ELC(STD)/S1/06	00
4	Typical drawing for copper coated pipe chemical earth electrodes (80 mm dia.)	NPI/120310/ELC(STD)/S1/07	00

➤ **Earth plus make chemical earth electrodes**

- Primary electrode shall be made of hot dip galvanized iron strip and secondary electrode shall be made of high quality gi pipe and pipe shall be filled with super conductive crystalline compound. The super conductive crystalline compound shall protect the primary electrode from corrosion and also shall increase the surface area for enhanced conductivity.
- It shall be three level protections from corrosion comprising of
 - ✓ Outer pipe (GI) 80 mm diameter x 3048 mm long in a end to end sealing
 - ✓ Layers of super conductive crystalline compound inside the pipe.
 - ✓ Primary conductor (copper strip)-50 x 6 mm x 3048 mm long.
 - ✓ Backfilling material supplied separately in bags
- Make 300 mm drill or auger a hole in the ground and place the electrode in the center of the hole and use earthing compound to backfill the area around the electrode.
- The earthing electrodes are comprising a outer pipe (gi) of 80 NB (IS 1239) class B , 3048 mm long completely filled with the super conductive crystalline compound filled inside the pipe completely encloses the primary conductor of 50 x 6 mm 3048 mm copper earth strip.
- The backfill material should have high electrical conductivity, which should be constant and unaffected by changes in temperature and moisture. It should permanently remain embedded and should not dissolve in and swept away by water. It should have the ability to absorb large amount of water and retain the same over a long period of time. Finally, it should not cause or accelerate the corrosion of the earth electrode metal SMI-280 C.
- The earth lead connections shall be enclosed in a masonry precast chamber/inspection pit. The chamber shall be provided with C.I frame and C.I cover. A proper permanent identification tag/label/earth cable marker shall be provided for each electrode.

➤ **Specification for lightning protection system:**

a) Conventional lightning protection system

- The method adopted for protection of buildings and allied structures against lightning shall be in accordance with IS: 2309.
- The lightning protection system shall comprise air terminations, horizontal conductors, down conductors, test links and earth electrodes.
- The air termination shall consist of copper spikes fixed onto 25 mm dia. copper tubes of at least 1.0 mtrs. or 1.5 mtrs. long having one prong spike at top with 100 mm dia. copper sphere and base plate 100mm dia. 6mm thick plate etc suitable to grout on the surface of the roof.
- 7/9 SWG GS shield wire with necessary tension and PG clamps, crimping type lugs / lightning spikes shall be used, as per statutory regulations. The shield wires / spikes shall protect bus bars and substation equipment with angle of shield as per statutory regulations.
- The conductors of the lightning protection system shall not be connected with conductors of the safety earthing system above ground level.
- Down conductors shall be supported by suitable clamps on the structures at 750 mm interval.
- Connection between each down conductor and pipe electrodes shall be made via test joint located approximately 1500 mm. above ground level.
- All metallic structures within a vicinity of 2000 mm in air and 5000 mm below ground shall be bonded to the conductors of lightning protection system.
- For building lightning protection system, unless otherwise specified air termination shall be of horizontal conductor. The horizontal air termination shall be so interconnected that no part of the roof is more than 9 metres away from the nearest horizontal conductor. For flat roof horizontal conductor shall generally be provided along the outer periphery of the roof.
- The number of down conductors from the air termination to the earth electrode shall be selected on the basis of one down conductor for every appropriate distance of building perimeter. However, in no case the number shall be less than two. Down conductor shall follow the most direct path possible between air termination and earth electrode avoiding sharp bends and kinks. All jointing and bonding shall be avoided in down conductors.
- The minimum size of horizontal conductor used shall be 32x6mm GI flat and the down conductor from air termination to the earth electrode shall be 25 x 6mm GI flat.

b) Early streamer emission lightning protection system

This specification covers early streamer emission external lightning protection system to be mounted on building. The lightning rod should be based on early streamer emission technology and should be capable of operating in all weather conditions and should be based on the standard NFC- 17-102.

