Request for Proposal (RFP) for Augmentation & Enhancement of Existing 8-inch Fab of Semi-Conductor Laboratory (SCL), India

Two-stage bid invited for the augmentation and enhancement of the existing 8-inch fab of Semiconductor Laboratory (SCL), India, as per the enclosed scope of work.
Special Instructions: In Stage 1 of the bidding process, only technical bids are to be submitted. Please note that NO Commercial bids should be uploaded in Stage 1 of the bidding process.

SEMI-CONDUCTOR LABORATORY

(Government of India, MEITY)

Sector-72, S.A.S NAGAR, PUNJAB, INDIA

Request for Proposal (RFP)

for

Augmentation & Enhancement of Existing 8-inch Fab of Semi-Conductor Laboratory (SCL), India

SEMI-CONDUCTOR LABORATORY

(Government of India, MEITY)

Sector-72, S.A.S NAGAR, PUNJAB, INDIA

Contents

Definitions

In this RFP, the following words and expressions shall, unless repugnant to the context or meaning thereof, have the meaning hereinafter respectively assigned to them. The following terms are defined for use in this RFP:

Defined terms /Abbreviation	**Meaning of defined terms/Full form of Abbreviation**
Agreement Date	Date of signing of Contract Agreement
ASIC	Application-specific integrated circuits
Authority	Semi-Conductor Laboratory, India
Authorized Signatory	Full time Director/CEO/CMD/MD of the company/firm duly depicting the designation and submitted on official stationery of the Bidder along-with the authorization to do so
BCD	Bipolar CMOS-DMOS
Bid	Shall mean Pre-Qualification Bid and Financial Bid, unless specifically referred as either
Bidder(s)	Private Limited Company or a Public Limited Company making an application/proposal as a response to this RFP
Bid Documents	Shall mean this RFP and other documents to be provided by the Authority pursuant to this RFP, as modification, alteration, amendment, addenda, corrigenda and clarification from time to time by the Authority
Bid Package	Schedule of requirements encapsulated within one shell for modular splitting of Scope of RFP and Bids
Bid Process	Shall mean the entire process between issuance of this RFP and signing of the Contract Agreement(s)
CIS	CMOS Image Sensor
CMOS	Complementary Metal-Oxide Semiconductor
Consortium	Shall mean multiple parties coming together for submission of Bid in response to this RFP pursuant to the Consortium Agreement signed between them.

Defined terms /Abbreviation	Meaning of defined terms/Full form of Abbreviation
Consortium Agreement	Shall mean the consortium agreement to be provided as set out in ***Annexure I*** of this RFP
Consortium Members/ Members of Consortium	Members of the Consortium party to the Consortium Agreement in bidding for the RFP
Contractor(s)	The Selected Bidder(s) with whom the Contract Agreement(s) shall be signed
Contract Agreement(s)	Agreement(s) that shall be signed between the Authority and the Selected Bidder(s)
EMD	Earnest Money Deposit also referred to as Bid Security in parts of the document
Financial Bid	Shall mean the financial bid submitted for bid evaluation pursuant to Overall Bid Process and Financial Evaluation sections of this RFP
Government/Govt./GoI	Unless specified otherwise Government shall mean Government of India
HV	High-Voltage
Intellectual Property Rights /IPR/Intellectual Property / IP	Means all patents, trademarks, service marks, logos, get-up, trade names, internet domain names, rights in designs, blueprints, programmes and manuals, drawings, copyright (including rights in computer software), database rights, semiconductor rights in know-how and other intellectual property rights, in each case whether registered or unregistered and including applications for registration, and all rights or forms of protection having equivalent or similar effect anywhere in the world
Item(s)	Technology IP(s) in scope of Bid Package 2 that shall be bid for and evaluated separately
HV LDMOS	High Voltage Laterally Diffused Metal Oxide Semiconductor
Lead Member	Means the lead member of the Consortium, who shall in case of selection of the Consortium as Selected Bidder(s) be required to hold majority shareholding in the Consortium
LOA	Letter of Award issued to the Selected Bidder(s)
MCLR	Marginal Cost of Funds based Lending Rate

Defined terms /Abbreviation	Meaning of defined terms/Full form of Abbreviation
MeitY	Ministry of Electronics and Information Technology, Government of India
MoU	Memorandum of Understanding
NDA	Non-Disclosure Agreement
Nm	Nanometers
OEM	Original Equipment Manufacturer for wafer fab equipment
Parent / Parent Company	Shall mean, in relation to the Bidder(s), an entity who has ownership, directly or indirectly of more than 50% (fifty percent) of voting shares of the Bidder / Consortium Member
Project	Augmentation & Enhancement of Existing 8-inch Fab of Semi-Conductor Laboratory, India for which this RFP has been issued
Qualified Bidder(s)	The Bidder(s) who are qualified after Technical Evaluation in the Bid Process
RBI	Reserve Bank of India
RF	Radio Frequency
RF-CMOS	Radio Frequency Complementary Metal-Oxide Semiconductor
RFP	Request for Proposal
SCL	Semi-Conductor Laboratory, India
Selected Bidder(s)	Shall mean the Bidder(s) selected by the Authority through this RFP for the respective Bid Package(s)
Si	Silicon
VLSI	Very Large Scale Integration
WSPM	Wafer Starts Per Month

1. Instructions to Bidders

A. General

1.1 About SCL

Semi-Conductor Laboratory (SCL), Mohali – an autonomous body under the Ministry of Electronics and Information Technology (MeitY), Government of India, is the only Integrated Device Manufacturing Facility in the country and is engaged in the design, development and manufacture of Very Large Scale Integrated Circuits (VLSIs) since 1983. SCL provides end-to-end solutions for development of Application Specific Integrated Circuits (ASICs), Opto-electronics devices, and Micro Electro-Mechanical System (MEMS) Devices encompassing Design, Fabrication, Assembly, Packaging, Testing and Reliability Assurance.

SCL has developed more than 400 products / variants chips over last 40 years with ~80 products including analog, logic, memory, mixed signal, opto-electronic, power, CCD image sensors, MEMS for India's space and other sectors. SCL possesses deep experience of "Lab to Fab to ATP" processes, and its facilities include:

1) CMOS Fabrication facility – SCL has an 8" wafer fab line at 180 nm CMOS technology node for the fabrication of products in analog, digital and mixed-signal domains. The facility meets international standards in terms of design, process equipment, in-line inspection & metrology tools, and support utilities. Fab has cleanrooms of class 1, 10, 100, and 1000 with controlled environmental conditions.
2) MEMS Fabrication facility – SCL also has a 6" fab line for MEMS development, equipped with in-line metrology and inspection tools, as well as a scanning electron microscope for analysis during the process and product development activities. The 6" MEMS fab shares the building shell, cleanroom and utilities with 8" CMOS wafer fab.
3) VLSI Design – SCL has VLSI design domains spread over analog, digital, mixed-signal, memory, RF-CMOS, and optoelectronic in the form of ASICs, ASSPs, SoCs, and test chips. In-house technology development activities are also pursued for the development of potential future applications and enhancement of present products. Designs have been silicon proven and qualified to space grade/high-reliability levels for induction in space and other programs.
4) Assembly & Packaging – SCL excels in developing ceramic packages including those with high complexity. The operations take place in a clean room environment that complies with VLSI & MEMS packaging class 1000 & 10k standards. The facility is equipped with essential tools like dicing machines, die bonders, multi-zone furnaces for hermetic sealing, multi-function bond pull testers, laser welders, & more.
5) VLSI & MEMS Testing – SCL meets the demanding test requirements of complex, high speed

and high-pin-count integrated circuits in digital, mixed-signal, and analog domains. It also specializes in the testing of MEMS and RF devices such as Pressure, Temperature Sensors, Accelerometers, RF Switches, and Band-Pass Filters. Test plans and engineering activities are implemented at various stages of product development.

6) Reliability & Quality Assurance – Quality and reliability assurance adhere to global performance specifications. Screening and qualification of products for specific applications are integral parts of the process. Inline QA inspection and audits ensure defect-free manufacturing. Continuous improvement is prioritized through feedback and failure analysis.
7) Utilities Infrastructure – SCL possesses capabilities in power management, water management, air management, bulk gases & specialty gases distribution systems. The quality parameters of ultra-pure water (UPW) & bulk gases produced at SCL are at par with international standards. The air management system includes make-up air units, recirculation air handlers, & exhaust systems for solvent, general, & acid/toxic fumes.

1.2 SCL Modernization Background

A specialized and independent "India Semiconductor Mission (ISM)" led by global experts in semiconductor and display industry, has been set up under the Ministry of Electronics and Information Technology (MeitY), Government of India for spearheading semiconductor manufacturing in India and to drive long-term strategies for developing a sustainable ecosystem for semiconductors and display fabs. Government of India launched the Modified Programme for Semiconductors and Display Fab Ecosystem to further the vision of Aatmanirbhar Bharat and position India as the global hub for Electronics System Design & Manufacturing. The Union Cabinet has also approved that Ministry of Electronics and Information Technology (MeitY) will take requisite steps for modernization of Semi-conductor Laboratory (SCL), Mohali.

Towards fulfilment of this mandate, the augmentation and enhancement of the existing facility at SCL has been envisaged. The primary focus of this effort shall be the 8-inch 180nm CMOS fab-line with the following outlined objectives:

- Augment the capacity of the line to at least 1500 WSPM, build redundancy and improve operational performance
- Enhance technological capability to support broader needs of government, academia and industry
- Ensure operational continuity and improved customer commitment

Through this RFP, SCL intends to engage experienced Contractor(s) for augmentation and enhancement of the existing 8-inch fab-line as further detailed in this document.

1.3 Bid Schedule

The Authority shall endeavor to adhere to the following Bid Schedule:

Table 1: Bid Schedule

S. No	Event	Date / Time / Location
1)	Issuance of RFP	19/02/2025
2)	Last Date for sending Pre-Qualification Bid Clarifications and Queries	04/03/2025
3)	Pre-Qualification Bid Meeting	11/03/2025
4)	Last date for issuing Responses to Queries from Bidders and issuance of Addendum / Amended RFP	18/03/2025
5)	Pre-Qualification Bid Due Date	01/04/2025
6)	Pre-Qualification Bid Opening	02/04/2025
7)	Notification of Qualified Bidder(s) who shall proceed further in the Bid Process	15/04/2025
8)	Data Room and Site Visit Period	15/04/2025 to 29/04/2025
9)	Last Date for sending Financial Bid Clarifications and Queries	06/05/2025
10)	Pre-Financial Bid Meeting	06/05/2025
11)	Last date for issuing Responses to Queries from Qualified Bidders and issuance of Addendum / Amended RFP, if needed	13/05/2025
12)	Financial Bid Due Date	27/05/2025
13)	Financial Bid Opening	03/06/2025
14)	Issuance of LOA	Within 90 days from the Financial Bid Opening
15)	Signing of Contract Agreement(s)	Within 30 days from the Issuance of LOA to the Selected Bidder(s)

1.4 Overall Bid Process

The Bid Process for the Selection of Bidder(s) shall be as follows:

1) Post the issuance of the RFP, the Authority shall endeavor to hold a Pre-Qualification Bid Meeting where interested Bidder(s) can get responses to their queries and/or make suggestions to the Authority
2) Interested Bidder(s) shall then submit their Pre-Qualification Bid only in accordance with the RFP (including the Pre-Qualification Bid Meeting responses, any issued addenda, amendments, etc.)
3) The Pre-Qualification Bids submitted shall be evaluated in accordance with the provisions of this RFP as detailed in *section 1.23 (Technical Evaluation)*
4) The Authority shall notify the Bidder(s) deemed qualified after Technical Evaluation who shall proceed further in the Bid Process
5) The Qualified Bidder(s) shall have secured access to the Data Room (DR) containing other additional information that can be made available and is deemed fit by the Authority. In addition, Site Visit(s) (cost of which shall be borne by the Bidder(s)) may be scheduled, at the discretion of the Authority, to facilitate the Bidder(s) in their assessment and preparation of Financial Bid. The modalities related to the visit(s) and due diligence shall be provided in the DR
6) Post the DR and Site Visit(s) process, a Pre-Financial Bid Meeting shall be held where the Authority shall endeavor to respond to any queries and clarify any doubts to aid the Qualified Bidder(s) in preparing robust Financial Bids
7) Based on the Pre-Financial Bid Meeting and/or DR and Site Visit(s) process and/or other internal decisions, if required, the Authority may choose to issue any Addendum(s) or an Amended RFP, as the case may be
8) The Qualified Bidder(s) shall then prepare and submit their Financial Bid with reference to the RFP (including the Pre-Financial Bid Meeting responses, any issued addenda, amendments, etc.)
9) The Financial Bids submitted shall be evaluated in accordance with the provisions of this RFP as detailed in *section 1.24 (Financial Evaluation)*
10) The L1 Bidder(s) (Bidder quoting lowest priced Bid) for each Bid Package / Item will be considered as the Selected Bidder(s) for the quoted Bid Packages / Items in accordance with the provisions of this RFP as detailed in *section 1.25 (Selection of Bidder)*

1.5 Scope of RFP

Scope of this RFP covers 6 broad dimensions for augmentation and enhancement of the existing 8-

inch fab-line and is split into 3 Bid Packages that shall be bid for separately. Bidder(s) can bid for one or more Packages, provided they are eligible and meet the Qualification Criteria as defined in *section 1.23 (Technical Evaluation)* for the quoted Packages. Bid Package 2 is further split into 3 Items that shall be bid for separately. Bidder(s) can bid for one or more Items in this Bid Package, provided they are eligible for the quoted Items.
The scope covered under each Bid Package shall be as follows:

Bid Package 1:

1) Gap Analysis & Detailed Study to determine precise requirements for cleanroom and utilities sources and distribution modifications/augmentations and validate proposed plan for augmentation of 8-inch line to at least 1500 WSPM
2) Detailed engineering and execution of modifications / augmentations of existing cleanrooms, utilities plants / sources and utilities distribution for commissioning supplied equipment (35 nos.), upgraded equipment (22 nos.) and relocated existing equipment (as required)
3) Supply, Installation, Testing and Commissioning of equipment (35 nos.) and equipment upgrades (22 nos.)
4) De-hook, roll-out and crating/packing of existing 6-inch tools (25 nos.) from the sub-fab, 6-inch cleanrooms, and extension areas in the fab
5) Comprehensive Annual Maintenance Contract (CAMC) for 5 years, extensible up to 3 more years, for existing equipment and supplied equipment and upgrades post-warranty

Bid Package 2:

Supply and Qualification of technology IPs (03 nos.) and design enablement on the existing SCL process for 8-inch line as part of technology transfer for the below technologies:

a) **Item 1:** RF-CMOS
b) **Item 2:** BCD (HV LDMOS)
c) **Item 3:** CMOS Image Sensor (CIS)

Bid Package 3:

Supply and Implementation of Manufacturing Execution System (MES) along with equipment automation

The Authority has endeavored to provide sufficient details of the scope for all the Bid Packages. The Bidder(s) shall ascertain total requirements based on their understanding of nature of work, existing

facilities available at SCL, site conditions etc. and shall be deemed to be aware of and have understood all the requirements regarding the statutory rules, regulations, provisions, codes / standards / norms, as per industry standards along with site conditions, existing equipment, material specification, installation, testing, commissioning and functioning requirements with reference to various systems mentioned in this RFP. The Authority shall endeavor to provide additional information in the Data Room and allow site visit(s) to help the Bidder(s) prepare and submit robust Bids.

The detailed scope of work is given under the succeeding sections followed by a summary of the staging of the scope components.

1.5.1 Bid Package 1

I. Gap Analysis & Detailed Study for Proposed Augmentation of 8-inch Line

1) Gap Analysis & Detailed Study shall be carried out to determine precise requirements for modifications / augmentations of existing cleanroom and utilities generation sources/plants & distribution and validate the proposed plan for augmentation of 8-inch line to 1500 WSPM capacity. The scope for the Contractor(s) shall be:

   a) Prepare the utility matrix basis proposed equipment upgrades and installations (replacement and additional) and the utility matrix for the existing tools to arrive at the final utility matrix. Based upon the final utility matrix, carry out the assessment of the existing utilities to analyse the gaps between the utility requirements viz-a-viz existing utilities (enclosed in ***Appendix 6A : Existing Utility Generations Plants & System Capacity***)

   b) Identify the requirement for new generation plants / utilities like UPW, Bulk and Specialty gases, PCW, CDA, PVAC, Exhaust systems, MAUs, Electricals, DRUPS, Instrumentations, LLD and TGMs etc. based on gap findings in respect of installed capacity & quality and utilization/sharing of the base utilities infrastructure for other existing/proposed areas, including ATMP facility, within the SCL campus.

   c) Work out the feasibility and schematic drawings for setting up new utilities sources or generation plants/systems along with utilities distribution networks

   d) Study the different possible layouts for the location of proposed tools and their subsystems (like pumps, chillers, LDS, power/control racks, transformers etc.) in the fab and sub-fab taking into account all constraints of the facility and existing setup (see ***Appendix 6B : Constraints of Existing Infrastructure***)

e) Re-check structural strength and vibration specs of the existing fab building on waffle slab & non-waffle slab areas and study impact of additional loads and pop-outs on building/slabs due to proposed equipment addition

f) Validate proposed equipment list, staging plan, fab layout, cleanroom and utilities modifications/augmentations, etc. in a comprehensive manner to evaluate whether 8-inch line capacity can reach at least 1500 WSPM

2) The Contractor(s) shall prepare and submit the Gap Analysis & Detailed Study Report to SCL for review and approval including:

a) Recommendations for changes/modifications to proposed equipment upgrades, replacement and addition, if any

b) Recommendations for changes/modifications to proposed staging plan for equipment upgrades, replacement and addition, if any

c) Recommendations for changes/modifications to proposed fab equipment layout, if any

d) Structure analysis for the wafer fab building and slabs

e) Final utility matrix basis proposed and/or recommended equipment upgrades, replacement and additions

f) List of utilities sources plants/systems to be set up with required capacity and quality basis proposed and/or recommended equipment list

g) Schematic drawings for the possible locations of utilities generation plants/systems

h) Equipment move-out and move-in plan basis proposed and/or recommended fab equipment layout and staging plan

3) Any recommended changes/modifications to proposed equipment upgrades, replacement, and addition, the staging of the same, the scope of work for cleanroom and utilities sources and distribution modifications/augmentations shall be discussed and mutually aligned between the Contractor(s) and SCL, before placing purchase orders for any equipment/material and/or execution of any cleanroom and utilities works and/or sub-contracting of any services/works to any agency by the Contractor(s).

4) All the proposed locations for utilities sources/plants and fab layouts will be discussed with SCL and best fit locations and layout shall be finalized basis mutual agreement & will be approved by SCL for detailed engineering and execution.

II. Detailed Engineering and Execution of Cleanroom & Utilities Modifications / Augmentations & Tools Hook-up

To support the replacement and upgrades of existing equipment and the addition of new equipment, utilities connections / tools hook-up and cleanroom modifications are needed to meet the requirements for commissioning of supplied and upgraded tools. The scope of activities to be undertaken by the Contractor(s) in this regard shall include:

1) Carry out detailed engineering for cleanroom and utilities sources and distribution modifications/augmentations and submit:

   a) Utilities routing from the source to the fab

   b) Utilities routing in the fab and sub-fab

   c) Cleanroom modification drawings to support the equipment upgrades, replacement and addition

   d) Tool hook-up plan from the utilities to the tools including the pop-outs required if any

   SCL will review the drawings and provide comments on the same for revision if required. The Contractor(s) will modify the drawings and submit the same again. The drawings once approved will be named as Approved For Construction (AFC) drawings. AFC drawings will be followed for execution of the work.

2) Conversion of 6-inch cleanrooms to class-1000 Ballroom / Bay & Chase type along with re-configuration / re-identification of cleanroom areas such as gowning area, air-shower, wafer start area, wafer storage, ERT, Reticle store etc. to accommodate higher capacity of the line (e.g., bigger gowning, bigger wafer store, etc. needed to account for higher manpower, wafers) and optimal movement of lots and fab personnel (e.g., common entry, common corridor, etc.)

3) Clean room modification work involves removal of existing cleanroom components (wall panels, ceiling grid, floor, ULPA filters, lighting etc.) and installation of new cleanroom components to set up the cleanrooms as per the revised layout for 8” expansion

4) Clean room modification shall include making cut-outs in clean room wall panels, raised floor modification required for tool pedestal, wall panels dismantling and reassembly for tools movement, filters/blank panels relocation, etc. as required

5) For cleanroom modification, the required modification in the supply air duct work is covered in the scope of the Contractor(s). This includes Supply, Installation, Testing & Commissioning of GI duct, volume control dampers, flexible ducting, supports, etc.