- The external lightning protection system should be designed to effectively protect the required area.
- All the accessories used should also be suitable for use in all weather conditions, should be mechanically sound and generally suitable for use for the lightning protection applications.
- The lightning rod should have a corrosion resistant stainless steel body and should be capable of working in all weather conditions. The electronics which include the voltage gradient capacitor, the energy storage device and the high voltage pulse generator should be housed in an epoxy mould to avoid degradation due to atmospheric conditions.
- The lightning rod should be self powered type and should not require any form of external power supply / batteries for its operation.
- The lightning rod should be designed for operating efficiently up to a maximum earth resistance value of 10 ohms as per the standard NFC-17-102.
- The height of mounting for the lightning rod should be decided based on the required radius of coverage. However care should be taken to ensure that the lightning rod is mounted at least 2 mtrs above any other equipment like antenna / dish etc on the structure to be protected. The entire lightning protection system including the equipment mounting arrangement, number of down conductors, their routing, location of earth pits, etc should be designed for level-I protection as per NFC-17-102.

TESTS:

- a) The lightning rod should be designed and type tested for gain in anticipation time (δt) from any recognized / internationally reputed third party test house according to the standard NFC-17-102. A copy of test report for each model proposed should be furnished along with the offer.
- b) The lightning rod should be capable of being tested at site with a portable hand held tester. The tester should test each component and should be of self diagnostic type and should have a sufficiently large LCD display to avoid errors during testing.

MOUNTING STRUCTURE:

The mounting structure provides the appropriate height corresponding to the area to be protected by the lightning rod and shall be mounted with adequate number of holding fixtures on the top most point of the structure to be protected. the mast shall be made of aluminum pipes with a base plate of minimum size 250 x 250mm and shall have an frp adaptor. it shall be suitable for mounting on the roof of the building. a special

design GI mast with FRP adaptor shall be provided where the lightning rod is to be mounted on the chimney and the entire arrangement shall be built to suit the site conditions. The mast shall be supported by a lattice / guy wire arrangement where required.

DOWN CONDUCTOR:

Each lightning rod should be connected to the earth with at least 1 down conductor. The down conductor should be of electrolyte grade solid bare copper flat/round or PVC insulated flexible cable having minimum cross sectional area of 70 sqmm or gi strip of 150 sqmm. The down conductor should be secured to the structure using proper clamps / fasteners. The down conductor should be connected to the lightning rod using the adapting piece located at the base of the lightning rod. The down conductor should be routed along the shortest possible path to the earth termination system.

DISCHARGE COUNTER:

A discharge counter should be provided for each lightning rod. This should be capable of detecting the pulse when the lightning rod conducts the lightning discharge to the earth and should increment the counter value. This should not require any form of external power supply / batteries for its operation. It should have IP 65 protections and 6 digit window.

TEST TERMINAL:

Each down conductor should be provided with a test terminal which should be used to disconnect the earth termination system for measuring it.

3. 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:

IS 1200	Mode of measurement
IS 269	Ordinary portland cement
IS 1130	Marble (blocks, slabs and tiles)
IS 287	IS 287 Recommendation for maximum permissible moisture contents of Timber for different purposes
IS 1141	Code of practice for seasoning of timber
IS 2202	Wooden flush door shutter (Solid core type)
IS 6313	PART 2 Anti-termite measures in buildings, pre-constructional chemical Treatment measures
IS 104	Specification for ready mixed painted, brushing, zinc chrome, priming
IS 137	Ready mixed paint, brushing, matt or egg-shell flat, finishing, Interior to Indian standard colour as required
IS 427	Distemper, dry colour as required
IS 428	Distemper, oil emulsion, colour required
IS 5410	Cement paint, colour as required
IS 5411	Plastic emulsion paint as required
IS 6241	Method of test for determination of stripping value of road aggregate
IS 733	Aluminium alloys
IS 1948	Aluminium sections
IS 2720	Density test of aggregate

4. ACCEPTANCE CRITERIA

I. FOR FABRICATED/MANUFACTURED ITEMS

- Overall dimensions shall be within +1.5mm of the size shown on drawings.
- Mullions, transoms etc. shall be of one length and permissible deviations from straightness shall be limited to $\pm 1.5\text{mm}$ from the axis of the member.

- c) Doors and shutters shall operate without jamming. The clearance at head and jamb for door shutters shall not exceed 1.5mm. For double leaf doors, the gap at the meeting stiles shall not be more than 1.5mm.
- d) Door leaves shall be under-cut where shown on drawings.
- e) Doors, windows, frames etc. shall be on a true place free from warp or buckle.
- f) All welds/joints shall be dressed flush on exposed and contact surfaces.
- g) Correctness of location and smoothness of operations of all shop installed hardware and fixtures.
- h) Provision for hardware and fixtures to be installed at site.
- i) Glazing beads shall be cut with metered corners.
- j) Glazing clips, fixing devices etc. shall be supplied in adequate numbers.
- k) Shop coats shall be properly applied.
- l) Exposed Aluminium surfaces shall be free from scratches, stains and discoloration. Anodized surfaces shall present a uniform and pleasing look.

II. FOR INSTALLED ITEMS :

- a) Installation shall be at correct location, elevation and in general in a true vertical plane.
- b) Fixing details shall be strictly as shown on drawings.
- c) Assembly of composite unit shall be strictly as per drawing with mastic caulking at transoms & mullions, gaskets weather strips etc. complete.
- d) All openable sections shall operate smoothly without jamming.
- e) All frames on external walls shall be mastic caulked to prevent leakage through joint between frames & masonry.
- f) Locks, fasteners, floor spring etc. shall be fitted in position properly. Keys shall be non-interchangeable.
- g) Cutting to concrete or masonry shall be made good and all abrasions to shop paint shall be touched up with paint of same quality as shop paint.
- h) Contractor to execute sample of glazing/Panelling work at site for clients approval. Shop drawing with calculations to be submitted by contractor to Employer for approval.

5. REFERENCE IMAGES:

Note: The Images shown below are only references, However the table color, profiles, sizes shall be referred as per BOQ, Technical Specifications and the detailed drawing including color shall be get approved from client before proceeding for Manufacturing.

5.1. (BOQ2 – Loose Furnitures/Workstations) – S.No 4.1 – L-Shaped Workstations.



5.2. (BOQ2 – Loose Furnitures/Workstations) – S.No 4.2 – Linear Workstations with partition.



5.3. (BOQ2 – Loose Furnitures /Workstations) – S.No 4.3 – Linear Workstations without partition.



5.4. (BOQ2 – Loose Furnitures/Workstations) – S.No 1.11.1 – Reception Center Table



5.5. (BOQ2 – Loose Furnitures/Workstations) – S.No 1.11.2 – CMD/CEO Room Center Table.



5.6. (BOQ2 – Loose Furnitures/Workstations) – S.No 1.11.3 – Director/COO/CFO Room Center Table.



5.7. (BOQ2 – Loose Furnitures/Workstations) – S.No 1.10 – Corner Table



5.8. (BOQ2 – Loose Furnitures/Workstations) – S.No 2.1 – CMD/CEO Chairs.



5.9. (BOQ2 – Loose Furnitures) – S.No 2.7/2.8 – Conference/Boardroom Chairs.



High Back



Medium Back

5.10. (BOQ2 – Loose Furnitures) – S.No 2.9/2.10 – Meeting/Auditroom Chairs.



High Back



Medium Back

5.11. (BOQ2 – Loose Furnitures) – S.No 2.3 – Cabin Manager Chairs.



High Back

5.12. (BOQ2 – Loose Furnitures) – S.No 2.11 – Workstation/Cabin visitor Chairs (Medium Back).



5.13. (BOQ2 – Loose Furnitures) – S.No 2.4 – External Visitor Chairs (Medium Back).



5.14. (BOQ2 – Loose Furnitures) – S.No 2.12 – Training Hall Chairs.



5.15. (BOQ2 – Loose Furnitures) – S.No 2.14 – Reception Sofa [4SEATER as Shown below]



5.16. (BOQ2 – Loose Furnitures) – S.No 2.14 – Cabin Sofa [3SEATER]



5.17. (BOQ2 – Loose Furnitures) – S.No 2.16 – Cabin Sofa [1SEATER]



5.18. (BOQ2 – Loose Furnitures) – S.No 1.7 – Reception Table.