6) Supply, Installation, Testing & Commissioning of new utility generation sources / plants and utilities distribution from new plants including the civil infrastructure as needed based on the Gap Analysis & Detailed Study Report and AFC drawings

7) Supply, Installation, Testing & Commissioning of replacement of existing Make-Up Air Unit plant with current or higher capacity

8) Supply, Installation, Testing, Commissioning & Validation of the modified cleanroom and utility sources and distribution modifications / augmentations for tool hook-up of the supplied equipment, upgraded equipment and any other tools if deemed necessary to be relocated including support tools in sub-fab as per AFC drawings. Work shall be carried out as per the specifications given in ***Appendix 5 : Details for Cleanroom and Utilities Modifications / Augmentations***.

9) The scope of tool hook-up installation for various utilities shall include utilities sources/plants augmentation and distribution network modification/creation as needed based on the final utility matrix and AFC drawings.

10) Utilities distribution shall be from the respective POC (Point of Connection) available in sub-fab (Ground Floor) / fab (First floor) up to the process/support tool connection port. While the existing utility-headers / sub-headers or lateral have spare POCs, in case the spare POC is not available in the nearest lateral, creating the same in the existing lateral will be in scope of the Contractor(s). The existing sub-fab layout is enclosed in ***Appendix 9 : Existing Sub-Fab Layout***. List of the POCs for existing 6-inch line in sub-fab for various utilities is enclosed in ***Appendix 7 : List of POCs***

11) For hooking specialty gases, co-axial tubing shall be extended from the spare valve sticks available in the respective VMB (Valve Manifold Box) installed in the sub-fab. In case, additional VMBs are required to be installed in sub-fab, the same shall be in the scope of the Contractor(s). Scope shall include Supply, Installation, Testing & Commissioning of the new identified VMBs. Please refer ***Appendix 7 : List of POCs*** for list of spare valve sticks available in respective VMBs.

12) Also, in case specialty gases other than those already installed at SCL are required for new tool-set / IP porting, gas cabinets for the same shall supplied & installed by the Contractor(s) as per SEMI guidelines. List of the specialty gas cabinets installed for 8-inch process-line is enclosed in ***Appendix 8 : List of Specialty Gas Cabinets***

13) Regarding electrical works / tool hook-up, scope of the work includes Supply, Installation, Testing and Commissioning of cabling from electrical panels to tools, local isolator, cable tray, cable termination, earthing, tagging, etc. as required.

14) The scope of work also includes supply and installation of pipe/ducts/tubes including complete fittings, valves, regulators, cables, cable trays, supports, clamps, saddles, auxiliary items like labels, etc. required for executing the tool hook-up.

15) If any tool pedestal is required for the supplied equipment, fabrication, supply and installation of the same is covered in the scope for executing the work.

16) If movement of any tool pedestal is required for the tool(s) to be relocated, its dismantling & movement from the existing location and installation at the new location is covered in the scope for executing the work.

17) The scope also includes modification of Life Safety Systems commensurate with the cleanroom changes, addition / relocation of fab tools and new utility requirements of VMBs, gas cabinets, chemical delivery systems, etc. as defined in ***Appendix 5 : Details for Cleanroom and Utilities Modifications / Augmentations***

18) All the plants / Systems / Components supplied & installed for the augmentation / modification of existing Utilities infrastructure shall be New (Not refurbished).

19) The Contractor(s) shall provide extensive operation and maintenance training for minimum 2 SCL Engineers/Technicians for each new utilities plants/systems installed and commissioned.

20) The Contractor(s) shall provide a comprehensive part and labor warranty for any and all new utilities plants/systems supplied and installed at SCL for a period of 24 months after commissioning and post-warranty support thereafter

III. Supply, Installation, Testing and Commissioning of Equipment and Equipment Upgrades

The Contractor(s) shall Supply, Install, Test and Commission equipment (35 nos.) in the 8-inch wafer fab as per SEMI standards. Out of these, 12 equipment are replacement for existing tools and 23 equipment are additional tools to be installed and commissioned. Additionally, 22 equipment upgrades are to be installed and commissioned as well.

The overall scope for equipment upgrades, replacement and addition shall be completed in 3 logical stages to cause minimal disruption of fab operations and introduce step changes in cleanroom and utilities modifications. The proposed staging/sequencing is shown below:

Table 2: Proposed Equipment Staging Plan

Stage	Equipment Action	Remarks
STAGE1	• **Upgrade:** 21 • **Replacement:** 2 • **Additional:** 1	• Upgrade, replace and add critical tools within existing 8” cleanroom • No potential impact on utilities sources • Cleanroom and utilities distribution modifications shall be required • Initiate clearing of 6” cleanroom and conversion to Ballroom / Bays & Chase in preparation of Stage 2
STAGE 2	• **Upgrade:** 1 • **Replacement:** 6 • **Additional:** 18	• Upgrade, replace and add tools for capacity, redundancy, yield and performance improvement in 8” line • Utilities sources augmentation may be needed with additional plants (e.g., UPW, PCW, Exhaust, MAU, DRUPS, Gas(es) Source & Purification, etc.) along with cleanroom and utilities distribution modifications / augmentations
STAGE 3	• **Relocation:** 3 • **Replacement:** 4 • **Additional:** 4	• CMP tools addition to increase 8” line capacity to up to 1500 WSPM • Relocate, replace and install additional tools to support MEMS in 8” in fab extension area

The proposed tool list for upgrades, replacement, and additional equipment is enclosed in ***Appendix 1 : Proposed Equipment Upgrades***, ***Appendix 2 : Proposed Equipment Replacement*** and ***Appendix 3 : Proposed Equipment Addition*** respectively. The stage in which these equipment are proposed to be upgraded/installed has also been indicated. The tentative location for the proposed replacement and additional equipment in the cleanroom has also been worked out and the proposed layout is enclosed in ***Appendix 4 : Proposed Equipment Layout***.

It is to be noted that the proposed equipment upgrades, replacement, and additions, the staging plan, the equipment layout, the total utilities requirement and the associated cleanroom modifications and utilities sources and distribution modifications / augmentations required shall be first determined and validated by the Selected Bidder(s) in the Detailed Engineering Study *(see Cleanroom & Utilities Modifications / Augmentations and Tools Hook-Up)* and changes or modifications required, if any, shall be mutually agreed to subsequently before placing purchase orders for tools and/or executing any cleanroom and utilities modification / augmentation works and/or entering into sub-contracts for the same.

The detailed scope of work for the Contractor(s) shall be as follows:

A. General

1) All equipment and upgrades should be as per details enlisted in ***Appendix 1 : Proposed Equipment Upgrades***, ***Appendix 2 : Proposed Equipment Replacement*** and ***Appendix 3 : Proposed Equipment Addition***. Any deviations from the specified make, condition or configuration should be clearly specified in the Technical Proposal remarks (see ***Annexure K***).
2) Provide Equipment Upgrade, Replacement and Addition Plan after Gap Analysis & Detailed Study (see *section 1.5.1[I] (Gap Analysis & Detailed Study for Proposed Augmentation of 8-inch Line)*) including finalized equipment and upgrade list, staging plan, installation drawings, work plan, scheduling, etc. so as to cause minimal disruption to the production operations and for timely preparation of installation site for the supplied equipment and upgrades
3) All equipment shall be purchased in the name of Semi-Conductor Laboratory (SCL), India with all necessary software licenses along with license key/password on perpetual basis in the name of Semi-Conductor Laboratory (SCL), India.
4) Any OEM-refurbished tools must have OEM support of at least 10 years from the time of tool acceptance, and a minimum residual life of 80% at the time of shipment, as per applicable government norms
5) Supply and install all necessary accessories, sub-modules, support tools viz. chiller units, chemical delivery system, liquid delivery system, vacuum pumps, etc. along with the equipment. These accessories shall be supplied as new, except in cases where such accessories are integral part of the equipment and the equipment itself is being supplied as refurbished
6) All the auxiliary items like interconnect matching cables, fittings, vacuum line, foundation pads/bolts, pedestals for vibration isolation, clamps, etc. and any other items as may be required to complete the installation and commissioning of the equipment and upgrades, shall also be supplied along with the equipment to achieve intended functionality of the equipment and upgrades
7) Carry out de-install, roll-out and proper crating/packing of existing equipment (total 15 nos. – including 12 equipment proposed for replacement as in ***Appendix 2 : Proposed Equipment Replacement*** and 3 other – BPSG Deposition, Optical Inspection Station and MEMS Coater tools). These are apart from the 25 nos. 6-inch tools identified separately in *section 1.5.1 [IV] (De-hook, Roll-out and Crating/Packing of 6-inch Tools)*
8) Relocation of existing tools is also needed to support the equipment upgrades, replacement and addition in an optimal layout and to support MEMS operations on the 8” line. 3 MEMS equipment have been identified for relocation in Stage 3 as shown below:

Table 3: MEMS Equipment to be Relocated

Equipment Description	Type of tool	Existing Tool model no	Current Installed Area	Proposed Installation area
Picotrack Coater	Process	Model No: PCT199	6" Litho	Fab Extension
Con-focal Optical Profiler	Meterology	Zeta-299	6" Wet	Fab Extension
Wafer Thickness Equipment	Meterology	M/s Film Matrix Model No; F-50, s1309	6" Diffusion	Fab Extension

Relocation of these, and any other equipment deemed necessary for relocation as determined in the Detailed Engineering Study (see Cleanroom & Utilities Modifications / Augmentations and Tools Hook-Up), shall be in the scope of the Contractor(s)

9) Supply and install chambers, modules, sub-modules, units, parts, power modules, software upgrade, special tools, licenses etc. as may be required to upgrade the existing equipment at its current location in the cleanrooms as per upgrade requirements enlisted in ***Appendix 1 : Proposed Equipment Upgrades***.
10) Supply the material and carry out necessary modifications/augmentations in existing cleanroom and utilities sources and distribution networks as per the industry standards, for installation and commissioning of the supplied equipment and upgrades, de-installation of existing equipment in case of replacement and relocation of existing equipment within the fab
11) Commission the supplied equipment and upgrades with the required utilities hook-up up to the tool and demonstrate the functionality at SCL site as per mutually agreed OEM acceptance procedure and/or industry standards
12) For the tools being supplied (replacement and/or addition) which are of a different make/model than those available at SCL, be they process tools (eg. Dielectric etcher, LAM DVI solvent strip, DNS bath for PDC, etc) or metrology tools, the Contractor(s) shall also provide process recipes for such tools, with recipe and success criteria to be defined by SCL
13) For the tools being supplied (replacement and/or addition) which are having the same make and model as those currently installed at SCL, the tool configuration should be compatible to the recipes being used in the corresponding tools at SCL in order to meet the process acceptance criteria for these tools
14) SCL shall have the option for pre-shipment inspection at the Contractor's / supplier's premises. Final acceptance, however, will be done after installation and demonstration of the functionality of the tool, as per the acceptance procedure at SCL.
15) Submit records and test method for all the FATs (Factory Acceptance Tests) done prior to shipment and submit detailed report for the same. These tests should include functioning of all critical modules of the equipment including in the assembled condition and submit test results of

all the process trials carried out at OEM/Suppliers site.

16) Supply two sets of technical documentation (in English language) containing, but not limited to, the following:
    a) System user manuals (two sets of clean room and two sets for grey rooms).
    b) System Hardware, Software manuals and SECS/GEM.
    c) Maintenance /Diagnostic / Trouble shooting manuals including schematics, Circuit diagram – Schematics (Electrical & Plumbing) along with parts identifier for all spares.
    d) OEM system/subsystem/accessories manuals
    e) Recommend / specify type of consumable required for pump and accessories.
    f) Supply all additional information such as application development notes, paper published/process information etc. related to the system.
17) General Specifications:
    a) Submit detailed Technical specifications of the supplied equipment and upgrades including modules, sub-modules, accessories for the Make & Model specified in ***Appendix 1 : Proposed Equipment Upgrades***, ***Appendix 2 : Proposed Equipment Replacement*** and ***Appendix 3 : Proposed Equipment Addition***. The Contractor(s) must also provide the configuration of the equipment being offered and make and model of all the support equipment/ sub modules.
    b) All the equipment to be supplied shall have to be compatible to cleanroom class in which these are to be installed.
    c) All the equipment and equipment software upgrade should be provided with latest hardware (controls system) and latest software versions.
    d) All the equipment have to be with SMIF Loaders (preferably Brooks make), compatible with Entegris POD & cassettes.
    e) All the equipment should preferably have in-situ Class-1 mini-environment.
    f) Provide all special and support tools required for operation & maintenance of the equipment.
    g) All the equipment should be SEMI Standard compliant.

B. Equipment Training

For the tools being procured (replacement and/or addition) which are of a different make/model than those available at SCL, be they process tools (eg. Dielectric etcher, LAM DVI solvent strip, DNS bath for PDC, etc.) or metrology tools, the Contractor(s) shall arrange for extensive operation and maintenance training for minimum 2 SCL Engineers per equipment at the OEM/Refurbisher's site or SCL, as mutually agreed for each equipment.

During commissioning of the tool, the Contractor(s) shall provide on-site hands-on training to the SCL personnel (including classroom training) on operations/process, application software, related applications, trouble-shooting and preventive maintenance of the tool supplied at SCL. The training should be extensive (at least for two weeks) enough so that quick diagnostics of problems and remedial actions is possible at SCL.

The Contractor(s) shall also provide training for the supplied upgrades.

C. Safety

All the tools / equipment and equipment upgrades shall conform to the applicable requirements of SEMI standards and appropriate safety mechanism in terms of warning alarms with interlock shutdowns, emergency machine off, etc. shall be provided for operator and environment safety.

The equipment safety assessment document as per applicable SEMI standard shall be provided along with operator and tool safety manual for model supplied.

Safety Protocol

1) SCL and the Contractor(s) team to prepare plan for replacement and new equipment install in line with approved fab equipment layout drawing.
2) Safety procedure for Tool/ Equipment utilities execution for Tool installs / De-install to be followed as under:
   SLE - Safety Check Electrical – Switch Gear Power Rating, Safety Interlocks, EMOs, Earthing etc
   SLO - Safety Check - Hazard warning labels, construction & connections were done according to procedures for Bulk Gases, PCW, UPW, PV, CDA, Exhaust, drain), Protection of Rotating/Moving parts, etc.
   SL1 - Safety Check – Safety requirement for process hazardous chemicals/ gases, All Alarms (Fire, Gas, liquid leak, Fire Protection, Approved Laser, UV, Ionization source safety etc

Safety during Commissioning

1) Authorization for hot works is required to be obtained from Fire and Safety Division (FSD) prior to start of work. The Contractor(s) shall submit a request giving details of work to be carried out.
2) Personal Protective equipment (PPEs) provision and adherence to wear as per job requirement shall be the Contractor's responsibility.
3) The Contractor(s) shall identify site focal safety officer who shall be coordinating with SCL Safety

Division and shall be responsible for generating report of near misses / incident report as required.

D. Warranty

Supplied Equipment

1) The Contractor(s) shall provide a comprehensive part and labor warranty for a period of 24 months after acceptance of the equipment/system at SCL.
2) The Contractor(s) shall also guarantee 80% uptime for the tool based on 24 hours working, 7 days a week.
3) The Contractor(s) has to give two Preventive Maintenance Visits per year in the Warranty Period of the tool.
4) The Contractor(s) shall provide all spares (including consumable spares: PM Kits, additional process kits) which will be required during preventive maintenance during the period of warranty.

Equipment Upgrade

1) The Contractor(s) shall provide 24 months warranty for equipment upgrades after acceptance of the upgrades at SCL
2) The Contractor(s) shall provide all spares (including consumable spares: PM Kits, additional Process kits) which will be required during preventive maintenance during the period of warranty.

E. Recommended Spares and Consumables

The Contractor(s) shall provide itemized List of Recommended Spares (for reference) for recommended essential spares and consumables which may be required for meeting the tool uptime.

IV. De-hook, Roll-out and Crating/Packing of 6-inch Tools

The Contractor(s) shall be responsible for:

1) Preparing and submitting plan for de-hooking & roll-out of existing 6-inch tools (25 nos.) from the 6-inch fab area. The list of 6" tools is enclosed in ***Appendix 11 : List of 6" Equipment to be Rmoved and Packed***
2) Ensuring identified 6-inch equipment is decontaminated, de-hooked of the utility connections upon safety clearance, moved out of the cleanrooms and packed/crated for safe storage.
3) Site preparation for installation of replacement and/or additional tools, including strip-out of existing utilities connections up to respective POCs (Point of Connections).

The de-hooking of the 6-inch tools shall commence as per the Authority's plan based on status of work completion in Bid Package 1 and/or other internal decisions made regarding MEMS capability.

V. Comprehensive Annual Maintenance Contract (CAMC)

The Comprehensive AMC for 5 years shall cover the existing 8" wafer fab equipment (as per ***Appendix 10 : Existing Equipment Included in CAMC***) as well as the supplied equipment (total 35 nos. – 12 replacement and 23 additional) and upgrades (22 nos.) after warranty period, as detailed in this RFP. The CAMC scope for the Contractor(s) shall include:

1) Preventive and corrective maintenance of equipment to maintain minimum equipment uptime of 80% calculated on monthly basis. In case the target uptime is not met, an annual penalty per equipment shall be levied.
2) Commit to a minimum line uptime factoring the CAMC scope and redundancy being built in the line via the installation of additional equipment
3) Maintain adequate team of service / equipment engineers at SCL site to maintain the equipment with provision for maintenance on 2-shift and weekends for priority lots / time-limit lots.
4) Secure back-to-back arrangement or MoU with prominent equipment OEMs whose tools are installed in the fab (AMAT, KLA, TEL, etc.) and provide external OEM / OEM trained experts for any critical maintenance
5) Maintain local inventory of spares and consumable spares including pumps, chillers, heat exchangers, RF generators, ozonators, microwave generators, CDS, LDS, etc.
6) Supply of all spares including consumable and non-consumable spares, back up parts for all equipment including their accessories and support equipment (in fab and sub-fab) shall be on open-book or pass-through cost basis
7) Supply of some high-consumption raw materials such as chemicals, gases, wafers, etc. on open-book or pass-through cost basis
8) Process kit cleaning
9) Failure analysis support
10) Flying wafer support
11) On job training for SCL Engineers

The warranty terms of the supplied equipment and upgrades may be appropriately adjusted in the CAMC. The CAMC shall be optionally extensible up to 3 more years, i.e., total 8 years tenure, contingent on satisfactory performance of the Contractor(s) and mutual agreement for extension.

Summary

In summary, the scope components of Bid Package 1 as laid out in preceding sections (except for Comprehensive AMC that shall continue throughout after signing of the Revised Contract Agreement for Bid Package 1) shall be staged as follows:

Table 4: Proposed Overall Staging Plan

<table>
<tr><th>Stage 0</th><th>Stage 1</th><th>Stage 2</th><th>Stage 3</th></tr>
<tr><td rowspan="3">Gap Analysis & Detailed Study to determine total utilities requirements, feasibility and schematics for setting up any new utility plants with distribution, and validating proposed equipment list, fab layout, staging plan, etc.</td><td>SITC of Equipment and Equipment Upgrades
[8” CMOS tools upgrade (21 nos.), replacement (02 nos.) & addition (01 nos.)]</td><td>SITC of Equipment and Equipment Upgrades
[8” CMOS tools upgrade (01 nos.), replacement (06 nos.) & addition (18 nos.)]</td><td>SITC of Equipment and Equipment Upgrades
[8” CMOS tools addition (02 nos.)]</td></tr>
<tr><td>Execution of Cleanroom and Utilities Modifications / Augmentations & Tools Hook-Up</td><td rowspan="2">Execution of Cleanroom and Utilities Modifications / Augmentations & Tools Hook-Up</td><td>SITC of Equipment and Equipment Upgrades
[MEMS tools relocation (03 nos.), replacement (04 nos.) and addition (02 nos.)]</td></tr>
<tr><td>De-hook, Roll-out and Crating/Packing of 6-inch tools (25 nos.)</td><td>Execution of Cleanroom and Utilities Modifications / Augmentations & Tools Hook-Up</td></tr>
</table>

The Contractor(s) shall be responsible for achievement of Bid Package 1 scope components and/or outcomes as per above proposed staging plan or the finalized staging plan after acceptance of Gap Analysis & Detailed Study Report. The Contractor(s) shall also prepare and submit detailed timeline and plan for scheduling of activities across the above scope components after Stage 0 at the time of signing of the Revised Contract Agreement for Bid Package 1. CAMC KPIs as per the SLAs will be defined and agreed to in the Contract / AMC Agreement. The Bidder(s) bidding for Bid Package 1, shall also furnish break-up of the Comprehensive AMC Total Cost year-over-year quoted in *Table 10 in Section 1.24 Financial Evaluation*.

1.5.2 Bid Package 2

Supply and Qualification of Technology IPs

A. General

The below technology IPs including design enablement are required to be embedded in SCL Dual Gate Oxide 180nm Technology Platform (refer ***Appendix 12 : SCL's 180nm CMOS Process Features*** for details) using existing tool set-up in SCL and with minimal disruption of operations of the 8-inch line:

1) **Item 1:** RF-CMOS technology
2) **Item 2:** BCD (HV LDMOS) technology
3) **Item 3:** CMOS Image Sensor (CIS) technology

The scope of work for the Contractor(s) shall be as follows:

1) Technology transfer of above IPs in SCL 180nm Technology Platform based on the specifications and other deliverables of the IPs as detailed in following sections.
2) Provide Process Design Kits (PDKs) for above technologies including design enablement in SCL flow, I/O Pad libraries, Reference Design Flows, Design Rule Manual (DRM), Model file, Symbol library, Pcell library, DRC & ERC rule file, LVS rule file, Pex rule file, DFM rule file / utility, dummy fill file / utility, Antenna file / utility, Process stack information for Electro-Magnetic (EM) simulation (applicable for RFCMOS), documentation, other relevant files, etc.
3) Preferably all PDKs should have coverage for industry-leading EDA vendors (Synopsys, Cadence, Siemens and Keysight) catering to their respective strengths
4) PDKs should be compatible with respect to established technology and will be the responsibility of the Contractor(s)
5) The scope of the Contractor(s) also includes supply of test chips / circuits for process enablement including GDS delivery, characterization and qualification through functional demonstration of test circuits.
6) Contractor(s) can choose to bid for any one, two or all three Tech IP(s) provided they meet the Technical Evaluation criteria as detailed in *Section 1.23 Technical Evaluation* for Bid Package 2. Financial Bid will be quoted and evaluated on item/ IP level as defined in *Table 9 : Financial Bid Format* in *Section 1.24 Financial Evaluation* for Bid Package 2.

For the IP porting, the PDK delivery (SCL's 1.8V/5V PDK), mask tape-out and wafer fabrication as per mutually agreed work plan, will be responsibility of SCL.

B. Scope of Technology Transfers

1) RF-CMOS Design Enablement in the existing baseline technology (for detailed SOW refer ***Appendix 13 : Detailed Scope of Work for RFCMOS Technology in SCL 180nm CMOS Process***):

   a) Provide test chip for process and device verification

   b) Industry standard scalable RF-models for all the active (1.8/3.3V MOSFETs) and passive devices (inductors, capacitors, varactors, etc.) characterized upto 20GHz frequency of operation over operating temperature range of baseline technology.

   c) Integrated RF design kit for RF active (MOSFETs – 1.8V & 3.3V) and passives (capacitors, inductors, varactors, diodes etc.)

   d) DC-RF characterization methodology, test plan and reference data

   e) High frequency I/O pad libraries with ESD protection (HBM ≥ 2kV).

   f) Technology demonstration of RF benchmark-circuits like LNA/Mixer/VCO or any other upto 6GHz operating frequency

2) BCD (HV LDMOS/ Laterally Diffused MOS) Technology (for detailed SOW refer ***Appendix 14 : Detailed Scope of Work for BCD (HV LDMOS) Technology in SCL 180nm CMOS Process***:

   Support for V_{DS} up to ~40V or higher and V_{GS} of 3.3V and/or 5V which includes:

   a) Provide test chips for process and device verification including reliability qualification & verification

   b) As a confidence building measure Contractor(s) to provide device characterization database (DC-AC curves along with critical device parameters such as Ron, SOA, high-voltage MOSFETs reliability trends).

   c) LDMOS / DEMOS devices suitable for different voltage ranges (up to 10, 15, 20, 40V) and BJTs

   d) Scalable drain voltage models for LDMOS / DEMOS

   e) Industry standard scalable high-voltage models for all variants of LDMOS / DEMOS valid over operating temperature range of baseline technology

f) Device, process and PDK support for all industry standard EDA tools

g) High voltage I/O pad libraries with ESD protection (HBM ≥ 2kV)

h) Reliability qualification of delivered LDMOS / DEMOS variants as per JEDEC standards

i) Shall provide suggestions for the necessary TCAD/EDA augmentation required for circuit design

3) CMOS Image Sensor technology (for detailed SOW refer ***Appendix 15 : Detailed Scope of Work for CIS Technology in SCL 180nm CMOS Process***):

a) The CMOS image sensor is to be integrated in SCL's existing 180nm CMOS process through a systematic work plan which includes both process and design enablement along with pixel and any other related IPs in SCL flow and support for all the characterization requirements.

b) Additional support for 1D and 2D stitching for large area arrays should be provided.

c) A CMOS image sensor process with below pixel specifications and features is required:

Table 5: CMOS Image Sensor Pixel Specifications

Parameter	**Value**
Pixel pitch (um)	5 to 40
Pixel Supply Voltage	3.3V
Illumination	Should support both front side and backside illumination
Photodiode type PPD (Pinned Photo Diode)	Pinned Photodiode (PPD) and Deep Depletion Extension (DDE)
Other features	Global shutter and rolling shutter

d) Pixel parameters including image lag, quantum efficiency, conversion factor, read noise, dark signal, etc. are to be demonstrated using an appropriate Active Pixel Array Sensor. The technology transfer should also demonstrate 3T and 4T pixels in small arrays (at least 5x5).

e) CIS pixel schematic, GDSII and timing diagrams are to be provided

C. Other Deliverables

For successful porting of technology at SCL, apart from the deliverables and specifications indicated for each technology IP above, the Contractor(s) shall also provide:

1) Test methodology, test parameters & limits, test algorithms for wafer level and device level testing
2) Applicable standard for qualification testing and methodology of qualification testing as per same standard.
3) Methodology for IP integration flow in digital and analog designs
4) Characterization and qualification test results for the parameters defined for each technology in this RFP document.
5) Related process control monitors (PCM), related GDSII, test plans and hardware requirements

D. Acceptance Criterion

All IPs shall be accepted by SCL, based upon characterization and qualification test results meeting requirements defined in this RFP including reliability.

E. Intellectual Property Rights (IPR)

SCL shall have full control over the IP and deliverables, including all licenses, enabling SCL to use the IP for internal usage as well as for external customers without any restriction and cost implications including but not limited to royalty and usage fees.

F. Training

Comprehensive training onsite /offsite/ online as per mutually agreed schedule and duration. The Contractor(s) shall provide Training Plan in advance for the different technologies.

1.5.3 Bid Package 3

Supply and Implementation of MES Software along with Equipment Automation

The scope of work for the Contractor(s) shall be as follows:

1) Basic Manufacturing Execution System compatible with 200 mm wafer line having modules and features as per detailed specifications (see ***Appendix 16: Detailed MES Specifications***) with below requirements:
   a) Software has to come bundled with minimum of 50 users' perpetual license.

b) Providing various modules as per detailed specifications.
c) Installing the software at SCL
d) Customization of modules as per SCL requirements
e) Integrating MES with various other software like Yield Management Software, Facility Monitoring System (FCMS) and Air Borne Particulate System etc.
f) Providing training to operators, modeling engineers, process engineers & fab engineers on various modules
g) Providing Administrative level training to CIM team

2) Hardware/Software required for running MES:
   a) All hardware and software has to be licensed in the name of SCL, India
   b) Provide required hardware: Database servers & Application Servers, directly or through partner
   c) Provide any additional software/hardware to be installed on clients for running MES, directly or through partner
   d) Provide the required underlying database (Oracle/SQL Server etc.), directly or through partner

3) Automatic Data Capturing & Parsing: Provide required hardware/software for configuring various existing (see ***Appendix 16: Detailed MES Specifications***) and finalized replacement/additional equipment after Gap Analysis & Detailed Study Report acceptance in Bid Package 1 (see *section 1.5.1[I] (Gap Analysis & Detailed Study for Proposed Augmentation of 8-inch Line)*) that are deemed compatible with SECS/GEM protocol automation for capturing/parsing equipment & process data and feeding into MES.

The implementation of MES software and equipment automation shall commence as per the Authority's plan based on status of work completion in Bid Packages 1 and 2 and/or other internal decisions made regarding MES capability.

1.6 Delivery and Payment Terms

1.6.1 Delivery Terms

1) The delivery period for successful completion i.e., achievement of final milestones as defined in *Table 7 : Project Cost Component Payment Milestones and Table 8 : Technology Cost Component Payment Milestones* , for cost/scope components shall be as below:
   a) Gap analysis & detailed study, as described in the Scope of RFP – Bid Package 1, shall be done within 3 months from the Agreement Date
   b) Equipment upgrades shall be done in a staggered manner and the upgrade of each equipment shall be completed within 4-5 weeks of release of the equipment for the upgrade.
   c) Supply, installation, testing and commissioning of all the equipment and equipment upgrades (including de-hook, roll-out and packing/crating of equipment to be replaced and relocation of existing equipment as necessary) and clean room and utilities modifications/augmentations & tools hook-up, as described in the Scope of RFP – Bid Package 1, shall be within 33 months from the Agreement Date.
   d) De-hook, roll-out and crating/packing of 6-inch tools, as described in the Scope of RFP – Bid Package 1, shall be within 3 months from the activity start (i.e., the Authority's go-ahead to commence the activity)
   e) Supply and qualification of technology IPs, as described in the Scope of RFP – Bid Package 2, shall be within 30 months from the Agreement Date
   f) Supply and implementation of MES software along with equipment automation, as described in the Scope of RFP – Bid Package 3, shall be within 24 months from the activity start (i.e., the Authority's go-ahead to commence the activity)
2) In addition to the final milestones, delivery terms shall also be applicable for the interim milestones as outlined in *Table 7 : Project Cost Component Payment Milestones and Table 8 : Technology Cost Component Payment Milestones*. The delivery period for these interim milestones shall be defined and agreed to in the Contract Agreement, and the subsequent AMC Agreement in the case of Bid Package 1.
3) All stores and materials such as upgrades, equipment, utilities, software, tools and tackles etc. should be supplied by the Contractor(s) on DAP, SCL SAS Nagar (F.O.R., SCL SAS Nagar) basis. Transportation from any overseas suppliers to IGI Airport New Delhi, customs clearance and inland transportation from IGI Airport to SCL SAS Nagar, loading at airports, unloading at SCL SAS Nagar and proper storage at SCL specified site shall be the responsibility of the Contractor(s).
4) In case of delays in delivery of cost/scope components against interim and/or final milestones for any of the Bid Packages or Items therein, for reasons directly attributable to the Contractor(s), the

Contractor(s) shall be liable to pay liquidated damages as outlined in *Table 6 : Liquidated Damages*. The Performance Security may be used to enforce the liquidated damages due to the Authority in case of default under this provision.

Table 6: Liquidated Damages

S.No	Cost	Project Cost/Scope Component	Liquidated Damages Criteria	Liquidated Damages Applicable
Bid Package 1				
1	Project Cost	Detailed engineering and execution of cleanroom and utilities modifications / augmentations & tools hook-up	Delay in interim or final milestone as defined in *Table 7*	0.5 (half) % of the Project Cost Component for each week or part thereof of delay for interim or final milestones. The total liquidated damages shall not exceed 10 (ten) % of the total Project Cost Component quoted by the Bidder(s)
2		Supply, installation, testing and commissioning of equipment and equipment upgrades	Delay in interim or final milestone as defined in *Table 7*	
3		De-hook, roll-out and crating/packing of 6-inch tools	Delay in interim or final milestone as defined in *Table 7*	
4	AMC Cost	Comprehensive AMC	Failure to meet minimum equipment uptime of 80% calculated on monthly basis & other KPIs as per the SLAs that will be defined and agreed to in the Contract Agreement, and the subsequent AMC Agreement	Penalty per equipment calculated on a monthly basis as defined in the Contract Agreement, and the subsequent AMC Agreement. The total liquidated damages shall not exceed 10 (ten) % of the total AMC Cost quoted by the Bidder(s)
Bid Package 2 (for each Item/IP)				
1	Technology Cost	Supply and qualification of technology IP(s)	Delay in interim or final milestone as defined in *Table 8*	0.5 (half) % of the Technology Cost Component for each week or part thereof of delay for interim or final milestones. The total liquidated damages shall not exceed 10 (ten) % of the total Technology Cost Component quoted by the Bidder(s) for each Item/IP
Bid Package 3				
1	Technology Cost	Supply and implementation of MES software along with equipment automation	Delay in interim or final milestone as defined in *Table 8*	0.5 (half) % of the Technology Cost Component for each week or part thereof of delay for interim or final milestones. The total liquidated damages shall not exceed

				10 (ten) % of the total Technology Cost Component quoted by the Bidder(s)

1.6.2 Payment Terms

The Contractor(s), for meeting the Scope of RFP, shall receive payment (based on Bid Packages quoted for) from the Authority in the form of:

1) Project Cost incurred towards detailed engineering and execution of cleanroom and utilities modifications/augmentations & tools hook-up, SITC of equipment and equipment upgrades, and de-hook, roll-out and crating/packing of 6-inch tools against Bid Package 1, as detailed in this RFP
2) AMC Cost for rendering Comprehensive Annual Maintenance Contract services against Bid Package 1, as detailed in this RFP
3) Technology Cost incurred towards supply and qualification of technology IPs against Bid Package 2 and/or supply and implementation of MES software along with equipment automation against Bid Package 3, as detailed in this RFP

The remuneration shall be provided subject to below terms:

1) The Contractor(s) shall prepare and submit a Project Cost Statement (if submitted bid for Bid Package 1) at the beginning of each quarter, detailing the payment due for work carried out and milestones achieved in the previous quarter, along with actual invoices for any supply of goods or services, or contracting done in the period.
2) The Project Cost payment, less liquidated damages if any, shall be made upon completion and acceptance of milestones and acceptance and sign-off of the Project Cost Statement submitted by the Contractor(s)
3) The payment due in each Project Cost Statement shall be commensurate with the milestones achieved, for the proportion of scope delivered in the previous quarter under each project cost component of the Bid Package(s) quoted, as shown below:

Table 7: Project Cost Component Payment Milestones

S.No	Project Cost Component	Milestone	Payment (% of Quoted Project Cost Component)
Bid Package 1			
1	Detailed engineering and execution of cleanroom and	Acceptance of detailed engineering drawings and sign-off on AFC drawings	**10%**

	utilities modifications / augmentations & tools hook-up	Receipt of materials, accessories, systems, etc. for cleanroom and utilities modifications/augmentations	**20%**
		Sign-off on completion of cleanroom and utilities modifications / augmentations as per AFC drawings	**50%**
		Successful running of the cleanroom and utilities modifications / augmentations for one month after acceptance sign-off	**20%**
2	Supply, installation, testing and commissioning of equipment and equipment upgrades	Receipt of supplied equipment and materials at SCL site	**50%**
		Installation, testing and commissioning of respective equipment and equipment upgrades as per SCL acceptance criteria	**30%**
		Successful running of the equipment for one month after acceptance sign-off	**20%**
3	De-hook, roll-out and crating/packing of 6-inch tools	Approval of plan for de-installation and site preparation thereafter	**20%**
		Sign-off on completion of de-hook, roll-out and crating/packing of 6-inch tools as per approved plan	**80%**

4) The Contractor(s) shall prepare and submit AMC Cost Statement (if submitted bid for Bid Package 1) at the beginning of each quarter, detailing the payment due for services provided and/or work carried out in the previous quarter along with actual invoices for spares used and report on KPIs met as per the SLA defined in the Contract Agreement
5) The AMC Cost payment, less liquidated damages if any, shall be made in quarterly installments upon acceptance and sign-off of the quarterly AMC Cost Statement submitted by the Contractor(s)
6) The Contractor(s) shall prepare and submit a Technology Cost Statement (if submitted bid for any Item(s) in Bid Package 2 and/or Bid Package 3) at the beginning of each quarter, detailing the payment due for work carried out and milestones achieved in the previous quarter, along with actual invoices for any supply of goods or services, or contracting done in the period.
7) The Technology Cost payment, less liquidated damages if any, shall be made upon completion of milestones and acceptance and sign-off of the Technology Cost Statement submitted by the Contractor(s)
8) The payment due in each Technology Cost Statement shall be commensurate with the milestones achieved, for the proportion of scope delivered in the previous quarter under each technology cost component of the Bid Package(s) quoted as shown below:

Table 8: Technology Cost Component Payment Milestones

S.No	Technology Cost Component	Milestone	Payment (% of Quoted Technology Cost Component)
Bid Package 2 (for each Item/IP)			
1	Supply and qualification of technology IP(s)	Receipt of initial documentation on IP including test chip GDS	**10%**
		Tapeout-1 and sign-off on characterization test results	**20%**
		Tapeout-2 and sign-off on qualification test results	**20%**
		Final delivery of IP including PDKs, requisite documentation and training	**30%**
		Successful running of the technology on SCL flow for two months after final delivery	**20%**
Bid Package 3			
1	Supply and implementation of MES software along with equipment automation	Receipt of MES and all related software and hardware	**30%**
		Complete installation and successful testing of the software and all its modules/functionalities	**30%**
		Completing all customizations as needed for SCL process, data model, required capabilities, etc.	**10%**
		Successful implementation of equipment automation for data capturing and parsing and feeding into MES for finalized equipment list	**10%**
		Sign-off on successful running of MES and equipment automation for two months after final acceptance	**20%**

1.7 Eligibility of Bidders

1.7.1 General Eligibility

For determining the eligibility of Bidders for submission of Bids hereunder, the following shall apply:

1) The Bidder may be a single entity or a group of entities (the “Consortium”), coming together to implement the Project. However, no Bidder applying individually or as a member of a Consortium, as the case may be, can be member of another Bidder for the same Bid Package or Item. The term Bidder used herein would apply to both a single entity and a Consortium
2) A Bidder may be a natural person, private entity, government-owned entity or any combination of them with a formal intent to enter into an agreement or under an existing agreement to form a Consortium. A Consortium shall be eligible for consideration subject to the conditions set out in

Consortium Requirements below.

3) A Bidder shall not have a conflict of interest (the "Conflict of Interest") that affects the Bidding Process. Any Bidder found to have a Conflict of Interest shall be disqualified. In the event of disqualification, the Authority shall be entitled to forfeit and appropriate the Bid Security or Performance Security, as the case may be, as mutually agreed genuine pre-estimated loss and damage likely to be suffered and incurred by the Authority and not by way of penalty for, inter alia, the time, cost and effort of the Authority, including consideration of such Bidder's proposal (the "Damages"), without prejudice to any other right or remedy that may be available to the Authority under the Bidding Documents and/ or the Contract Agreement or otherwise. Without limiting the generality of the above, a Bidder shall be deemed to have a Conflict of Interest affecting the Bidding Process, if:
   a) the Bidder, its Member or Associate (or any constituent thereof) and any other Bidder, its Member or any Associate thereof (or any constituent thereof) have common controlling shareholders or other ownership interest; provided that this disqualification shall not apply in cases where the direct or indirect shareholding of a Bidder, its Member or an Associate thereof (or any shareholder thereof having a shareholding of more than 20% (twenty per cent) of the paid up and subscribed share capital of such Bidder, Member or Associate, as the case may be) in the other Bidder, its Member or Associate is less than 20%(twenty percent) of the subscribed and paid up equity share capital thereof; provided further that this disqualification shall not apply to any ownership by a bank, insurance company, pension fund or a public financial institution referred to in subsection (72) of section 2 of the Companies Act, 2013. For the purposes of this clause, indirect shareholding held through one or more intermediate persons shall be computed as follows: (aa) where any intermediary is controlled by a person through management control or otherwise, the entire shareholding held by such controlled intermediary in any other person (the "Subject Person") shall be taken into account for computing the shareholding of such controlling person in the Subject Person; and (bb) subject always to sub-clause (aa) above, where a person does not exercise control over an intermediary, which has shareholding in the Subject Person, the computation of indirect shareholding of such person in the Subject Person shall be undertaken on a proportionate basis; provided, however, that no such shareholding shall be reckoned under this sub-clause (bb) if the shareholding of such person in the intermediary is less than 26% of the subscribed and paid up equity shareholding of such intermediary; or
   b) a constituent of such Bidder is also a constituent of another Bidder; or
   c) such Bidder, its Member or any Associate thereof receives or has received any direct or indirect subsidy, grant, concessional loan or subordinated debt from any other Bidder, its Member or any Associate thereof or has provided any such subsidy, grant, concessional loan or subordinated debt to any other Bidder, its Member or any Associate thereof; or

d) such Bidder has the same legal representative for purposes of this Bid as any other Bidder; or

e) such Bidder, or any Associate thereof has a relationship with another Bidder, or any Associate thereof, directly or through common third party/ parties, that puts either or both of them in a position to have access to each other's information about, or to influence the Bid of either or each other; or

f) such Bidder, or any Associate thereof has participated as a consultant to the Authority in the preparation of any documents, design or technical specifications of the Project.