6. APPROVED MAKES:

LIST OF APPROVED MAKES	
ITEM	MAKES
DECORATIVE LAMINATES	SUNDEK / CENTURY / GREENLAM
WOOD VENEER	CENTURY / GREEN VENEER / DONEAR / SONEAR
CORIAN SURFACE	DURALEX / DUPONT / LG HAUSYS
ENTRANCE FLOOR MATS	3M / EURONICS / AMERICAN FLOOR MATS
VITRIFIED TILES	H&R JOHNSON / KAJARIA / SOMANI / NITCO
VINYL FLOORING	ARMSTRONG / FORBO
CORIAN SURFACE	DURALEX / DUPONT / LG HAUSYS
PLYWOOD	GREENPLY / CENTURY PLY / NATIONALPLYWOOD
ACOUSTICAL PANEL	FABRISORB / ARMSTRONG / ACOUSTIBLOC
TOUGHNED / FLOAT GLASSES	SAINT GOBAIN
LAMINATE	MERINO / GREENLAM / CENTURY
WATERPROOF PLYWOOD	GREENPLY / ARCHIDPLY
GYPSUM BOARD	INDIA GYPSUM / SAINT GOBAIN (GYPROC)
GRID FALSE CEILING	ARMSTRONG / GYPROC
ACOUSTIC FABRIC	ANUTONE / SAINT GOBLIN - ECOPHON / ATMOSPHERE
CARPET	MILLIKEN / FORBO
GLASS DOOR HARDWARE	DORMA / GODREJ / HAFELE
SLIDING FOLDING PARTITION DOOR	MODERNFOLD / DORMA / PANELFOLD
METAL DOOR	AZURAMAZDA / SAKTHI / ADVIK DOORS
VINYL GRAPHICS	3M / HEXIS
WALLPAPER	EGO
LACQUERED GLASS	SAINT-GOBAIN / ASAHI
ALUMINIUM SECTIONS	HAFELE / ENOX
GLASS PARTITIONS	SAINT GOBAIN / ASAHI

ROLLER BLINDS	VISTA OR EQUIVALENT
WASHBASIN	PARRY WARE / NIAGARA / JAGUAR CONTINENTAL
PILLAR COCK	JAGUAR FLR 5016 / PARRYWARE
BOTTLE TRAP	JAGUAR ALD-769L250X190 / PARRYWARE
FLEXI PLY	GREENPLY, ARCHIDPLY
SOUNDSCAPES	ARMSTRONG OR EQUIVELANT
ACOUSTIC PANELS	ARMSTRONG OR EQUIVELANT
ANTISTATIC VINYL FLOORING	ARMSTRONG / FORBO
PRELAM BOARD	ACTION TESA HERITAGE
TIMBER	AS APPROVED (BASIC RATE = RS. 1800/- PER CFT)
PLYWOOD COMMERCIAL MARINE GRADE ISI MARKED	ARCHI PLY / GREENLAM / CENTURY PLY
HERMETICALLY SEALED DOUBLE GLAZING	IMPACT SAFETY GLASS / ATUL TEMP / ABOVE SAID NORMAL GLASS CAN BE TOUGHNED
ACRYLIC EMULSION PAINT	ASIAN PAINT / ICI / BERGER
SYNTHETIC ENAMEL	ASIAN PAINT / ICI / BERGER
TEXTURED PAINT	ASIAN PAINT / ICI / OIKOS / VALPAINT
ANTI-TERMITE PAINT	WOOD CARE / WOOD GUARD
MELAMINE POLISH	MRF / LIGHT HOUSE / SHEENLAC
PATCH FITTINGS	OZONE GLOBAL / EBCO / DORMA
FLOOR SPRING	OZONE GLOBAL / EBCO / DORMA
EXPOSED DOOR CLOSER	OZONE GLOBAL / EBCO / DORMA
BEARING HINGES	HETTICH / EBCO / DORMA
MORTISE HANDLE	GODREJ / EUROPA / DORMA
DEAD LOCK	GODREJ / EUROPA / DORMA / NEKI
MORTISE LOCK CYLINDER	GODREJ / EUROPA / DORMA
PATCH DOOR HANDLE	HARWYN / GODREJ / DORMA
FLOOR MOUNTED DOOR STOPPER	GODREJ / EUROPA / DORMA / NEKI