4) A Bidder shall be liable for disqualification if any legal, financial or technical adviser of the Authority in relation to the Project is engaged by the Bidder, its Member or any Associate thereof, as the case may be, in any manner for matters related to or incidental to the Project. For the avoidance of doubt, this disqualification shall not apply where such adviser was engaged by the Bidder, its Member or Associate in the past but its assignment expired or was terminated at least 30 (thirty) days prior to the Bid Due Date. Nor will this disqualification apply where such adviser is engaged after a period of 3 (three) years from the Bid Due Date.

Explanation: In case a Bidder is a Consortium, then the term Bidder as used in this clause, shall include each Member of such Consortium.

1.7.2 Consortium Requirements

In case the Bidder(s) is a Consortium, the following conditions shall apply:

1) The total Members of the Consortium, including Lead Member, for any Bid Package shall not exceed 03 (three)
2) A Bidder bidding in an individual capacity cannot at the same time be Member of a Consortium for the same Bid Package or Item. Further, a member of a particular Bidder Consortium cannot be Member of any other Bidder Consortium for the same Bid Package or Item. However, Bidder(s) may participate individually for one or more Bid Packages or Items and be Member of a Consortium for the other Bid Packages or Items
3) Members of a Consortium shall nominate one member as the Lead Member. The nomination(s) shall be supported by a power of attorney, executed as per applicable law and in the format specified in this RFP, signed by all the remaining members of the Consortium
4) The duties, responsibilities and powers of such Lead Member shall be specifically included in the Consortium Agreement. It is expected that the Lead Member would be authorized to incur liabilities and to receive instructions for and on behalf of the Consortium
5) Change in composition of the Consortium(s) shall be permitted only in accordance with the provisions of Contract Agreement executed between the Selected Bidder(s) and the Authority and

with the Authority's prior approval

6) Each member of the Consortium(s), when submitting its Bid, is required to furnish the declarations as required in this RFP document.
7) The capabilities of the Consortium(s) as a whole shall be considered for the purpose of evaluating the Pre-Qualification Bid as per the defined Qualification Criteria for each Bid Package or Item
8) The Consortium(s) is required to submit:
   a) An executed Consortium Agreement as per the format set out in ***Annexure I*** of this RFP;
   b) A power of attorney for the authorized signatory as per the format set out in ***Annexure E1*** of this RFP;
   c) A power of attorney for Lead Member of Consortium as per the format set out in ***Annexure E2*** of this RFP

1.8 Amendment of the RFP

1) Up until the date that is mentioned in the Bid Schedule, the Authority may, for any reason, whether on its own initiative or in response to a query raised or clarifications requested by a Bidder in writing, amend the RFP by issuing an Addendum or an amended RFP
2) All Addenda/amendments will be issued on the Authority's website **www.scl.gov.in** & procurement portal **https://eprocure.gov.in**
3) The Bidders are required to read the RFP with any Addenda/amendments that may be issued in accordance with this section
4) Each Addendum/amendment will be binding on the Bidders
5) Any oral statements made by the Authority or its advisors regarding the Bid Process, the RFP or on any other matter, shall not be considered as amending the RFP
6) The Authority will assume that the information contained in the Addendum/amendments will have been taken into account by the Bidder in its Bid. The Authority assumes no responsibility for the failure of a Bidder to submit the Bid in accordance with the terms of the Addendum/amendments or for any consequent losses suffered by the Bidder

1.9 Rights of the Authority

The Authority reserves the right to verify all statements, information and documents submitted by the Bidder in response to this RFP and the Bidder shall, when so required by the Authority, make available all such information, evidence and documents as may be necessary for such verification. Any such verification, or lack of such verification, by the Authority shall not relieve the bidder of its obligations or liabilities hereunder nor will it affect any rights of the Authority thereunder.

The Authority, in its sole discretion and without incurring any obligation or liability, reserves the right,

at any time, to:

1) Suspend the Bid Process and/or amend and/or supplement the Bid Process or modify the dates or other terms and conditions relating thereto;
2) Consult with any Bidder in order to receive clarification or further information at any stage of the Bid Process;
3) Retain any information, documents and/or evidence submitted to the Authority by and/or on behalf of any Bidder;
4) Independently verify, disqualify, reject and/or accept any and all documents, information and/or evidence submitted by or on behalf of any Bidder;
5) Reject any Bid and forfeit the Bid Security if:
   a) At any time, a material misrepresentation is made or uncovered, or Bidder is found to be involved in fraud and corrupt practices as per *section 1.10 (Fair Practices & Anti-Corruption)*, or Bidder is having conflict of interest as per *section 1.7 (Eligibility of Bidders)*; or
   b) The Bidder does not provide, within the time specified by the Authority, the supplemental information sought by the Authority for evaluation of the Bid; or
   c) The Authority finds any Bid to be unreasonable, impractical or unviable
6) Accept or reject a Bid, annul the Bid Process and reject all Bids, for any or all Bid Packages at any time, without any liability or any obligation for such acceptance, rejection or annulment and without assigning any reasons whatsoever to any Person, including the Bidders. If the Authority annuls the Bid Process and rejects all Bids for any Bid Package or the Project, it may in its sole discretion invite fresh Bids for the Bid Package or Project.

1.10 Fair Practices & Anti-Corruption

The Bidders and their respective officers, employees, agents and advisers shall observe the highest standard of ethics during the bidding process and during the subsistence of the agreement. Notwithstanding anything to the contrary contained herein, or the contract, the Authority may reject a bid, or terminate the agreement, as the case may be, if it determines that the bidder, has directly or indirectly or through an agent, engaged in corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice in the bidding process. In such an event, the Authority shall be entitled to forfeit and appropriate the Bid Security as damages, without prejudice to any other right or remedy that may be available to the Authority under the agreement, or otherwise, without being liable in any manner whatsoever to the Bidder.

If a bidder is found by the Authority to have directly or indirectly or through an agent, engaged or indulged in any corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice during the bidding process, or the execution of the agreement, such bidder shall

not be eligible to participate in any tender or request for proposal issued by the Authority during a period of 3 years from the date such bidder, as the case may be, is found by the Authority to have directly or indirectly or through an agent, engaged or indulged in any corrupt practice, fraudulent practice, coercive practice, undesirable practice, or restrictive practices, as the case may be.

For the purposes of this clause, the following terms shall have the meaning hereinafter respectively assigned to them:

"corrupt practice" means (i) the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence the actions of any person connected with the Bidding Process (for avoidance of doubt, offering of employment to or employing or engaging in any manner whatsoever, directly or indirectly, any official of the Authority who is or has been associated in any manner, directly or indirectly, with the bidding process or has dealt with matters concerning the contract or arising therefrom, before or after the execution thereof, at any time prior to the expiry of one year from the date such official resigns or retires from or otherwise ceases to be in the service of the Authority, shall be deemed to constitute influencing the actions of a person connected with the bidding process; or **(ii)** save and except as permitted under clauses of this RFP, engaging in any manner whatsoever, whether during the bidding process or after the execution of the contract, as the case may be, any person in respect of any matter relating to the Project or the Contract, who at any time has been or is a legal, financial, or technical adviser of the Authority in relation to any matter concerning the Project.

"fraudulent practice" means a misrepresentation or omission of facts or suppression of facts or disclosure of incomplete facts, in order to influence the Bidding Process.

"coercive practice" means impairing or harming, or threatening to impair or harm, directly or indirectly, any person or property to influence any person's participation or action in the bidding process.

"undesirable practice" means (i) establishing contact with any person connected with or employed or engaged by the Authority with the objective of canvassing, lobbying or in any manner influencing or attempting to influence the bidding process; or (ii) having a conflict of Interest as set out in this RFP; and

"restrictive practice" means forming a cartel or arriving at any understanding or arrangement among bidders with the objective of restricting or manipulating a full and fair competition in the bidding process.

The following set of sanctions shall be enforced by the Authority for any violation by a bidder of its commitments or undertakings:

a) Denial or termination of agreement;
b) Refund of all sums already paid by the Authority along with interest at the rate of 12% per annum;
c) Recovery of such amount, referred to above, from other contracts of the bidder with the Authority. In case the bidder is a consortium, the recovery of such amounts referred to above shall be secured from other contracts of the Lead Member.

At the discretion of the Authority, the bidder shall be liable for action as per the guidelines of the Authority on penalties in business dealings with entities.

1.11 Integrity Pact

The Bidders are required to furnish a signed and stamped copy of the Integrity Pact as set out in ***Annexure G*** at the time of submission of the Bid. All clauses of the Integrity Pact shall be applicable on the Bidders and shall be deemed to be incorporated in the RFP and subsequent contracts thereto.

1.12 Official Secrets Act

Any Information shared with regards to this RFP, including but not limited to the data room shall be covered under **'Restricted Information' Categories under 'Official Secrets' under Section 5 of the Official Secrets Act, 1923.** Any contravention to the above-mentioned provisions by any Bidder or related sub-contractors or their consultants or advisors, or the employees of a contractor, will make them liable for penal consequences under the above said legislation.

1.13 Program Governance & Dispute Resolution Mechanism

An Empowered Committee comprising nominated members from SCL, MeitY & any other relevant private/ government departments will be constituted to oversee the modernization at SCL. The committee will meet on a weekly/ bi-weekly basis during the early months of the program, and subsequently the review governance cadence will stabilize to a monthly project progress review meeting to ensure timely execution of this mission critical project.

Furthermore, a Project Control Room will be constituted on-site to monitor progress & de-bottleneck any day-to-day issues. Daily standups will be held with all the key stakeholders to discuss progress & resolve issues in an agile manner. In case any conflicts/ challenges remain unresolved in the Project Control Room, a three-stage Internal Dispute Resolution Mechanism will be adopted:

Stage 1 - Director General, SCL: Initial disputes will be reviewed and resolved by the DG within ten (10) business days.

Stage 2 - Joint Secretary, MeitY: Unresolved issues will escalate to the JS, who will provide a decision within fifteen (15) business days from escalation point.

Stage 3 – Secretary, MeitY: Final unresolved disputes will be addressed by the Secretary, whose decision will be issued within thirty (30) business days from escalation point.

The proposed three-stage mechanism will be aimed at bringing about an internal resolution of potential disputes with an intent to avoid recourse to arbitration or external adjudication. All stakeholders shall agree to the binding nature of this Dispute Resolution Mechanism as a condition of their participation in the SCL modernization program.

1.14 Arbitration

1) If efforts in conciliation fail even after Program Governance & Dispute Resolution Mechanism, the Parties to the RFP/ resultant contract agree to resolve their contractual disputes in accordance with the provisions of Indian Arbitration and Conciliation Act, 1996.

2) The number of arbitrator(s) shall be 3.

3) Each disputing Party shall appoint one arbitrator, and the two arbitrators shall appoint the third or the presiding arbitrator. In the event that there are more than two disputing Parties, then such arbitrator(s) shall be appointed in accordance with the provisions of Indian Arbitration and Conciliation Act, 1996.

4) The language of the arbitrator proceedings shall be English.

5) The place of arbitration proceedings shall be New Delhi.

B. Preparation and Submission of Bid

1.15 Language

The Bid and all related correspondence and documents in relation to the Bid Process shall be in English language. Supporting documents and printed literature furnished by the Bidder with the Bid may be in any other language provided that they are accompanied by translations of all the pertinent passages in the English language, duly authenticated and certified by the Bidder. Supporting materials, which are not translated into English, may not be considered. For the purpose of interpretation and evaluation of the Bid, the English language translation shall prevail.

1.16 Format and signing of Bid

1) The Bidder shall provide all the information sought under this RFP. The Authority will evaluate only those Bids that are received in the required formats and complete in all respects. Incomplete and /or conditional Bids shall be liable to rejection.
2) The Bid shall be typed or written in indelible ink. It shall be duly signed in digital form by the authorized signatory of the Applicant. All the alterations, omissions, additions or any other amendments made to the Bid shall be initialed by the person(s) signing the Application. The Bid shall contain page numbers.

1.17 Cost of Bidding

The Bidders shall be responsible for all of the costs associated with the preparation of their Bids and their participation in the Bid Process. The Authority will not be responsible or in any way liable for such costs, regardless of the conduct or outcome of the Bid Process.

1.18 Bid Security

1) Each Bidder while submitting their Pre-Qualification Bid, shall submit Bid Security in the form of Earnest Money Deposit (EMD). This Bid Security is to safeguard against a Bidder(s) withdrawing or altering its bid during the bid validity period.
2) Amount of Bid Security: The total amount of the EMD shall be determined for each Bidder(s) based on the Bid Package(s) that they bid for. The EMD amount applicable for each Bid Package is as below:
   a) Bid Package 1 – INR 25 Crore
   b) Bid Package 2 (irrespective of number of Items/ IPs quoted for) – INR 5 Crore
   c) Bid Package 3 – INR 0.5 Crore (50 Lakhs)

   In case a Bidder(s) bids for more than one Bid Package, the EMD amount should be equal to sum of respective EMD amounts of all the Bid Packages that they have bid for.
3) Format of Bid Security: The EMD shall be in the form of a Bank Guarantee from any Indian Public or Private Scheduled Commercial Bank notified by Reserve Bank of India or first-class banks of international repute. The format of the bank guarantee for Bid Security is provided at ***Annexure F*** of this RFP document.
4) Validity of Bid Security: The Bid Security will be valid for 12 months or till signing of the Contract Agreement, whichever is later. The bid security shall be extended from time to time as required by the Authority and agreed by the Bidder(s). No interest shall be payable by the Authority to the Bidder(s) on the EMD for the period of its currency. For unsuccessful Bidders EMD will be returned

post declaration of the Selected Bidder(s).

5) Instances of Forfeiture of Bid Security:
   a) If the Bidder withdraws or amends, impairs or derogates from the bid in any respect within the period of validity of this RFP.
   b) If the Bidder having been notified of the acceptance of its Bid by the Authority during the period of its validity, fails to:
      i) sign and return, as acknowledgement, the duplicate copy of the LOA
      ii) furnish the Performance Security in accordance with *section 1.27 (Performance Security)*
      iii) fulfil any other condition precedent to the execution of the Contract Agreement
      iv) execute the Contract Agreement
   c) If the Pre-Qualification Bid and/or Financial Bid submitted by the Bidder are deemed infeasible leading to disqualification of the bidder from the RFP process
   d) If the Bidder gets disqualified from the RFP process for reasons covered in but not limited to *section 1.7 (Conflict of Interest), section 1.9 (Rights of the Authority)*, *section 1.10 (Fair Practices & Anti-Corruption),* or any other clause in the RFP provided such reasons arise out of a violation of the conditions set-out in the clauses of this RFP then in such case the decision of the Authority for forfeiture of bid security under such circumstances shall be final and binding for all such bidders
   e) In case of any breach of the terms of the Non-Disclosure Agreement executed by the Bidder(s) in accordance with the terms of this RFP, the Bid Security will be forfeited besides other legal penalties as may be decided by the Authority.

1.19 Bid Clarifications and Queries

1) Bidders requiring any clarification on the RFP may notify the Authority only by e-mail in accordance with the details specified in the RFP. They should send in their queries on or before the date specified in the Bid Schedule in the format prescribed in ***Annexure J*** via email - **fab_pm@scl.gov.in**. The Authority shall endeavor to respond to the queries within the period specified therein, but no later than 10 (ten) days prior to the Bid Due Date. The Authority will post all the queries and its responses on the official website without identifying the source of queries.
2) The Authority shall endeavor to respond to the questions raised or clarifications sought by the Bidders. However, the Authority reserves the right not to respond to any question or provide any clarification, in its sole discretion, and nothing in this clause shall be taken or read as compelling or requiring the Authority to respond to any question or to provide any clarification.
3) The Authority may also on its own motion, if deemed necessary, issue interpretations and clarifications to all Bidders. All clarifications and interpretations issued by the Authority shall be

deemed to be part of the Bidding Documents. Verbal clarifications and information given by Authority or its employees or representatives shall not in any way or manner be binding on the Authority.

1.20 Pre-Bid Meeting

1) The Authority shall endeavor to hold Pre-Qualification Bid Meeting and Pre-Financial Bid Meeting as part of the Bid Process (collectively referred to as Pre-Bid Meetings hereinafter)
2) All interested Bidders shall be invited to attend the Pre-Qualification Bid Meeting on the date, time and place mentioned in the Bid Schedule. However, only the Qualified Bidder(s) shall be invited to the Pre-Financial Bid Meeting as per the Bid Schedule
3) The purpose of the Pre-Bid Meetings will be to clarify issues and answer questions on any matter relating to the RFP, the Bid Process or the Project. Necessary queries or clarifications for the Pre-Qualification Bid and Financial Bid must be sent as per respective details specified in the Bid Schedule.
4) Bidder(s), or their authorized representative is requested to attend the Pre-Bid Meetings. The details of the attendees should be shared at least a week in advance to facilitate obtaining of security clearance.
5) During the course of the Pre-Bid Meetings, attendees will be free to seek clarifications and make suggestions to the Authority.
6) Non-attendance at the Pre-Bid Meetings will not be a cause for disqualification of a Bidder from participating in the Bid Process.

1.21 Submission of Bids

1) Bidder(s) are required to prepare and submit only the Pre-Qualification Bid to be considered for qualification evaluation. Bidder(s) shall submit the Pre-Qualification Bid no later than the date and time specified in the Bid Schedule, on the e-procurement platform portal **https://eprocure.gov.in,** duly signed in digital form by the authorized signatory of the Bidder, by uploading the complete and legible scanned/digital copies of the Pre-Qualification Bid in pdf/digital format (i.e. scanned copy of original signed documents and the supporting documents).
2) The Bid is to be submitted on the document downloaded from Official Website, the Bidder shall be responsible for its accuracy and correctness as per the version uploaded by the Authority and shall ensure that there are no changes caused in the content of the downloaded document. In case of any discrepancy between the document used for submission by the Bidder and the version uploaded by the Authority, the latter shall prevail.
3) The Bidders should ensure that, sufficient information is provided to enable the Authority to make

judgments about their suitability and in assessing the Pre-Qualification Bid submitted.

4) The Pre-Qualification Bid should be valid for 12 months from Bid Due Date or till signing of the Contract Agreement, whichever is later.
5) Submission of Pre-Qualification Bid: The documents comprising the Pre-Qualification Bid shall include:
   a) Letter Comprising the Pre-Qualification Bid in the format set out in ***Annexure A***
   b) Details of the Bidder/Members in the format set out in ***Annexure B***
   c) Details of the Execution Capacity of the Bidder in the format set out in ***Annexure C***
   d) Details of the Financial Capacity of the Bidder in the format set out in ***Annexure D***
   e) Power of Attorney in the format set out in ***Annexure E1***, executed by the Bidder or the Lead Member authorizing the signatory of the Bid to commit the Bidder
   f) In case of a Consortium, Power of attorney in the format set out in ***Annexure E2***, executed by the Members of the Consortium authorizing the Lead Member of the Consortium to act on behalf of and commit the Consortium
   g) Bank Guarantee for Earnest Money Deposit in the format set out in ***Annexure F***
   h) Integrity Pact as per *section 1.11 (Integrity Pact)* in the format set out in ***Annexure G***
   i) Undertaking regarding Blacklisting / Debarment / Suspension / Ban by the authorized signatory in the format set out in ***Annexure H***
   j) In case of a Consortium, Consortium Agreement in the format set out in ***Annexure I***
   k) Technical Proposal in the format set out in ***Annexure K***
6) Submission of Financial Bid: Only the Qualified Bidders after evaluation of Pre-Qualification Bids shall submit their Financial Bid. For this purpose, the Bidders may schedule site visits to SCL for preparation of robust Financial Bids. The Financial Bid shall include the bid quote as per Bid Parameter specified in *section 1.24 (Financial Evaluation)* in the RFP. The Financial Bid must be firm and fixed and should be valid for at least 360 (three hundred and sixty) days from the Bid Due Date.

All the details and submissions given as part of the Bidder's Pre-Qualification Bid shall form an integral part of the Bid. The Bidder shall be liable to be disqualified from the Bidding Process in case of incomplete Pre-Qualification Bid or in case the Pre-Qualification Bid is not submitted.

C. Bid Evaluation and Acceptance

1.22 Evaluation Process

1) **Bid responsiveness:** The Authority shall determine whether the Pre-Qualification & Financial Bid of each Bidder(s) is completed, unconditional and unqualified, and in accordance with the format

and requirements as laid out in this RFP document. If the Bid of a Bidder(s) is not in accordance with the provisions of the RFP, such Bids shall be deemed non-responsive and will be summarily rejected without evaluation.

2) **Bid evaluation**: The responsive Bids shall be evaluated as per the Technical Evaluation and Financial Evaluation detailed in succeeding sections

1.23 Technical Evaluation

The Bidder(s) meeting the Qualification Criteria defined herein for each Bid Package/Item shall be deemed Qualified Bidder(s) for the respective Bid Package/Item after Technical Evaluation and shall proceed in the Bid Process for submission and evaluation of their Financial Bid.

The Bidder(s) shall submit proof of Execution Capacity (see ***Annexure C***) and Financial Capacity (see ***Annexure D***) as applicable for the Bid Package(s)/Item(s) that they bid for, in accordance with below requirements:

Bid Package 1

1) Execution Capacity: The Bidder(s) should have successfully completed at least one similar contract (s) / project (s) in the 15 years preceding the Bid Due Date for each of the following:
   a) Supply, Installation, Testing & Commissioning of cleanroom and utilities works for a wafer fab including experience in:
      i) Conducting detailed engineering and/or feasibility studies for cleanroom and utilities sources and distribution design
      ii) Execution of cleanroom works (civil, electrical, etc.) and setup of utilities plants / sources (e.g., UPW, PCW, Exhaust, Gases, etc.) and corresponding distribution network
   b) De-hooking or de-installing, rolling out and crating or packing of wafer fab equipment including experience in utilities strip-out and site preparation
   c) Supply, Installation, Testing & Commissioning of wafer fab equipment and integrating the same with baseline process at 180 nm or advanced nodes including experience in:
      i) Procurement of wafer fab equipment from OEMs and/or Refurbishers
      ii) Replacement of existing process equipment in fab lines (180 nm or advanced) and re-qualification and process development on the replacing equipment.
      iii) Equipment upgradation activities in a running fab, with minimum line disruption
   d) Annual Maintenance Service / Contract execution for a wafer fab including experience in:
      i) Preventive and corrective maintenance of equipment (process, metrology and support)
      ii) Sourcing of consumable and non-consumable spares

Additionally, service/equipment engineers proposed to be maintained on-site shall have minimum 7 years of relevant wafer fab equipment maintenance experience

The above types of projects/contracts and the requisite experience sought therein need not necessarily be for the same project/contract and can be spread across different projects/contracts executed by the Bidder(s). However, each individual experience claimed must be supported by corresponding proof of Execution Capacity.

2) Financial Capacity: The Bidder(s) should have an average annual turnover of at least INR 1000 Crore during the last three audited financial years. The Bidder(s) shall also submit audited financial statement as part of proof of Financial Capacity.

Bid Package 2

Execution Capacity:

a) The Bidder(s) should have successfully completed at least one similar contract (s) / project (s) in the 15 years preceding the Bid Due Date with experience in technology transfer with process module integration and qualification in the baseline process for a CMOS wafer fab
b) The Bidder(s) should have or establish access to respective 180nm process technologies that they bid for:
   i) Item 1 – Have or establish access to RF-CMOS technology
   ii) Item 2 – Have or establish access to BCD (HV LDMOS) technology
   iii) Item 3 – Have or establish access to CIS technology

   In case Bidder(s) do not have these technologies readily available, they may establish access to the same by entering Memorandum of Understanding (MoU) with any technology partner or provider. The copy of the MoU must be submitted with the Pre-Qualification Bid as part of proof of Execution Capacity in such case.

Bid Package 3

Execution Capacity: The Bidder(s) should have successfully completed at least one similar contract (s) / project (s) in the 10 years preceding the Bid Due Date with experience in supply, installation, testing and commissioning of MES with all related software and hardware for a wafer fab

In case the Bidder(s) is a Consortium, the Qualification Criteria for any Bid Package/Item shall apply for the Consortium as a whole, i.e. of all Members combined, for the purpose of Technical Evaluation.

1.24 Financial Evaluation

Financial Bid shall be solicited, opened and evaluated, only for Bidders who are deemed qualified after the Technical Evaluation.

For the purpose of evaluation of Financial Bids, the Bidders shall quote the Bid Parameter – *Total Cost in INR Core.* - required to them for delivering the scope of work for the Bid Package(s) they have bid for in the below format:

Table 9: Financial Bid Format

Bid Package	Total Cost in INR Crore (In numerals)	Total Cost in INR Crore (In words)
Bid Package 1		
Bid Package 2	*To be quoted at Item level for Bid Package 2*	
Item 1 (RF-CMOS)		
Item 2 (BCD HV LDMOS)		
Item 3 (CMOS Image Sensor)		
Bid Package 3		

Notes:

1) For the Bid Packages, Bidder(s) shall quote Total Cost based on the scope and conditions outlined in the RFP including relevant appendices and any subsequent information provided by the Authority in the Pre-Bid Meeting responses, and/or any addenda issued, and/or any Amended RFP issued before the Bid Due Date
2) All prices shall be quoted on DAP, SCL SAS Nagar (F.O.R. SCL, SAS Nagar) basis.
3) It is further clarified that the bid quoted by the Bidder(s) shall be inclusive of all the expenses for any activities proposed to be undertaken for the fulfilment of the scope of work covered in the RFP documents (including pre-bid queries responses, any addenda, amended RFP, etc.) and payment for any additional financial obligations/ costs for any third party, etc. shall not be made unless the same have been specifically approved in writing.
4) It is further clarified that in case there is a discrepancy in the financial quotation between what is quoted in numerals and what is quoted in words, the financial quotation that has been submitted in words will be considered for the purpose of evaluation.

Apart from the bid parameter specified above, the bidders bidding for Bid Package 1, shall also furnish break-up of the Bid Package 1 Total Cost quoted in the following format supporting their Financial Bid:

Table 10: Bid Package 1 Total Cost Break-Up

S.No	Scope Component	Total Cost Break-Up	Amount *(INR Cr.)*
1	Gap analysis and detailed study for proposed augmentation of 8-inch line	Borne by the Selected Bidder(s)	Not to be included in Total Cost quoted
2	Detailed engineering and execution of cleanroom and utilities modifications /	Project Cost	

	augmentations & tools hook-up		
3	Supply, installation, testing and commissioning of equipment and equipment upgrades		
4	De-hook, roll-out, and crating/packing of 6-inch tools		
5	Comprehensive AMC for all the equipment including existing as well as supplied upgrades and replacement / additional equipment	AMC Cost (Year 1)	
		AMC Cost (Year 2)	
		AMC Cost (Year 3)	
		AMC Cost (Year 4)	
		AMC Cost (Year 5)	

1.25 Selection of Bidder

1) The selection of bidder shall be based on Least Cost Selection (LCS) method. Least Cost Selection shall be done at Bid Package level for Bid Packages 1 and 3, and at Item level for Bid Package 2 (i.e., separately for each item)
2) The Qualified Bidder offering the lowest priced bid for a particular Bid Package or Item, shall be the Lowest Bidder (L1) for that Bid Package or Item. The Bidder(s) quoting second lowest bid for that Bid Package or Item shall be L2 Bidder and so on
3) Generally, the Lowest Bidder (L1) shall be declared the Selected Bidder(s). The Authority may choose to accept the Bid of the Selected Bidder(s) or invite the Selected Bidder(s) for further negotiations provided such negotiations shall not result in any increase in the initial quote by the Selected Bidder(s).
4) The remaining Bidders shall be kept in reserve and may be invited to match the Bid submitted by the Lowest Bidder for a particular Bid Package or Item in case such Lowest Bidder withdraws or is not selected for any reason. In the event that none of the other Bidders match the Bid of the Lowest Bidder, the Authority may, in its discretion, invite fresh Bids from the remaining Bidders or annul the Bidding Process for any or all Bid Packages or Items, as it deems fit.

1.26 Letter of Award

1) In the event of acceptance of the Bid of the Selected Bidder with or without negotiations, the Authority shall notify the Selected Bidder(s) through the Letter of Award (“LoA”) (to be issued in duplicate) that its Bid has been accepted for particular Bid Package(s) and/or Item(s), subject to the Bidder meeting all other conditions specified in the RFP
2) The Selected Bidder shall within 15 (fifteen) days of the receipt of the LoA, sign and return the

duplicate copy of the LoA in acknowledgement thereof. In the event the duplicate copy of the LoA duly signed by the Selected Bidder(s) is not received by the stipulated date, the Authority may, unless it consents to extension of time for submission thereof, appropriate the Bid Security and cash the Bank Guarantee of such Bidder on account of failure of the Selected Bidder(s) to acknowledge the LoA, and the next lowest eligible Bidder(s) (L2 Bidder) may be considered.

1.27 Performance Security

1) The Selected Bidder(s) shall furnish to the Authority a Performance Security, in the form of a bank guarantee for an amount equivalent to 10% of the Total Cost quoted for all the Bid Package(s) and/or Item(s) the Bidder(s) has been declared the Selected Bidder(s) for, on or before the Agreement Date to secure its obligations under the Contract Agreement(s).
2) For Bid Package 1, the Performance Security shall remain valid for a period of 60 days beyond the latest date of expiry of the warranty period of the supplied equipment and upgrades as specified in the Contract Agreement(s). However, prior to the expiry of this Performance Security, a new Performance Security equivalent to 10% of the remaining cumulative value of the AMC must be submitted. This new Performance Security shall remain valid for a period of 60 days beyond the expiry of the AMC Agreement.
3) For Bid Package 2, the Performance Security shall remain valid for a period of 60 days beyond the target date for completion of final milestone “Successful running of the technology on SCL flow for two months after final delivery” as mentioned in *Table 8 : Technology Cost Component Payment Milestones*, under the section of Bid Package 2.
4) For Bid Package 3, the Performance Security shall remain valid for a period of 60 days beyond the target date for completion of final milestone “Sign-off on successful running of MES and equipment automation for two months after final acceptance” as mentioned in *Table 8 : Technology Cost Component Payment Milestones*, under the section of Bid Package 3.
5) The Selected Bidder(s) shall provide the Performance Security in the form of an unconditional, irrevocable, and on-demand bank guarantee issued by a Scheduled Bank as per the format prescribed in the Contract Agreement.
6) If the Selected Bidder(s) fails to furnish the Performance Security in accordance with *section 1.27 (Performance Security)* on or before the execution of the Contract Agreement(s), then the Authority shall have the right to appropriate the Bid Security of the Selected Bidder(s) which shall be forfeited in accordance with *section 1.18 (Bid Security)*.
7) Instances of Forfeiture of Performance Security:
    a) If the Selected Bidder(s) becomes insolvent or goes into liquidation voluntarily or otherwise.
    b) If the progress regarding execution of the Contract Agreement, made by the Selected Bidder(s) is found to be unsatisfactory against interim and/or final milestones for any of the

Bid Packages or Items therein.

c) If the Selected Bidder(s) fails to complete the due performance of the Contract Agreement in accordance with the agreed terms and conditions.
d) If the Selected Bidder(s) get merged / taken over by another firm.
e) If there is a breach of terms of Contract Agreement by the Selected Bidder(s).
f) Post selection, if the Selected Bidder(s) is found in violation of clauses under *section 1.7 (Conflict of Interest), section 1.9 (Rights of the Authority), section 1.10 (Fair Practices & Anti-Corruption)*, or any other clause in the RFP provided such reasons arise out of a violation of the conditions set-out in the clauses of this RFP then in such case the decision of the Authority for forfeiture of Performance Security under such circumstances shall be final and binding for all such bidders.
g) In case of any breach of the terms of the Non-Disclosure Agreement executed by the Selected Bidder(s) in accordance with the terms of this RFP, the Performance Security will be forfeited besides other legal penalties as may be decided by the Authority.

1.28 Contract Agreement

The Selected Bidder(s) shall be required to execute the Contract Agreement(s) within 30 (thirty) days of the issue of the LoA by satisfying other terms and conditions as specified in this RFP to be carried out before signing of the Contract Agreement(s) for the Bid Package(s) awarded to them.

For Bid Package 1:

- After the acceptance of Gap Analysis & Detailed Study Report, as detailed in *section 1.5.1 [II] (Detailed Engineering and Execution of Cleanroom & Utilities Modification / Augmentations & Tools Hook-Up)*, 1), any mutually agreed deviations in the list of equipment proposed for upgrades, replacement, and addition, and/or in the scope of work for cleanroom and utilities modifications/augmentations, and/or in any other scope of work – shall be taken up for discussion and negotiation on case-by-case basis to account for revised effort and/or scope of work along with commensurate upward or downward revision (as the case may be), in the Total Cost quoted by the Contractor(s) for the Bid Package 1.
- The Authority and this Contractor(s) shall then enter into a Revised Contract Agreement for Bid Package 1. The Revised Contract Agreement shall reflect:
    - The mutually agreed changes/modifications to proposed equipment list, staging plan, scope of work for cleanroom and utilities sources/plants and distribution modifications/augmentations, any other deviations; and
    - Adjusted Total Cost for Bid Package 1, commensurate with the incorporated changes or deviations, based on negotiations held with the Authority.

For Bid Package 3:

After the acceptance of Gap Analysis & Detailed Study Report, as detailed in *section 1.5.1 [II] (Detailed Engineering and Execution of Cleanroom & Utilities Modification / Augmentations & Tools Hook-Up)*, 1), based on the finalized equipment list, the Authority and the Contractor(s) for Bid Package 3, shall enter into a Revised Contract Agreement for Bid Package 3 that shall reflect the finalized scope and equipment list for MES software implementation along with equipment automation.

2. Appendix

Appendix 1 : Proposed Equipment Upgrades

#	Area	Type	Description	Current Make, Model	Upgrade Details	Stage
1	CMP	Process	CMP Oxide	AMAT Mirra 3400 Mesa 200mm	1.In-situ end point system 2.POU Filter Upgrade 3. Upgradation of Slurry recirculation and delivery pump in MABAT (CDU 3000) Slurry Delivery System 4. Hard disk upgrade (from mechanical HDD to RAID SSD) 5. Upper Pneumatic Assembly (UPA) module upgrade 6. Upgrade from peristaltic pump to CLC for slurry loop 7. Slurry Injection System (SIS) 8. Upgrade Slurry / DIW main valve from 1 line to 3 line	Stage 1
2	CMP	Process	CMP Tungsten	AMAT Mirra 3400 Mesa 200mm	1. POU Filter Upgrade 2. Upgradation of Slurry recirulation and delivery pump in MABAT Slurry Delivery System 3. Hard disk upgrade (from mechanical HDD to RAID SSD) 4. UPA (Upper Pneumatic Assembly) module upgrade 5. Upgrade from peristaltic pump to CLC for slurry loop 6. Slurry Injection System (SIS) 7. Upgrade Slurry / DIW main valve from 1 line to 3 line	Stage 1
3	DRY ETCH	Process	Metal Etcher (1 DPS ch + 1 ASP ch)	AMAT Metal Etch Centura II	1. chamber addition 1 DPS chamber and 1ASP chamber 2. Change the existing 4.2Mb hard disk to flash drive	Stage 1

#	Area	Type	Description	Current Make, Model	Upgrade Details	Stage
					3. Change the floppy drive to USB drive 4. Existing Buffer CH Viewport window to be upgraded with sapphire glass	
4	DRY ETCH	Process	Poly Si/STI etcher	AMAT Centura 5200	Change the floppy drive to USB drive	Stage 1
5	IMPLANT	Process	High Energy Implanter	Axcelis NV GSD / HE	Additional wafer buffer loader	Stage 1
6	PHOTO	Process	Track DUV	TEL ACT8	1. PRA (X, Theta & Z axis) Motors & Drivers 2. Interface (IRM & IRA) Motors & Drivers 3. Upgrade PLC on Developer LDS 4. Hard disk upgrade - IDE to SSD	Stage 1
7	PHOTO	Process	Scanner DUV	Nikon NSR S204B	1. Wafer Stage ZT Linear Scale upgrade 2. Reticle Stage Linear Motor/Driver	Stage 1
8	PHOTO	Process	Track MUV	TEL ACT8	1. Additional - 01 Hot Plate (HHP) and 01 Chill Plate 2. Temperature and Humidity Controller Upgrade 3. PRA (X, Theta & Z axis) Motors & Drivers 4. Interface (IRM & IRA) Motors & Drivers 5. Hard disk upgrade - IDE to SSD	Stage 1
9	PHOTO	Process	Stepper MUV	Nikon NSR 2205i14E2	1. Application software/hardware upgrade for Multiple reticle exposure option 2. Power Optics Upgrade	Stage 1
10	THIN FILM	Process	PECVD TEOS	AMAT Centura DXZ	1.Up-grade with RPS 2. SACVD chamber addition 3. Change the existing 4.2Mb hard disk to flash drive 4. Change the floppy drive to USB drive 5. Additional chamber for TEOS dep with RPS	Stage 1
11	THIN FILM	Process	Barrier Metal Deposition	AMAT Endura-5500	1.High speed robot configuration	Stage 1

#	Area	Type	Description	Current Make, Model	Upgrade Details	Stage
					2. Change the existing 4.2Mb hard disk to flash drive 3. Change the floppy drive to USB drive 4. Addition of one IMP Ti chamber 5. Addition of one pre-clean chamber	
12	THIN FILM	Process	HDP Oxide CVD (3 ch)	AMAT C-5200 HDP Ultima Plus	1.Replace ETO RF generator for two chambers with ENI RF generators 2. Change the existing 4.2Mb hard disk to flash drive 3. Change the floppy drive to USB drive	Stage 1
13	THIN FILM	Process	Silicide PVD Sputter	AMAT Endura 5500	1.Upgradation of Conventional Ti Chamber for TiN capability 2. Change the existing 4.2Mb hard disk to flash drive 3. Change the floppy drive to USB drive 4. Additional Co Chamber	Stage 1
14	THIN FILM	Process	PECVD Nitride and Oxide	Novellus C2-Sequel Express	Addition of one chamber on equipment Novellus C2-Sequel (for MEMS)	Stage 1
15	WET ETCH	Process	Single wafer spin processor	LAM RST223 Spin processor	Chuck Upgrade in both module- Wafer edges can be better handle with upgraded Chuck. Upgradation of CDS to handle 200 Ltr drum for catering increase chemical consumption with increase capacity O3 generator upgrade Additional Heat exchanger for Med 2	Stage 1
16	WET ETCH	Process	Nitride Strip	SES Wet Station	Additional Quartz Bath for redundancy and MEMS application. Space is available in the tool and only quartz bath to be procured.	Stage 1
17	CMP	Metrology	Film thickness and	KLA Optiprobe	Install Mini environment Wedge Calibration wafer	Stage 1

#	Area	Type	Description	Current Make, Model	Upgrade Details	Stage
			reflectance measurement	3290		
18	PHOTO	Metrology	CD SEM	Hitachi S-9300	1. Hard disk upgrade (from mechanical HDD to RAID SSD)	Stage 1
19	THIN FILM	Metrology	FTIR Spectroscopy	BIORAD QS 2200	Upgradation for B,P, and Si-OH bond measurement capability.	Stage 1
20	WET ETCH	Support	Wafer Sorter – Wafer Start	Brooks PRI SCS 3000	Upgrade to wafer Back side reading	Stage 1
21	WET ETCH	Support	Wafer Sorter	Brooks PRI SCS 3000	Upgrade to wafer Back side reading	Stage 1
22	INLINE YIELD	Metrology	CP measurement - Unpatterned wafer scan system	KLA Tencor SurfaceScan CP Measurement	Existing equipment needs to be upgraded for Computer hardware, Windows Operating System & Hard Disk Storage	Stage 2

Appendix 2 : Proposed Equipment Replacement

#	Type	Area	Description	Reqd. Make, Model	Proposed Stage	Location
1	Process	DRY ETCH	Asher BEOL	Mattson Aspen II	Stage 1	Cleanroom
2	Process	WET ETCH	Scrubber	DNS SS-80EX 4 chamber	Stage 1	Cleanroom
3	Process	WET ETCH	Photo Resist Strip	TEL Zeta Viper	Stage 2	Cleanroom
4	Process	WET ETCH	Pre Diffusion Clean	DNS bath configuration with IPA dryer	Stage 2	Cleanroom
5	Metrology	DIFFUSION	CV Plotter	Quantox, SEMILAB, FAaST 300 SL	Stage 2	Cleanroom
6	Metrology	DIFFUSION	Film Thickness Ellipsometer	*SEMILAB, PS-2500*	Stage 2	Cleanroom
7	Metrology	INLINE YIELD	Optical Review Station	Zeiss Axiospect 302, with backside inspection	Stage 2	Cleanroom
8	Support	DIFFUSION	Quartz cleaner	Polyflow S-610	Stage 2	Cleanroom
9	Process	MEMS PHOTO	1x Mask Aligner	*SUSS Microtech Model No: SUSS MA200 Gen3*	Stage 3	6"Litho
10	Process	MEMS DRY	DRIE	*LAM Research Model: Alliance TM + 1x DSiE G System*	Stage 3	MEMS Fab Extension
11	Process	MEMS TF	E-beam metal dep	*Telemark,USA Model: SCT BC-18C*	Stage 3	Post CMOS
12	Process	MEMS DRY	PR Asher	*Trymax Plasma Tech, Model: NEO2222*	Stage 3	6" Wet