CABINET HINGE (AUTO CLOSING)	HETTICH / GLOBAL / EBCO
AUTO DOOR BOLT	DAZ
CABINET HANDLES	KICH / CHH 84 S
FOAM RUBBER	U FOAM KURLON
VITRIFIED TILES	H&R JOHNSON / KAJARIA / SOMANI / NITCO
SILICON SEALANT	DOW CORNING / EQUIVALENT
GREY CEMENT	L&T 43 GRADE / AMBHUJA CEMENT / BIRLA 43
WHITE CEMENT	JK WHITE CEMENT / BIRLA WHITE
FROSTED FILM	LUMAR / AVARY / BIRLA 3M
COMPOSITE ALUMINIUM INTERIOR	ALUCOLIC / TIMEX BOND / VIVA BOARD
FABRIC AS PER APPROVED SAMPLE (BASIC RATE RS.175 - 250/- PER RMT.)	YAMINI - BASIC RATE - 450/ MTR, GLOBAL / GITANJALI - 150 / MTR
FIBRE GLASS WOOL	UP TWIGA / KIMCO / ROCKWOOL
110 DEG OPENING AUTO CLOSING HINGES	EBCO / HAFELE / BLUM
OIL BASED DISTEMPER	ASIAN / BERGER
STAINLESS STEEL	SAIL / JINDAL
ALUMINIUM SECTIONS	JINDAL / NALCO / INDAL / HINDALCO
GI SECTION FOR PARTITIONS & FALSE CEILING	INDIA GYPSUM / APPROVED EQUIVALENT
CHAIRS IN WORKSTATION / CABIN / VISITORS / CONFERENCE / BOARD / AUDIT / MEETING ROOMS	FEATHERLITE OR EQUIVALENT
CMD/CEO/COO/CFO/CS CHAIRS	GODREJ / FEATHERLITE / HERMAN MILLER
TRAINING HALL CHAIRS	GODREJ OR EQUIVALENT
SOFA	GODREJ / NILKAMAL / FEATHERLITE
COMPACTORS	GODREJ OR EQUIVALENT
GI / ALUMINIUM / SS	SAIL / JINDAL
CALCIUM SILICATE FALSE CEILING	ARMSTRONG, GYPROC (SAINT-GOBAIN), AEROLITE, RAMCO HILUX, INDIA GYPSUM.
METAL GRID FALSE CEILING	ARMSTRONG / HUNTER DOUGLAS
SS SCREWS FOR FABRICATION	KUNDAN / PUJA / ATUL
CERAMIC TILES	H&R JOHNSON / KAJARIA / SOMANI / NITCO

MS PIPING	TATA/JINDAL
SWITCHES & SOCKETS	ANCHOR ROMA/LEGRAND
COPPER WIRES / CABLES	HAVELL'S/FINOLEX/POLYCAB
DISTRIBUTION BOARD	HAVELLS/SCHEINDER/LEGRAND
MCB	HAVELLS/SCHEINDER/LEGRAND
LIGHT FIXTURES	WIPRO/BAJAJ/HAVELS
CARDIOD/WIRELESS MICROPHONES	AKG / SENNHEISER
CABLE TRAY	PATNI / UNIVERSAL
LCD PROJECTOR	PANASONIC / NEC
SPEAKERS	JBL / TANNOY / BOSCH
AMPLIFIERS	JBL / LAB.GRUPPEN / BOSCH
DSP	BSS / CLEARONE
AV SYSTEM CABLES	EXTRON / KRAMER
VIDEOCONFERENCING CABLES	EXTRON / CRESTRON
VIDEOCONFERENCE	POLYCOM/AVAYA
LFD DISPLAY	SAMSUNG / LG
SCALING PRESENTATION SWITCHER	EXTRON / CRESTRON

Note:

1. For any other item required to be incorporated, prior approval required from Employer.
2. Any Equivalent category to be get approved from Client before bidding by submitting the necessary point to point comparison of equivalent details.

7. 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 and 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 equipment 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 equipment.
- 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.

8. LAYOUT / SCHEMATIC DRAWINGS:

The Drawing is attached as Annexure – VIII.

9. BOQ ITEMS

The BOQ items list is attached as Annexure – VII.

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 and Commissioning of Office Interior Furnishing at Integrated Vaccine Complex, HBL Chengalpattu “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, up to 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: ramanr@hllbiotech.com & sureshs@hllbiotech.com. Due date of submission of the bid will be on **20-11-2015 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. **Tender Fee:** The tenderer should submit the tender fee **Rs.3,150/- (Rupees Three Thousand One Hundred and Fifty Only)** in the form of Demand Draft or Banker's cheque in favour of HLL Biotech limited, payable at Chennai. The DD/ Banker's cheque has to be enclosed along with the technical bid which is non-refundable. In case of cancellation of tender by HBL, the tender fee shall be refunded.
- c. Bid document bearing signature and seal of the bidder in all pages
- d. Pre-bid Meeting Minutes bearing signature and seal of the bidder in all pages
- e. **Section: II** (Scope of Work, Technical specification, technical brochures/datasheets/drawings/Model no)
- f. **Section IV** (Minimum Eligibility Criteria)
- g. **Section: VI** (Bid Data sheet)
- h. **Section: VII** (Past experience, including performance certificate from clients).