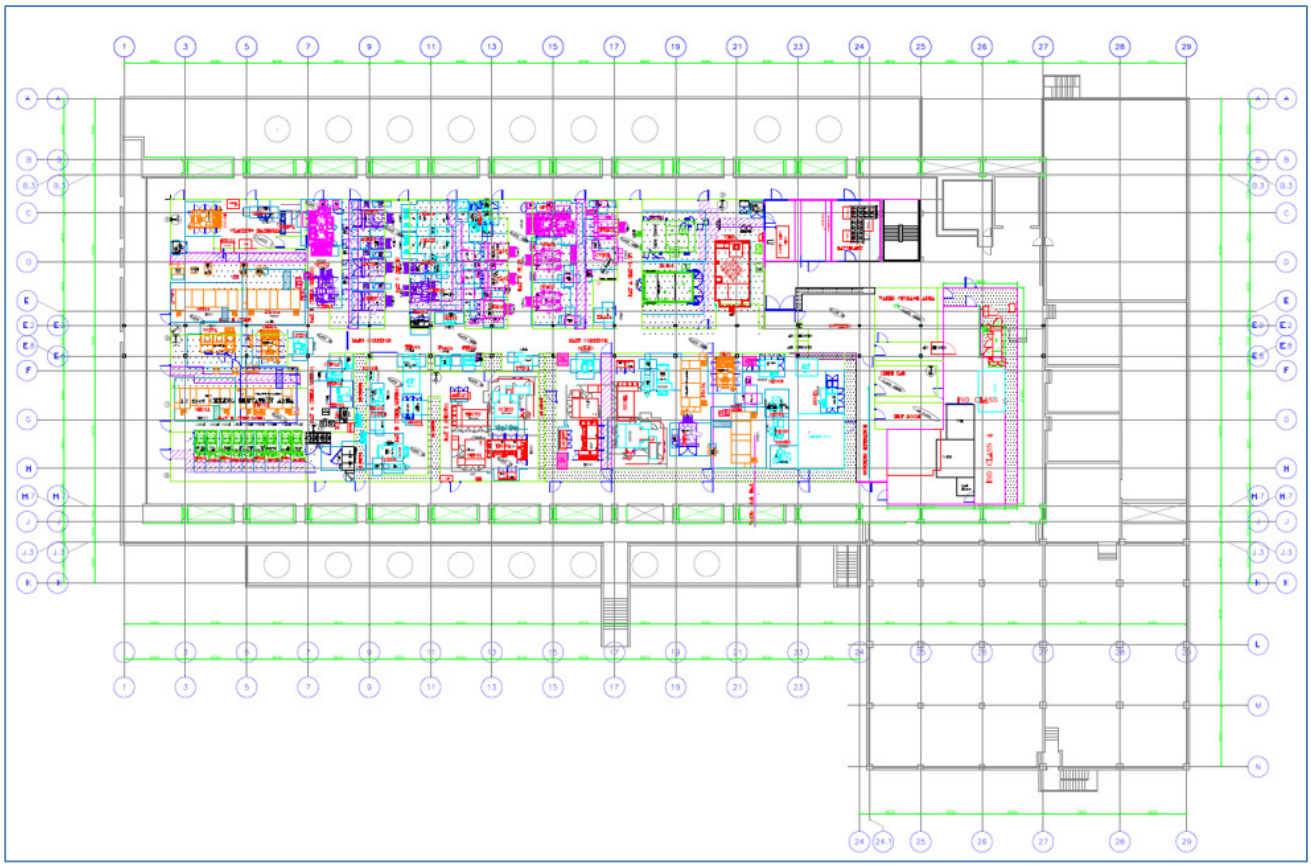
Note: A MEMS Coater tool of Obducat make is already under procurement by the Authority, and hence not part of the proposed replacement list here for purchase orders. However, this tool shall be considered part of the scope for the Contractor(s) for all other work such as the Gap Analysis & Detailed Study, Detailed Engineering and Execution of Cleanroom & Utilities Modifications / Augmentations & Tools Hook-Up and Comprehensive AMC.

Appendix 3 : Proposed Equipment Addition

#	Type	Area	Description	Reqd. Make, Model	Proposed Stage	Location
1	Metrology	INLINE YIELD	CP measurement - Unpatterned wafer scan system	KLA Tencor SurfaceScan CP Measurement	Stage 1	Cleanroom
2	Process	DRY ETCH	Dielectric Etcher (1 Spacer Etch ch + 1 CS/Via etch ch)	LAM Flex Excelan 2300	Stage 2	Cleanroom
3	Process	DRY ETCH	Metal Etcher (1 DPS ch + 1 ASP ch)	AMAT Metal Etch Centura II	Stage 2	Cleanroom
4	Process	THIN FILM	Metal Sputter	ULVAC ENTRON W-200 TANDEM / AMAT	Stage 2	Cleanroom
5	Process	WET ETCH	Photo Resist Strip	TEL Zeta Viper	Stage 2	Cleanroom
6	Process	WET ETCH	Pre Diffusion Clean	TEL Zeta Viper	Stage 2	Cleanroom
7	Process	PHOTO	Scanner DUV	Nikon NSR S204B	Stage 2	Cleanroom
8	Process	WET ETCH	Solvent Strip BEOL	LAM, DVI (DV24)	Stage 2	Cleanroom
9	Process	PHOTO	Stepper MUV	Nikon NSR 2205i14E2	Stage 2	Cleanroom
10	Process	PHOTO	Track DUV	TEL ACT8	Stage 2	Cleanroom
11	Process	PHOTO	Track MUV	TEL ACT8	Stage 2	Cleanroom
12	Metrology	INLINE YIELD	Defect Inspection	KLA 2367 Pro	Stage 2	Cleanroom
13	Metrology	INLINE YIELD	Defect Inspection - Dark Field	8920 DF Mode with Backside and Bevel Inspection and optical review	Stage 2	Cleanroom
14	Metrology	INLINE YIELD	Optical Review Station	Zeiss Axiospect 302	Stage 2	Cleanroom
15	Metrology	INLINE YIELD	SEM Review Station	AMAT G6	Stage 2	Cleanroom
16	Support	PHOTO	Amine NMP detection	IMS AirSentry	Stage 2	Sub-fab
17	Support	ET	ET Prober	Electro Glass EG4090	Stage 2	Sub-fab
18	Support	ET	ET Tester	HP4070	Stage 2	Sub-fab
19	Support	ET	XSEM	Zeiss560 FESEM with EDX	Stage 2	Sub-fab
20	Process	CMP	CMP Oxide	AMAT Mirra 3400 Mesa 200mm	Stage 3	Cleanroom
21	Process	CMP	CMP Tungsten	AMAT Mirra 3400 Mesa 200mm	Stage 3	Cleanroom

22	Process	MEMS WET	Spin Rinse and Dryer	*Class1 Technologies SRD 8800HP*	Stage 3	
23	Process	MEMS WET	Wet Bench	*RENA Wet Bench*	Stage 3	

Appendix 4 : Proposed Equipment Layout



Appendix 5 : Details for Cleanroom and Utilities Modifications / Augmentations

A. CLEAN ROOMS MODIFICATION

1. Modification of Clean Rooms (CR) and allied air management to facilitate addition of tools, tools relocation, tool upgradation, etc. is covered under the scope of work of the contractor. Cleanroom modifications, however, shall be carried out strictly as per the detailed engineering / Approved for Construction (AFC) drawings.
2. Scope of work involves modification of existing Supply air ducting and providing additional ducting including main balancing dampers, individual dampers for flexible ducts, flexible ducts connecting ULPA filters, support structures etc. as required.
3. The duct work shall be Galvanized steel sheet of Lock forming quality having ZINC coating as per ASTM A-525, G90. The duct work shall be fabricated and installed as per SMACNA standard. All Volume control dampers shall be of Aluminum anodized.
4. Process Tools (8-inch) are installed in CRs of Class 3 to Class 6 (As per ISO14644-1). The CRs modifications, where ever required, shall be executed in such a way that existing CR classification is maintained for the entire 8-inch fab-line.
5. 6-inch CMOS tools are housed in Class 4 (Class-10, Fed std.) cleanrooms, contiguous to the existing 8-inch fab-line. Post CMOS MEMS tools are housed in Class 5 (Class -100, Fed. Std.) clean rooms located in sub-fab. Contractor's Scope of work shall include modification of these cleanrooms to match the requirement of the 8-inch process tools proposed to be installed in this area(s).
6. During Cleanroom modification work, most of the CR materials like wall panels, doors, raised floor, ceiling grid, filters, blank panels, light fixtures, flexible ducts etc. will be reused. Supply of all the extra material required for completion of the work shall be in scope of the Contractor(s) as per the specifications provided herein:
7. Removal of all the existing ULPA filters and Supply and installation of new ULPA filters in Clean rooms is covered in scope of the Contractor(s). Filter coverage shall be as under:

Class 3	:	100%
Class 4	:	100%
Class 5	:	70% minimum
Class 6	:	30% minimum
Class 7	:	20% minimum

Wall Panels

- 50mm thick (nominal) Aluminium Honeycomb core panel, studless (non-structural) wall system.

- The vertical joints in the panels are to be secured utilizing anodized, Aluminium batten strips/Vertical post powder coated matching with clean room wall system.
- All wall panels shall be double skin type having Aluminium skins (0.8mm thick) on outer surfaces with Aluminium Honey Comb Core with antistatic protection. All wall panels shall have a Epoxy/PE finish in standard designer white colour.
- The wall system must easily accommodate pipe, duct and tool penetration and doors while maintaining its air seal and structural integrity.
- The system must be capable of performing as a free standing wall.
- The wall system is to be held in place, utilizing a gasketed head track (secured to the suspended ceiling) and gasketed floor track assembly.
- The height of wall system will be 3.00m high in the areas where the raised access floor will occur and 3.60m high where the Clean Room wall system is required to go below the raised access floor .
- All the framing members like head track, floor track, batten strips, corner posts, wall ends, vertical post etc. shall be made of extruded Aluminium in designer white finish matching wall panel system.

Clean Room Doors

- The Clean Room wall systems shall include all doors with associated hardware.
- The Clean Room doors shall be of Aluminium (Al) construction, flush configuration, swing type, double skin, Al frame and powder coated matching with clean room wall system, with door closer, handles, lock sets with option of one or both side access, half glazed with 6mm clear tempered glass on the top and 6mm honey Comb panel on the bottom.
- Clean Room Wall System shall include half glazed Aluminium sliding door with 6mm clear tempered glass on the top and 6mm honey Comb panel on the bottom with lock sets and other required hardware.

Clean Room Access Floor System

- Clean Room access floor system shall be removable raised access system consisting of an assembly of perforated floor tiles mounted on adjustable pedestals to provide an under floor space to accommodate mechanical service line, electrical conduits and to serve as an air supply and return plenum.

- The floor system shall be stringer-less, conductive type and shall include die-cast Aluminium perforated (with dampers as required) tiles , adjustable pedestals with grounding clips and conductive vinyl tile covering on the face of all floor tiles.
- The floor tile size is 600 x 600 x 50 mm thick.
- The height of raised floor will be 600 mm.
- The floor tiles shall be capable of carrying the following loads:
  - Concentrated load $\geq$ 650 Kg with deflection $\leq$ 2.0mm
  - Uniform load $\geq$ 1250 Kg/sq. m with deflection $\leq$ 1.0mm
  - Rolling load $\geq$ 200 kg/sq. m with deflection $\leq$ 0.5mm
  - Ultimate load $\geq$ 1575 kg/6.45 sq. cm at centre
- Floor tiles shall be Al die cast construction with static conductive vinyl, non-combustible chemical and abrasive resistant cover of minimum 2 mm thickness. Floor tiles system resistivity shall have a minimum value of $1.5x10^5$ ohm and a maximum value of $2x10^7$ohm between top structure of tile and under structure.
- Static conductive vinyl coating tile shall be fabricated in one piece.
- Floor tiles with dampers shall be to check/correct the uni-directional flow in the Clean Room.
- All tiles shall be completely interchangeable and easily removable with a lifting tool.
- Pedestals shall conform to the panel specifications with regard to the load bearing characteristic. Pedestals assemblies shall be capable of supporting a 2250 Kg axial load without deformation.
- Pedestals shall be made from hard drawn Aluminium tube.
- Floor system pedestals and tiles shall be laterally stable in all the directions with panels in place or removed without the use of additional framing or stringers.
- Adjustment of pedestals to be provided by threaded rod member and an elevating collar of ± 25 mm. The pedestals head of Al die cast construction should provide positive interlocking of panels and pedestals to prevent lateral movement.
- Pedestal heads to be equipped with a conductive vinyl grounding pad.
- Pedestals are to be vertically true, located on centres to conform with size of panel to be equipped with locking device to prevent the loss of finished elevation.
- Installation of the floor system shall include the under floor plenum barriers as required, providing earth clamps and bare copper wire to earth all floor pedestals & interconnection and connecting the same to system earth in sub- fab through PVC insulated Copper earth cable of suitable cross-section.

Ceiling Grid

- The clean Room ceiling system shall provide rigid frame work to install the ULPA filters in Clean Rooms. The ceiling grid shall be heavy duty with walk over capability.
- The ceiling grid shall be 2” (minimum) heavy duty, inverted “T” grid system.
- The ceiling grid shall be extruded aluminium construction with white powder coated to match the clean room wall system.
- The grid system shall include “hold-down” devices, to be used for all filter ceiling modules and blank ceiling panels and hardware to be used at all joints and suspension points.
- The ceiling grid size shall consist standard size i.e. 1200mm x 600mm to accommodate the filters/Blank ceiling panels etc.
- Ceiling grid shall comprise of individual ceiling lengths interconnected by cruciform sections which allow connections through grid for sprinklers, wiring etc.
- The ceiling grid should provide a leak proof filter grid system.
- The grid shall be designed for gasket seal type ULPA filters.
- Lighting shall be mounted on to the ceiling grid.
- Blank ceiling panels, as required, shall be provided in the ceiling grid.
- All Blank ceiling panels shall be of 1/4" thick aluminium Honey Comb, with Aluminium facing. All edges shall be folded over to cover exposed Honey Comb material. The finish to the blank ceiling panels shall match the Clean Room wall system.
- The grid system shall be suspended utilizing 1/4" threaded rod and turn buckles (for levelling) with locking nuts.
- The overall ceiling grid shall be levelled within ± 1.5mm in 3m and not over ± 2.5 mm throughout the room.
- The ceiling grid shall accommodate airtight seals around all penetrations including fire sprinklers, electrical lines etc. The System shall be pre-drilled, permitting assemblies to be easily carried out in the field.

ULPA Filters

- The Clean Room ceiling system shall include ULPA filter ceiling modules as indicated on the reflected ceiling plan.
- The filters will be used as terminal air distribution device. The air supply plenum shall be connected directly to a connecting collar on the filter top with individual GI damper in the plenum and flexible ducts.

- The filters shall be U15 class of ULPA filters as per EN1822 with an efficiency of 99.9995% down to 0.12 micron.
- The design Air velocity through filter shall be 0.45m/s with IPD of 130±5% Pa or better.
- The filter media shall be Glass Fibre with hot melt separator.
- The filter shall have expanded sheet metal face guard. The face guard shall be powder coated in off-white colour.
- The filter shall be having endless polyurethane D-profile, Liquid pour to solid in extrusion profile seal at the outlet.
- All the filters shall be individually tested according to EN1822 and computerized scan test report should accompany each filter.
- The filter shall be held in place utilizing 'hold down' devices with the Ceiling grid using channel on the filter top and T-bolts in the ceiling grid pressing the filter against ceiling grid.
- All filter modules shall be complete with 12" diameter inlet collars and an integral supply casing fabricated of 0.062" thick aluminium (min.) with the capability of supporting a person standing on the top surface.
- Filter media shall be bonded to extruded aluminium cell sides.
- Supply casing shall be factory mounted to filter cell sides.
- The face of the extruded aluminium frame shall align with the face of the ceiling grid system.
- Blank ceiling panels, as required, shall be provided in the ceiling grid.

Lighting

- Lighting level in clean Rooms will be 600 Lux and 400 Lux in grey areas, at 80 cm above the floor. The Contractor(s) to design the lighting layout for clean rooms and grey areas to achieve the prescribed lighting levels.
- Light fixture in Grey areas of suitable rating as per the Lux requirement shall be suspended from steel structure at plenum level.
- Clean room LED light fixture shall be tear drop, suitable for laminar airflow system, grid mounted to minimize turbulence in clean room.
- The scope includes all the accessories such as teardrop end cap cover plate (single), intermediate connector loom, interconnector plate and all other accessories required for smooth installation of the fixture in the clean room on existing/new ceiling grid.
- The LED light fixtures shall be non-degassing type and not contaminate the clean room environment.
- Technical specifications shall be as follows:

S.No	Description	Monochromatic Yellow light LED	Clean Room White light LED	White light LED For grey area
1	Wattage	40W ± 1 W	40W ± 1 W	20 W
2	Dimension	4 feet/ 1200 mm	4 feet/ 1200 mm	4 feet/ 1200 mm
3	CRI	80 or better	80 or better	80 or better
4	CCT		5700 K± 500K	6000K ± 500K
5	Lumens/ Watt	90 or better	90 or better	100 or better
6	THD	Less than 10%	Less than 10%	Less than 10%
7	Diffuser	Polycarbonate	Polycarbonate	Polycarbonate
8	Power factor	>0.95	>0.95	>0.95

- About 25% of the light fixtures in the clean Rooms and Grey areas will be backed by SCL's captive power system and the Contractor(s) will design and install separate wiring system accordingly.
- The lighting wire shall be 1.5 sq mm copper conductor, FR PVC as per IS 694 and run in 25 mm bore GI conduit. Modular Switches will be provided in each room/area for local control of the lights. If required, Contractor(s) shall provide double door TP+N type MCBDB equipped with suitable rating 30mA sensitivity RCBO as incomer and required suitable rating MCBs in the outgoings.
- MCBDBs will be installed at plenum level. The Contractor(s) shall also supply, lay and commission suitable size 1.1 KV grade Aluminium conductor PVC/XLPE insulated armoured overall FRLC PVC outer sheathed cables to the MCBDB's Incomer from spare switches in lighting DB's located in Sub fab.

Flexible Duct Work

- Un-insulated, flexible ductwork shall be installed from GI supply duct work to each ULPA filter ceiling module.
- The flexible duct work shall be sealed and secured at each filter module and sheet metal collar utilizing stainless steel flexible duct bands and duct band locks.
- The diameter of flexible duct shall be 12" (305 mm).
- Flexible ducting shall be heavy duty suitable for +2500 Pa of air pressure and 30m/s air velocity.
- Material of duct: Multiple layers of Al - polyester laminated with spring steel wire helix.

Performance Testing Of Clean Room

- Certification of Clean Rooms shall be done through an experienced "independent" agency to be engaged by the Contractor and approved by SCL.

- Tests shall be performed in “As Built” and “At-rest” condition in accordance with the testing Procedure specified in ISO 14644.
- The “independent” testing firm shall have experience of having conducted Clean Room testing for certification of minimum 2 (two) Class 6 Clean Rooms in the last 5 years.
- The Clean Room Certification agency will prepare report for approval of SCL.
- In the event of non-conformance to the defined Clean Room parameters, the Contractor shall take corrective action at his cost. The Clean Room certification shall be redone at Contractor’s cost to establish conformance to specifications.

Process Exhaust Ducting

1) Hookup of the Tools with the Process exhaust (Acid Exhaust – AEX and General Exhaust GEX) is in the scope of the Contractor(s).
2) The MOC of existing Process Exhaust system ductingis FRP/SS for the AEX and GI for the GEX.
3) Exhaust laterals are having POCs for connecting the tools.
4) From POCs to the tools, the ducting is primarily of PVC-U material for both the AEX &GEX and SS316L at few places. The MOC of smaller size ducts (50 mm and below) for pumps connections is SS316L.
5) For the proposed work, similar configuration will be adopted.
6) POCs will be identified by SCL for the tool hookup and drawings will be generated accordingly by the Contractor(s). If spare POC is not available in the nearest lateral, spare POC in the adjacent laterals will be used. However, if spare POC is not available in particular area, creating spare POC will be in scope of the Contractor(s). Each POC should have a damper at the outlet of the POC.
7) In case, it is required to extend the lateral of the exhaust system, it will be in scope of the Contractor(s).
8) MOC of the laterals/ducts will be primarily PVC-U AEX and GEX. MOC for extending existing SS316L laterals/ ducts will be SS316L ducts.
9) MOC for the POC will be fire retardant FRP/SS316L for AEX (depending upon the duct material) and GI for GEX depending upon the MOC of the header.
10) Welding of all the SS piping shall be carried out using TIG welding only.
11) Quantity and MOCs of various size ducts & POCs is as per BOQ provided with.
12) The Contractor(s) to provide well trained technical manpower for creating new POCs in the running system with the minimum disturbance to the existing system.
13) From POC to the tool, the exhaust ducting shall meet the following specifications:

a) *Providing, fixing and testing of PVC-U piping system including all the fittings, PN16 rated, confirming to EN ISO 15493, DIN 8061/62, DIN EN 1452 standard.*
b) Ball valves/damper confirming to EN ISO 16135 shall be provided near the each tool.
c) For SS lines, SS316L material shall be used with thickness not less than 2 mm.
d) Magnehelic gauge will be provided in each line near the process tool.
e) All the fittings shall be joined with OEM make/recommended cement. Jointing surface of pipe and fitting must be cleaned and free of grease as per the OEM recommendations.
f) Exhaust piping shall be supported and clamped at suitable intervals as per the OEM standard to avoid any line sagging.

Approved Makes for PVC-U: + GF / Asahi/AGRU

B. PROCESS COOLING WATER (PCW) SYSTEM:

1) The scope of work involves the Hookup of the New/Relocated/upgraded Tools with the PCW distribution system as per the tool requirement.
2) The MOC of existing PCW distribution system is True bore SS304L designed for 25 bar pressure.
3) PCW Laterals are having 2"/1.5" SS ball valves for connecting the tools.
4) For the modification/upgradation work proposed under this RFP, piping from lateral valves upto the tools shall be of SS304L, Sch. 20 minimum.
5) POCs will be identified by SCL for the tool hookup and drawings will be generated accordingly by the Contractor(s). If spare POC is not available in the nearest lateral, spare POC in the adjacent laterals will be used. However, if spare POC is not available in particular area, creating spare POC will be in scope of the Contractor(s).
6) The Contractor(s) to provide well trained technical manpower for creating new POCs in the running system with the minimum disturbance to the existing system.
7) For creating new POC in the existing lateral/main header, True Bore SS304L pipe/fittings/valves suitable for 25 Bar Pressure rating shall be used. SS welding will be carried out using Orbital/TIG welding technique.
8) From POC to the tool, the PCW piping shall meet the following specifications:
   a) Providing, fixing, testing and commissioning of True bore SS304L piping system including all the fittings.
   b) Ball valves shall be provided near each tool.
   c) Flow meter shall be provided in each line to check the PCW flow in the line.
   d) Pressure gauge with the isolation valve to be provided in each line near the process tool.
   e) All the piping/ fittings shall be orbital/TIG welded.
   f) PCW piping shall be supported and clamped at suitable intervals.

g) After laying down the line, each line shall be tested for minimum 10 bar working pressure for a period of 24 hours before connecting to the process tool.

Approved Makes for SS Pipe and fittings: Dockweiler/ Swagelok / Valex/ Fujikin

C. GAS DISTRIBUTION PIPING

A. MATERIAL SPECIFICATIONS:

PIPE/TUBING

Stainless steel piping/tubing shall be Seamless, 316L, stainless steel, ASTM A 213, ASTM A 269, ASTM A 632; hydrogen bright annealed having a controlled inside diameter finish with a maximum roughness not to exceed 10 microinch and a hardness of Rb 60 to Rb 80, with 5% maximum allowable chromium carbide, 0.005 to 0.017% maximum Sulphur content, and chrome/iron ratio 2:1.
The tubing supplied shall have the same heat number for the same size.

CO-AXIAL TUBING: The containment jacket for co-axial tubing shall be of seamless 316L stainless steel, meeting the requirements of ASTM A269 and ASTM A362. Diameter shall conform to the following:

Gas Transmission pipe OD size (Inch)	Containment Jacket Pipe OD Size (Inch)	Wall thickness (Inch)
0.25	0.50	0.049
0.375	0.625	0.049
0.5	0.75	1.22
0.75	1.0	1.65

FITTINGS

Weld Fittings:

a) Tees: Fabricated by using seamless 316L stainless steel tubing having fabrication dimensions and tolerances compatible with orbital welding equipment.

b) Elbows: Manufactured, long radius type with the same wall thickness and heat number as that of tubing for each respective size. Field bending will not be acceptable. Fabrication dimensions and tolerances shall be compatible with orbital welding equipment.

Mechanical fittings:

a) All mechanical fittings for sizes ≤ 1" Ø shall be VCR® type with Nickel gaskets and 316SS retainer ring, for all process gases unless the gas type does not allow this like with CO then the gasket will be SS.

b) Compression fittings (double ferrule fittings) of 316SS shall be used only for non-critical applications like CDA, PVAC etc.

VALVES

Pack-less bellows type rated at 150 psi, provided with 316L stainless steel bodies, Kel-F seats, integral purge ports downstream of seat with VCR fitting caps. VCR gasket seal shall be constructed of electro-polished pure nickel.

The valves shall be Pre-cleaned for Ultra high purity gas system and shipped to site in sealed, unopened, double polyethylene bags.
The valves shall be provided with 6" tube extensions, cut and faced for automatic but-weld system, with tube wall thickness to match system. Valve tube extensions shall be the same as tubing material.

Leak test of each Valve

Each valve shall be tested by Pressurization to 150 psi with 100 % Argon. Valves shall be tested for compliance with a leak rate not exceeding 1 x 10^{-9}atm Cu.cm/sec between the valves and ambient, and across seat.

FINISH: Electro-polish interior valve surfaces to a surface finish 10 Ra Micro- inch Max and 7 Ra average after tube extensions and purge ports have been welded to valve body.

B. EXECUTION / FABRICATION:

1) All fabrication activities staring from un-packing the clean pipe/fittings to welding etc. shall be carried out in the clean room facility with clean rooms classification 100 vertical laminar flow station to be provided by the Contractor(s).

2) A sufficient I.D. purge (Ar or N2 grade 6) velocity shall be provided during cutting deburring and bending of pipe to prevent back-streaming of particles in the tubing. Purge shall be from the end farthest from the cut or deburred point.

3) Cut pipe using a wheel-type cutter. Deburr each cut with the tubing piece oriented vertically with the end to be deburred pointing downward.

4) Following cutting and deburring of pipe, cleaning of the inside diameter shall be done.

5) For butt-welds, ends shall be squared, cleaned, cover ends with Aclar-33C cap.

6) The ends are to be closed with 6 mil polyethylene bags sealed at least 6" from the ends with clean room low residue tape and left under atmospheric Nitrogen gas pressure.

7) A continuous Argon gas purge on piping segments shall be maintained when system is not being fabricated or installed. This "inside" purge is separate and distinct from the Argon Purge Welding. Regulate Argon gas delivery pressure to 30 psi at the cylinder.

8) Place a clean, once used Aclar-330 pipe bag over the end of a piping segment for purging. Provide bags with the following hole sizes:

   - Less than ¾", use 1/8" diameter hole.
   - ¾" to 1-1/2", use ¼" diameter hole.

9) Prior to welding components together, begin Argon backing gas purge. Maintain purge to reduce moisture level to less than 2 ppm and Oxygen level to less than 3 ppm. Instruments shall be contract furnished, Owner approved. Continue exterior argon purge after completion of weld unit joint has cooled to less than 25 deg. C (77 deg. F) . Exterior Argon Purge rate shall be in strict accordance with the welding equipment manufacturer's recommendations.

10) Fabricate piping subassemblies in the clean room/clean environment to minimize field welding. Clean and seal fabricated sections in poly ethylenebags, purged with argon, and transport to the point of final installation. Do not remove bags until actual installation is to begin.

11) Once installation of a piping system has begun, continue the inner argon gas purge without interruption until the system is completed and can be isolated from contact with the environment.

12) Upon completion of the installation, maintain a constant Argon purge at the end of each branch using the last valve as a regulating flow orifice. Maintain the system in this condition until acceptance. Testing is to be performed as specified.

13) Make valve/pipe terminations with VCR cap fittings.

C. TESTING

Detailed information pertaining the instruments and methods to be used in performing the gas analysis for purity and particulate certification of the distribution system shall be submitted to the SCL for review prior to testing. SCL shall have the right to be present and witness the testing and certification of the piping systems.

PRESSURIZATION TESTING:

1) Use Argon/Nitrogen for pressurization of the distribution systems.

2) Filter Argon immediately before introduction into the piping system.

3) Maintain the system at 250 psig static pressure for a period not less than 24 hours without a delta pressure 0 psi. During this period Argon gas source is disconnected and isolated.

HELIUM (VACUUM) LEAK TEST

1) Prior to testing, thoroughly inspect the gas systems to assure compliance with flow diagrams.

2) Bag all orbital weld joints, valves and VCR connection with 4 mil, Aclar – 33C bags.

3) Pump system down to 1 x 10^{-9}atm cm^3/sec.

4) Starting from the closest point from the vacuum pump, inject 100% helium into each Alcar bag.

5) Using the approved (i.e. Edwards, Model 300E, Portable Helium Leak Detector or equivalent with sensitivity at least 4 x 10^{-10} atm. Cu cm/sec. As determined in accordance with American Vacuum Society Standard T.S. 2.1 and Record in chart strip charge recorder), locate and identify all leaks by systematically checking all welds, valves and VCR connections. Clearly mark and document leaks. Report leaks to SCL in writing.

6) Inboard Helium leak check – 1x10-9 sccm He/sec shall also be performed.

7) Before any leak is repaired or sections replaced, contractor shall submit procedures to SCL for approval. Upon completion, retest the system as specified.

PURITY / PARTICULATE TEST

1) Mains and branch, valves of the system shall be sampled and analyzed. Total residue, gas impurities shall be no greater than those existing at the primary gas source specified.

	1) Start of Header	2) End of Header
2) Moisture –	1) 10 ppb	2) 10 ppb
3) Oxygen –	1) 10 ppb	2) 10 ppb

4) The particle counts taken at the farthest end shall be well within the limits to be specified. Particles <10/scf @ .02µm.

5) Record location and analytical results for all points sampled. The names and signatures of operators and witnesses shall be recorded for each sample.

6) If a gas/particle analysis reveals that a sampled point does not comply with specifications, retest said point(s). If a second testing of that point also indicates noncompliance, SCL shall determine the extent of the segment of the system to be removed and replaced as a result of noncompliance. The procedures to be followed for such remedial action shall be in strict

accordance with these specifications. The installing contractor shall be held responsible for all costs incurred in performance of corrective action taken, due to non-complying piping segment, including costs associated with retesting of the system until acceptable. Waiving of testing will not be allowed.

D. CODES AND STANDARDS

The design, manufacture, testing and inspection of the Ultra Purity Stainless Steel Piping covered under this specification shall conform in general to the codes and standards (latest edition) mentioned below:

1) American Society for testing of materials (ASTM) Standard.
2) American Welding Society Standards.
3) Pipe fabrication Institute Standards ES-3.
4) American Vacuum Society Standards.
5) ANSI-ASME B 31.8 – 1982 Gas Transmission and Distribution Piping System.
6) Industrial Practice for gaseous oxygen transmission and distribution piping system per Compressed Gas Association Inc.
7) ANSI B 36.19: Stainless Steel Pipe.
8) SEMI – Standards.

APPROVED MAKES: Dockweiler/ Cardinal/Valex

	ITEM	APPROVED MANUFACTURER
1.	Electro polished Stainless Steel tubing's and fittings (ordinary and co-axial)	Cardinal / Valex / Dockweiler
2.	High Purity SS Fittings (Double Ferrule and Gasketted)	Swagelok / Parker / Hamlet
3.	Pressure Regulators	Veriflo / /AP Tech/ Tescom / Rotarex
4.	Point of use valves (Diaphragm Valves)	/ Tescom /Ap Tech / Hamlet / Rotarex
5.	Point of use filters	Millipore / Pall
6.	Pressure Gauges	USG / Tescom/ Wika

D. PVDF DISTRIBUTION NETWORK FOR UPW

A. MATERIAL SPECIFICATIONS

Semi-Conductor grade piping, fittings and valves shall be pre-cleaned, capped or sealed in a bag and enclosed in a container to prevent contamination during shipment and storage at site.

UHP PVDF PIPING:

Piping fabricated of virgin Kynar or Solef, a pure Poly Vinylidene fluoride (PVDF) homopolymer of a type which shall not introduce contamination with UHP water. The tubes shall have glasslike I.D. finish. The maximum roughness in micro-inches shall be identified by the tubing manufacturer. Internal surfaces shall comply with the following:

a. Not more than 5 pore per 1300 sq.mm with no pore larger than 5 microns across.
b. No visible flow lines in the interior.
c. Non fragmenting and smooth shouldered pores.
d. Glass like finish.

The tubings shall be supplied in 20' – 0" lengths, in lots of 20 section each. Each tube shall be nitrogen purged and then securely capped.

PVDF FITTINGS

Elbows shall be long sweep type.
Fitting thickness shall be same as tubing wall thickness whenever possible. Heavier wall thickness with machined ends compatible with adjoining tubes is acceptable.
Fitting roughness – The manufacturer shall identify the interior surface roughness in micro inches.
Piping, fittings and valve joints shall be made by Butt fusion process in strict accordance with manufacturer's specifications.
The Stub flanges shall be Butt- fused, for use with Teflon – coated Viton rubber gaskets. UNC hex-head 316 SS machine bolts & nuts are to be provided.

VALVES

The valves shall be of PVDF body with Teflon diaphragm provided with position indicators. Valves upto 2" size shall be butt fused. Valves of 2 ½ " or larger size shall be butt fused or flanged.

SUPPORTS

Piping supports shall be in accordance with recommendations of piping manufacturer.

B. EXECUTION/FABRICATION

A condition of Ultra High Purity must be maintained inside of PVDF system throughout the duration of fabrication and installation activities. All fabrication activities starting from un-packing the clean pipe/fittings to welding etc. shall be carried out in the clean room facility with clean rooms classification 100 vertical laminar flow station to be provided by the Contractor(s).

PIPING

1) The pipe shall be cut using wheel type cutter only. Each cut shall be deburred with the pipe piece oriented vertically with the end to be deburred pointing downward to ensure that burr does not get entrapped with in the pipe.
2) Prior to butt fusions, pipe ends shall be squared and cleaned of particulates, the cut end shall be wiped clean with a lint-free cloth saturated with semiconductor grade acetone. Once used, the cloth shall be discarded.
3) Strict attention should be paid to progress of assembly so as to ensure that system ends and components are not left exposed to the environment when the work is not in progress.
4) When the piping system is not under construction or work has been interrupted, open pipe ends should be capped.

JOINTS

1) Butt fused joints shall be made up in strict accordance with manufacturer's instructions.
2) Threaded joints shall be used only at equipment connections. Teflon tapes shall be used for make up using not more than 2 wraps beginning at large end of threads, wrapping towards small end, and leaving 2 end threads exposed. No sealant material other than Teflon tape is acceptable.

VALVES

1) The valves and in-line specialties shall be located in readily accessible positions for operation and maintenance. Unions and flanges shall be provided at equipment and work station connections or at other in line locations requiring maintenance.
2) Sampling valves shall be provided at the end of each sub-loop/ chase.

C. TESTING

Test procedure for the piping system shall comprise of the following:

1) Test fluid shall be semiconductor grade deionized water filtered to 0.2 micron absolute for all times.
2) Test piping shall be pressurized hydrostatically.
3) The piping system shall be filled with DI Water, opening all valves and ports to purge system or air.
4) 100 psi pressure shall be applied to the system using specification grade nitrogen. The leaks, if any, shall be noted, the pressure released and the DI Water removed by purging with specification grade nitrogen.
5) Special care shall be taken while repairing leaks. The fragments and particular matter produced during joint preparation shall be removed. The test shall be resumed after repairing the leaks.
6) The piping system shall be recharged & maintained at 100 psi test pressure for 24 hours with no decay.

APPROVED MAKES

	ITEM	APPROVED MANUFACTURER
1.	PVDF PIPING and FITTINGS	+ GF / Asahi/AGRU
2.	VALVES	+ GF/Gemu/AGRU

E. CDA/PVAC/DRAINS/CITY WATER CONNECTIONS

	COMPONENT	SPECIFICATIONS
1	**COMPRESSED DRY AIR (CDA).**	**PIPING:** Truebore TCC orbital weldable SS 316L pipes/Tubing shall be of controlled ID finish and shall be supplied from the manufacturer in pre-cleaned condition completely free from oxide, oils, greases, other lubricants, mill chips, scales etc. **FITTINGS:** Orbital Weldable SS Fittings compatible with adjoining pipes. **VALVES:** Ball valves with NPT connections, SS ball with Teflon seat or stem seals, quarter turn handles, and a locking plate. Valves shall be designed for vacuum and working pressure upto 250 psi. Valves shall be factory cleaned for oxygen service. **PRESSURE REGULATOR:** Pre-cleaned single stage regulators with SS body, Kel-F or equivalent seats, reinforced nylon/ neoprene diaphragm, inlet & outlet gauges and end ports with double ferrule compression fittings (for < ¾" dia).

		FLEXIBLE CONNECTIONS: Nylon tubing with double ferrule brass fittings.
2	**PROCESS VACUUM**	**PIPING:** Truebore SS304L. The tubing shall be supplied by manufacturer in pre-cleaned condition completely free from oxide, oils, greases, other lubricants, mill chips, scales etc. **FITTINGS:** Weldable Fittings compatible with adjoining pipes. **VALVES:** Ball valves with NPT connections, SS ball with Teflon seat or stem seals, quarter turn handles, and a locking plate. Valves shall be designed for vacuum and working pressure upto 250 psi. Valves shall be factory cleaned for oxygen service.
3	**DRAINS**	
a.	Acid and Chemicals (except solvents)	**PIPING:** The chemical and acid drains shall run through Sch-80 CPVC tube: - Sch-80 CPVC pipe shall be as per ASTM F441 - Fittings, solvent socket welds - Solvent cement shall be as per ASTM C 2646 **VALVES:** All wetted parts of the valve shall be appropriate for the chemical service – VITON, EPDM or equivalent. For aggressive chemicals Teflon or Teflon coated elastomers shall be provided
b.	Organic Solvents	**PIPING & FITTINGS:** Welded SS304 **VALVES:** S.S.Butterfly/ Ball valves with flanged end connections
4	**CITY WATER**	**PIPING & FITTINGS:** C-class G.I. piping and fittings **VALVES:** S.S. Ball valves. **FLEXIBLE CONNECTIONS:** Braded hoses having female NPT end ports

F. ELECTRICAL

Brief Scope of the work:

1) Study of 400 volts and 208 volts LT panels, vertical/horizontal DBs catering to the 8" Fab tool.
2) Identification and list out the spare feeders/isolators with their power rating in the electrical panels/DBs to match the same with new/relocated tools and their accessories power requirement.
3) If required, Design, Supply, Fabrication, Installation, Testing and Commissioning new IEC 61439 compliance electrical panels, vertical DBs, their cabling, termination, earthing etc. based on the above requirements.
4) The Contractor(s) shall relocate/modify the existing lighting fixture, GI conduits, wiring, fire detection system, speakers, LAN, ESD active ionizers etc. as may be required to match the modified clean room layout as approved by SCL.

5) To work out the requirements of cables, Cable trays, cable termination, cable tie, earthing etc. to meet the any modification/alternation of the electrical infrastructure for augmentation/relocation of the fab tools.
6) SITC of XLPE insulated, Copper, flexible cable as per IS, GI perforated/ladder cable tray, local isolator, earthing, tagging etc. from the electrical panels/vertical DB for tool hook up to augment the new/relocated Fab tools.
7) 6A/16A Power / utility service sockets as may be required for Single/three Phase loads for new/relocated 8" tools.
8) Cabling, wiring, MCB-DBs for items under (g).
9) Power and ESD earthing.
10) Shifting of the 10 loop fire panel and LSS (Life safety system) node from the existing ERT room to the new ERT room, as per the layout drawing.
11) Dismantling, strip our and reinstallation of electrical material for clean room modification, augmentation/relocation of Fab tool. The Contractor(s) may utilize the existing material as required to the maximum extend to achieve the same.
12) Material, accessories, hardware and all required items/ services, whether Specified or not, for satisfactory completion of electrical work.

A. CODES AND STANDARDS:

The Electrical system shall conform to the requirements of the following Standards:

1) Indian Electricity Rules.
2) IS/ IEC standard for electrical
3) National Electrical Code of India
4) National Building Code of India (NBC).
5) Applicable standards issued by Bureau of Indian Standards (BIS)
6) Regulations of local electricity and fire authorities
7) Requirements stipulated by Pollution Control Board for Noise, Air & Water Pollution.

B. System Configuration:

For process tools

Main power circuit:	-	400 volts and 208 volts AC 3 phase and solidly Grounded neutral.
Control circuit:	-	230 volts AC/120 volts AC
Emergency power:	-	400volts AC from DG set and UPS

For utility Equipment

Main power circuit:	-	415volts+_10 % AC, 3 phase, and solidly

		grounded neutral.
Control circuit:	-	240 volts AC
Emergency power:	-	415volts AC from existing DG set and UPS
Frequency Variation:	-	50±5% Hz.