All other supporting documents (**mentioned in section IV**) 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: VIII** (Bid form) – duly filled, stamped and signed.
- b. **Section: IX** (Price Schedule - Financial bid in the prescribed format given in the bid document) - duly filled, stamped and signed in all the pages

2.1 The bids shall be enclosed in a sealed envelope super scribing "**Tender for Design, Supply, Installation and Commissioning of Office Interior Furnishing Works at Integrated Vaccine Complex, HBL Chengalpattu, tender ref no. HBL/TD/IVC/ADMIN/OFF_FURNISH/15-16 dtd 31.10.2015**" and shall be addressed to,

**"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. Country of Origin

- 3.1 Deleted

4. 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.

5. Tender Price & Documents

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

- a) All rates shall be quoted as per the tender form. The amount for each item should be worked out and requisite totals to be given. Special care should be taken to write the rates in figures as well as in words and the amount in figures only. The total amount should be written both in figures and words.
- b) The bidder should give the total composite price inclusive of all Central & state levies and taxes i.e., sales-tax, purchase-tax, turnover tax, service tax, works contract tax etc., or any other taxes or duties like octroi, local area development tax on material/labour etc. However the evaluation and comparison of respective bids shall be done on the basis of cost to HBL on the prices of the goods offered inclusive of duties and taxes, sales tax, packing, forwarding, freight and insurance charges etc.,
- c) Charges towards Packing & Forwarding, Inland Transportation, Insurance (local transportation and storage) would be borne by the Supplier from warehouse 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.

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)

6. 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

7. 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.

8. Notification of Award

- 8.1 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.
- 8.2 Upon selection of the successful bidder (technically qualified L1 party) HBL will promptly notify the same to successful Bidder through an LOI/Purchase Order.
- 8.3 EMD's of unsuccessful bidders will be returned only after award of contract to L1 Party and EMD's of technically non-responsive bidders will be returned after financial bid opening.
- 8.4 **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
MINIMUM ELIGIBILITY CRITERIA

1. The Bidder shall be either of the following:
 - Manufacturer of the tendered items
 - Authorized Dealer/Distributor/Agent/Re-seller of the tendered items
 - Authorized channel partner of the manufacturer/s for the tendered items(Copy of manufacturer authorization certificate as per **Annexure IV** shall be provided)
2. The bidder should have proven and demonstrable experience in turnkey interior works including Interior Furnishing, Furniture, Electrical etc., covering design, engineering, supply, installation, testing and commissioning, continuously during last 5 years ending 31/10/2015. (Purchase Orders & Job Completion Certificates in client(s)' letterhead for all the last 5 years have to be enclosed).
3. The bidder should have successfully completed during the last Five years ending 31/10/2015 the following: (Copy of Purchase orders and respective completion certificates in client(s)' letterhead to be attached).

“Three similar turnkey interior furnishing projects of worth not less than INR 200 Lakhs each

(or)

Two projects worth not less than INR 250 Lakhs each

(or)

A single project of worth not less than INR 300 Lakhs”
4. Average Annual financial turnover during the last 3 financial years, ending 31st March 2015 should not be less than INR 350 Lakhs (2012-13, 2013-14, and 2014-15).
5. Net worth of the company shall be positive during the last three financial years (2012-13, 2013-14 and 2014-15). Notarized copies of the Chartered Accountant certified balance sheet statements should be enclosed.

Note:

“The Purchaser reserves the right to assess the Tenderer's competency to perform the contract satisfactorily by inspecting their facility. Such assessment shall be done for each technically responsive bidder before opening the Price Bid.”

SECTION – V

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:-
- "HBL" means HLL Biotech Limited, which expression shall unless excluded by or repugnant to the context include HBL's representative.
 - "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.
 - "Earnest Money Deposit" (EMD) means Bid Security/ monetary or financial guarantee to be furnished by a tenderer along with its tender.
 - "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 10% of the contract value shall be released against Bank guarantee equivalent to 110% of the advance amount and submission of 5% 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. Advance will be paid only after the Contractor has unconditionally accepted the contract. The advance will be adjusted 10% from each running bill. Format for the Bank Guarantee is given as Annexure-III.

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

- b) 70% of the contract price shall be paid on receipt of goods in good condition and upon the submission of the following documents :
- Along with the original invoice, Two copies of supplier's invoice showing contract number, goods description, quantity, unit price and total amount;
 - Consignee Receipt Certificate as per Annexure-V 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 Defect Liability Period) 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 & Service Order) 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 AMC 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 **60 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. DEFECT LIABILITY PERIOD

- 9.1 The bidder shall give comprehensive warranty of all the major items, furnitures listed in the BOQ 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 The contractor/Bidder shall make good at his own cost and to the satisfaction of HBL's Representative all defects, or other faults, which may appear during the defect liability period.
- 9.3 In case of specialized work based on the contractors own design and their standard manufacturing

product incorporated in the works and in the event of the design of the system being defective or any components used found to be defective on account of manufacturing defects or otherwise forcing, any improvement thereof to be implemented or undertaken to rectify such inherent defects, notwithstanding additional cost of components or design modification, they shall be undertaken at contractor's own cost.

- 9.4 In default, HBL may employ and pay other agency or persons to amend and make good such damages, losses and expenses consequent thereon or incidental thereto such expense shall be made good and borne by the contractor/Bidder failing which the payment shall be recovered by forfeiting the PBG.

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:
- a) To rescind the agreement.
 - b) 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- VI

BID DATA SHEET

S.No	Description	Details
1.	Bid reference number	HBL/TD/IVC/ADMIN/OFF_FURNISH/15-16 dtd 31.10.2015
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- VII
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 - VIII

BID REF No: HBL/TD/IVC/ADMIN/OFF_FURNISH/15-16 dtd 31.10.2015

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 IX
PRICE SCHEDULE

The Price should be quoted against each BOQ items as per Annexure-VII

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/CST etc.,
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 –X
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?			
b.	Have you enclosed Tender Fee of required amount?			
2. a.	Have you enclosed duly filled Bid Form as per format in Section VIII?			
b.	Have you enclosed Power of Attorney in favour of the signatory?			
3.	Are you a SSI/MSE unit, if yes have you enclosed certificate of registration issued by 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 IX?			
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 IV) 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 2014-15)?			
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 - XI
SCHEDULE OF FISCAL ASPECTS

S No.	Particulars	Description
1	Submission of completed Tender	On or before 20-11-2015, at 15:00 Hrs
2	Opening of Technical Bid	20-11-2015, at 15:30 Hrs
3	Time period for Completion	The Design, Supply, Installation and Commissioning should be completed within 60 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	Defect Liability Period	24 (Twenty Four) months from the date of Completion and Final Acceptance Certificate
7	Earnest Money Deposit	Rs.12,50,000/- (Rupees Twelve Lakhs Fifty Thousand Only)
8	Refund of Earnest Money Deposit to unsuccessful bidders	On award of contract to successful bidder
9	Tender Fee	Rs.3,150/- (Rupees Three Thousand One Hundred and Fifty Only)
10	Transportation & Insurance	On account of Contractor
11	B.G/ DD to be in favor of	HLL Biotech Ltd., Chennai
12	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: ramanr@hllbiotech.com , sureshs@hllbiotech.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 - II

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 – III
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

MANUFACTURER'S AUTHORISATION FORM

To

HLL Biotech Limited, Chennai

Dear Sirs,

Ref. Your TE document No _____, dated _____

We, _____ who are proven and reputable manufacturers of _____ (*name and description of the goods offered in the tender*) having factories _____ at _____, hereby authorise Messrs _____ (*name and address of the agent*) to submit a tender, process the same further and enter into a contract with you against your requirement as contained in the above referred TE documents for the above goods manufactured by us.

We also hereby extend our full warranty for the goods and services offered for supply by the above firm against this TE document.

Yours faithfully,

[Signature with date, name and designation]

for and on behalf of Messrs _____

[Name & address of the manufacturers]

Note:

1. This letter of authorisation should be on the letter head of the manufacturing firm and should be signed by a person competent and having the power of attorney to legally bind the manufacturer.
2. Original letter may be sent.

Annexure – V

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 – VI
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.