C. Technical Specifications

1. Technical specification for Electrical Panel (3 Phase 208V/3 Phase 400V)–

The Contractor(s) to assess SCL's electrical panels, vertical DBs to cater power to new/relocated tools based on the Approved Fab layout drawing and try to utilize the existing POCs to maximum extent without taking power shutdown. However, if requirement could not be met from existing infrastructure, the Contractor(s) to plan for new electrical panel/vertical DB and their cabling etc. as required to power up the tools. Specification of new panel/ vertical DB is as under:-

General

- Panel shall be fabricated as per IEC 61439 part 1 & 2.
- Panel shall be indoor, metal clad, air insulated floor mounted extendable to side, single front construction, front wired, front connected.
- Minimum thickness of sheet metal used shall be 2 mm and panel shall confirm to IP54 protection. IP test certificate shall be furnished along with the offer.
- The design should be fully compartmentalized with metal partitions between compartments. All doors shall be gasketed. Each vertical section shall have removable back cover.
- All switches, push buttons, lamps, indicating instruments shall be flush mounted.
- A full height vertical cable chamber with cable supports shall be provided in each section to facilitate unit wiring. Cable chamber shall be sized to accommodate all cable and shall have removable covers. A horizontal wire way extending the entire length shall be provided at the top of panel for inter panel wiring.
- The Panel shall be mounted on a robust base frame made up of steel channels with a minimum height of 75 mm. The base frame shall be able to withstand the static and dynamic loads of the LT Panels. The steel channels shall be painted with two coats of black enamel paint over a coat of zinc chromate primer. The steel channels shall have slots/ holes provided for fixing the panel.
- The panel shall undergo seven tank or better process as per relevant IS/IEC standards.
- Lifting hook shall be provided at each section for easy transportation.
- Different compartment of the panel shall be provided with dust proof type air filter louvers /explosion vents or similar safety arrangements in the panels to let out gases under pressure generated during event of any fault inside the panel.

- Panel shall have pocket for the Panel drawing in the incomer section.
- The LT Panel shall be designed for usage up to an altitude of 2000 m as per IS/IEC 61439.
- The Panel shall, in all respects, be suitable for operations in service conditions and shall withstand the stresses due to the seismic conditions.
- The Panel along with Switchgears, Busbars and connections shall have all type tests a defined in latest IS/IEC 61439-1 & 2with latest amendments for the ratings specified from CPRI/ERDA/Independent international test house. All type test reports as per IS/IEC 61439 shall be submitted along with the offer for verification.
- Panel shall be tested to withstand internal arc fault and valid Type Test Certificates have to be provided as per IEC61641 (with latest amendments).
- The LT panel enclosure shall have designed to take care of normal stress as well as abnormal electro-mechanical stress due to short circuit conditions. All covers and doors provided shall offer adequate safety to operating persons and provide minimum ingress protection of IP 54. Ventilating openings and vent outlets, if provided, shall be arranged such that same ingress protection of IP 54 is retained.
- Panel shall also have test certificate for seismic withstand capacity as per relevant standards.
- The LT panel shall be provided with front and back access and the maximum height of the panel shall not exceed 2300 mm. All operating devices on the LT panel shall be positioned at an accessible height.
- The switchgear assembly/sub-assemblies or panels shall be termite and rodent proof. The sub-assemblies of similar equipment shall be interchangeable.
- Electrical panel shall be installed either on ground floor or on first floor. Necessary crane/ hydra for shifting the panel from ground to first floor of the building shall be arranged by the contractor.

IEC /IS STANDARDS (with latest Amendment as applicable)

IEC 61439 (Part-1 & 2)	Low-voltage Switchgear and Control gear assemblies
IEC 60044 (Part-1 & 2)	Instrument Transformers (Current Transformer & Potential Transformer)
IS/IEC 60947 (Part-1 to 5)	Low voltage switchgear and Control gear
IEC 61641 : 2008 / IS: 2147:1962	Specification for Internal Arc Containment Test
IS/ IEC 60529	Degree of protection provided by enclosures (IP code)

IEC 60073	Basic and Safety Principles for Man-Machine Interface, Marking and Identification – Coding Principles for Indicators and Actuators.
IEC 60417	Graphical symbols for use on equipment.
IEC 62052-11	Electricity metering equipment (AC) General requirements, tests and test conditions Part 11: Metering equipment-First Edition.
IEC 62052-21	Electricity metering equipment (A.C.) General requirements, tests and test conditions Part 21: Tariff and load control equipment-First Edition
IEC 62208	Empty enclosures for low-voltage switchgear and Control gear assemblies General requirements
IEC 60228	Conductors of Insulated Cables.
IS 694	PVC insulated cables for voltage including 1100 V with copper conductor.

Busbar and Bus Taps

- Construction of Busbar, Busbar connections, Busbar chamber, supports and conductors shall be as per the type tested/ verified design in compliance to IS/IEC 61439. Busbars shall be provided with colour coded sleeves for phases and Neutral identification.
- The short-time withstand current rating shall be 35kA.
- Busbar shall be of rectangular section with hard drawn high conductivity with minimum 99.0% purity, aluminium conductor adequately rated and supported by moulded insulators spaced at suitable intervals. The complete assembly shall be capable of withstanding the maximum mechanical stresses to which it may be subjected to under fault conditions.
- The configuration of LT panel shall be such that its bus bar shall be extensible on both sides by addition of vertical sections after removal of the end covers.
- The cross section of neutral busbar shall be same as that of the phase busbars.
- Auxiliary buses for control power supply, space heater power supply or any other specified service shall be provided. These buses shall be insulated, adequately supported and sized to suit specific requirement.
- Barriers shall be provided between the busbar chamber cover and live busbar in order to avoid accidental contact with live parts.
- The main bus and connections shall be of high connectivity Aluminium/Aluminium alloy, sized for specified current ratings with maximum temperature limited to 85° C. i.e. 35° C rise above ambient temp. of 50° C.
- Separate vertical bus bars shall be provided for each vertical panel.
- Adequate contact pressure shall be ensured at bus connections by means of two bolt connections with plain and spring washers and lock nuts.

- Bus bar and connections shall be fully insulated for working voltages with adequate phase/ground clearances. Insulating sleeves heat shrink type for bus bar and shrouds, removable type joints shall be provided. Bus insulators shall be flame retardant.
- Busbar should be connected in such a way that it can be dismantled/assembled while separating different section of the panel.
- Shrouds of transparent sheet on the exposed bus in cable alleys, for adequate safety measure.
- Clearances between phases-phases, phase – Earth/ neutral should be in line with IS/IEC 61439.
- Bus Bar supporting Material shall be of SMC/DMC.

Surge Protection Devices (SPDs)

- Panel incomers shall be protected by providing a suitable Surge Protection Device (SPD) having voltage protection level ≤ 1.5 kV. At the line entrance into the structure (at the boundary of Lightning Protection Zone-1, for example at the main LT panel), SPD tested with typical 10/350 impulse current waveform and tested with 8/20impulse current waveform i.e. SPD Class1 & 2 shall be provided. Sub-distribution panels (at the boundary of Lightning Protection Zone-2 and higher) shall be protected with SPD tested with typical 8/20 impulse current waveform i.e. SPD Class 2.
- SPD shall be installed in LT panel in such a way that the maximum length of wire/ cable connecting SPD and Earth Bus shall be lesser than 0.50m.

Control Module

- Fixed type control module shall house the control components for a circuit.
- The equipment layout shall provide sufficient working space in between the components and subject to SCL approval.

MCCB

- The MCCBs should be extra current limiting type with trip time of less than 10 msec under short circuit conditions. The current limiting action should be achieved with repulsion principle. The MCCBs should preferably have an anti-reclosing feature.
- The MCCBs should be 4 poles for incomer and outgoing feeders.
- The MCCBs shall be arranged in multi-tier formation.

- The MCCBs should have a Service short circuit breaking capacity (Ics) of not less than 35 kA rms at 400 Volts 50Hz AC for incomer. The service breaking capacity should be equal to ultimate breaking capacities (Icu) (i.e. Ics= Icu=100%).
- The release should be thermal magnetic having adjustable overload and short circuit.
- Cubicle doors of incoming and outgoing shall be mechanically interlocked with switchgear to prevent unintentional openings of the door while the unit is in energized condition. However, defeat interlock provision is also to be provided.
- All incoming and outgoing feeders shall be provided with bolted disconnect link for isolation of neutral, if necessary. Selector switches shall be of rotary type.
- The MCCB shall be provided with rotary drive kit, spreader terminals and ON/OFF/Trip (MCCB) position of switch handle to be clearly marked.
- For incomers MCCB should be microprocessor based communicable MCCB (35 kA or above) with numerical releases for O/L, S/C & EFR.

Contactor

- The contactor shall be 3 pole, air break type AC3 Duty continuous rating for motor starter feeders with non-bouncing silver/ silver alloy contacts.
- Contactor shall be of electromagnetic type rated for uninterrupted duty as per relevant standards and also suitable for capacitor duty
- Contactor shall be provided with adequate auxiliary contacts rated for 10Amps @ 240VAC for interfacing with control scheme.
- Contactor coil rating shall be minimum pick up of 85% of rated voltage and minimum drop out of 75% rated voltage.

Control and Indications

- Push buttons will be heavy duty, oil tight, and push to actuate type with integral plate marked with its function.
- Each push button shall be provided with 2NO+2NC contacts rated for 10Amps @ 240VAC.
- Lamps shall be LED type rated for 240V AC. Lens and lamps shall be replaceable from the front.

Meters

- All indicating instruments shall be digital, Switchboard type with accuracy class +/- 2% full scale.
- MFM of suitable rating shall be used in the incomer feeder.

- All outgoing shall be equipped with digital ammeter. Selector switches shall be furnished at outgoing feeders for ammeter.
- All meters shall be of digital type flush mounted industrial pattern of size 96x96 mm with accuracy class 0.5.
- Multifunction meter shall be of digital type flush mounted industrial pattern of size 96x96 mm with accuracy class 0.5 as per IEC 62052/53 suitable for measurement of Current, Voltage, Power, Frequency, Power factor, Energy and ready port to communicate with FCMS through RS 485. The Meter should have Modbus communication port as well.

CT (Current transformer)

- CT will be cast resin type rated 15VA or more burden with Maximum accuracy limit of class 0.5.
- The current transformers for metering and for protection shall be mounted on the busbars with proper supports.
- Current transformers ratings shall be as per the feeder rating.
- Current transformers shall conform to latest edition to relevant standards. The Current transformers shall be epoxy resin cast with bar Primary or ring type.
- The design and construction shall be sufficiently robust to withstand thermal and dynamic stresses due to the maximum short circuit current of the circuit. CT core laminations shall be of high grade silicon steel.
- Secondary terminals of CT shall be brought out suitably to a terminal block which will be easily accessible for testing and terminal connections.
- Access to the CTs for cleaning, testing or changing shall be from front, back or top of the panel.
- Name plate details and terminal markings shall be according to the latest edition of relevant Indian Standard.

Secondary wiring

- All control wiring for panel shall be with FRLS copper conductor wires. The wiring shall be coded and labeled with approved ferrules for identification. The minimum size of copper conductor control wires shall be 1.5 sq. mm. All CT connections/ circuits shall be provided with copper conductor control wires with a minimum size of 2.5 sq. mm. Runs of wires shall be neatly bunched and suitably supported and clamped. Identification ferrules shall be used at both end of wires.
- Panel shall be fully wired at the factory to ensure proper functioning of control and protection.
- Fuse and links shall be provided to permit individual circuit protection from bus wires without disturbing other circuits. All spare contacts of relays, push buttons and other devices shall be wired up to terminal blocks.

- Wire termination shall be done with crimping type connector with insulating sleeve.

Power/control Terminal Blocks

- Terminal block shall be 660V grade box clamp type with marking strips similar to ELMEX 10 mm2 or equal for Control.
- Terminal for CT secondary leads shall have provision for shorting.
- Not more than two wires shall be connected to any terminal.
- Spare terminals equal in number to 20% active terminals shall be provided.
- Terminal blocks shall be suitably located in cable alleys.
- For Power cable, Bus Bar type cable connector (Melamine material) shall be provided.
- For Control cable, heavy duty screw type cable connector (Melamine material) shall be provided.

Cable termination

- Panel shall be designed for cable entry from top.
- Each cable shall be clearly marked at both ends with an indestructible marker, preferably a cable tag made of Aluminium tacked with indicating cable number & both end feeder tags with switchboard tags. Cable tags at ends of cable shall be provided inside the gland plate as well as outside the gland plate
- All provisions and accessories shall be furnished for termination of cables including removable gland plates, cable supports and terminal blocks.
- Gland plate shall be minimum 3 mm thick.

Heating & Ventilation of Panel

- Anti-condensation space heaters shall be fitted in cubicles together with an ON/OFF isolating switch suitable for electrical operation at 230 volts 50 Hz AC supply. The space heater shall be of sufficient capacity to raise the internal temperature of LT panel by 50°C over the outside ambient temperature. The design shall be such that the maximum permitted rise in temperature inside panel is not exceeded if the heaters are energized while the LT panel is in operation. Heaters shall be provided with protection against overheating such as thermostats, sensors etc. and associated disconnecting circuits.
- LT Panel cubicles shall be properly ventilated with grills, louvers, fans etc. as per the design verified by IS/IEC 61439 while maintaining the IP.

Ground Bus

- Continuous earth bus suitably (as per IS/IEC 61439) for prospective fault current to be provided with arrangement for connecting to station earth at two points. Hinged doors / frames to be connected to earth through adequately sized flexible braids.

Nameplate and Labels

- Suitable engraved metal name plates and identification labels shall be provided for all LT panels and Circuits. These shall indicate the feeder number, feeder designation, rating of switchgear. Nameplate shall carry the name of the LT panel manufacturer and / or Original Manufacturer.
- LT panel shall be provided with “Danger Notice Plate” conforming to relevant Indian Standards, preferably on busbar chamber cover.
- Permanent marking of SLD shall be provided on the LT panel.
- Drawing Pouch shall be provided at the incomer cable allay.

Painting

- Panel shall be painted with light grey epoxy powder painted (Siemens Gray RAL 7032) and shall have matt finish.
- The minimum powder coating thickness of LT panel shall be 60 microns as per IS 13871.
- Caution notice plate shall be fixed at the back of each vertical/horizontal bus bar allay of the panel.

Cable Alley Illumination:

- All cable alley compartments shall be provided with 10W LED batten type lamps, provided with MCB of suitable rating operating on 240 volts, 1 phase 50 Hz AC supply.

Test Reports:

- Complete set of type test reports/ design verification reports as per IS/IEC 61439 for the offered panel shall be submitted along with the offer and along with the GA drawings submitted for Department clearance.
- Type test reports as per IS/IEC 60947 for all type of switchgears proposed for the LT panel, shall be furnished to the department.
- Following routine tests shall be carried out as per IS/IEC standards at the LT panel fabricators shop in the presence of Department representative prior to dispatch.

    a) Physical verification and dimensional check with Functionality check.
    b) Verification of bill of materials, SLD, control circuits etc.
    c) HV test
    d) Insulation resistance test

- Following pre-commissioning tests shall be carried out at site on LT panels:

    a) Physical verification and dimensional check.
    b) Verification of bill of materials, SLD, control circuits etc.
    c) Check cleanliness of cubicles, busbar chamber and interconnections and Check the tightness of busbar interconnections.

d) Functionality check.
e) Earth continuity test.
f) Insulation resistance test.

Drawing & Information:

- The Contractor(s) shall furnish following drawings/documents in accordance with enclosed requirements:
  a) General Arrangement drawing of the LT Panel, showing front view, plan, foundation plan, floor cut-outs/trenches for external cables and elevations, transport sections and weights.
  b) Sectional drawings of the circuit breaker panels, showing general constructional features, mounting details of various devices, bus bars, current transformers, cable boxes, terminal boxes for control cables etc.
  c) Schematic and control wiring diagram for circuit breaker and protection including indicating devices, metering instruments, alarms, space heaters etc.
  d) Terminal plans showing terminal numbers, ferrules markings, device terminal numbers and function details etc.
  e) Wiring diagrams.
  f) Equipment List.

- The Contractor(s) shall furnish required number of copies of above drawings for Department review. Fabrication of switch boards shall start only after clearance from Department. After final review, required number of copies (reproducible) shall be furnished as final certified drawings. The information furnished shall include the following:
  a) Technical literature giving complete information of the equipment.
  b) Erection, Operation and Maintenance Manual complete with all relevant information, drawings and literature for auxiliary equipment and accessories, characteristics curves for relays etc.
  c) A comprehensive spare parts catalogue.

Installation and Commissioning:

- LT panels shall be supplied in properly packed conditions. After ascertaining that there is no damage to packing, all the items shall be inspected after unpacking. It shall be ensured that all LT panel components are in accordance with the requirements. It shall also be ensured that all the components like switchgears, relays, indicating lamps, meters etc. are in good condition and has not suffered any damage during transit.

- Any damaged components received at site shall be replaced at no extra cost by the supplier. Any damage over the finished sections including scratches on the paint etc. shall be attended and suitably finished by the supplier.
- LT panels shall be installed using necessary bolts for grouting of panels and shall furnish the drawing / templates if any required for grouting the foundation bolts.
- All loading and unloading arrangements and transporting of panels to site with necessary tools and equipment's shall be the part of the scope of work and all required man power shall also be provided by the supplier for unloading and installation and commissioning the panels in the designated location at site.

Make of Electrical panel: As per Approved Panel manufacturer list (attached).

Make of Switchgears etc.: As per Approved make list (attached).

2. Earthing (Grounding) System:

- The system will be designed/modify to limit the earth loop impedance so as to ensure positive and timely operation of the current operated safety devices.
- The grounding system is to be designed/modify to limit the resistance to one ohm or less.
- Dedicated earthing, as required.

Earthing conductor:

As per IS: 3043,inclusive of brazing, welding, jointing, clamping, hardware, bituminous paint at joints, connection to equipment and all required material, to be laid along conduit, trays or on floor / wall / ceiling /roof / structure etc. with clamping at 500 mmintervals. All electrical equipment, metal casings, frames, electrical panels, conduits, cable trays etc. shall be independently earthed at two points. Metallic sheaths, screens, armor of cables shall be earthed at both ends of cable. The Contractor(s) shall connect all earth continuity conductors from process tools/all other equipment to risers from the existing underground earthing in sub fab.

The earthing conductor shall be of the same material as the electrode in the form of wire or strip. Thesize of earthing conductor shall not be less than the following

(a) 4mm dia (8 SWG) copper wire

(b) 25mmx4mm in the case of GI strip, or,

(c) 20mmx3mm in the case of copper strip

ESD Active Protection

Addition/modification of the ESD Active Protection will be provided by installing active Ionizers in Photo and Starting Material Areas.

3. Illumination in clean room and gray area.

- Lighting level in clean Rooms will be 600 Lux and 400 Lux in grey areas, at 80 cm above the floor. The Contractor(s) to design the lighting layout for clean rooms and grey areas to achieve the prescribed lighting levels.
- Light fixture in Grey areas of suitable rating as per the Lux requirement shall be suspended from steel structure at plenum level.
- Clean room LED light fixture shall be tear drop, suitable for laminar airflow system, grid mounted to minimize turbulence in clean room.
- The scope includes all the accessories such as teardrop end cap cover plate (single), intermediate connector loom, interconnector plate and all other accessories required for smooth installation of the fixture in the clean room on existing/new ceiling grid.
- The LED light fixtures shall be non-degassing type and not contaminate the clean room environment.
- Technical specifications shall be as follows:

S.No	Description	Monochromatic Yellow light LED	Clean Room White light LED	White light LED For grey area
1	Wattage	40W ± 1 W	40W ± 1 W	20 W
2	Dimension	4 feet/ 1200 mm	4 feet/ 1200 mm	4 feet/ 1200 mm
3	CRI	80 or better	80 or better	80 or better
4	CCT		5700 K± 500K	6000K ± 500K
5	Lumens/ Watt	90 or better	90 or better	100 or better
6	THD	Less than 10%	Less than 10%	Less than 10%
7	Diffuser	Polycarbonate	Polycarbonate	Polycarbonate
8	Power factor	>0.95	>0.95	>0.95

- About 25% of the light fixtures in the clean Rooms and Grey areas will be backed by SCL's captive power system and the Contractor(s) will design and install separate wiring system accordingly.
- The lighting wire shall be 1.5 sq mm copper conductor, FR PVC as per IS 694 and run in 25 mm bore GI conduit. Modular Switches will be provided in each room/area for local control of the lights. If required, Contractor(s) shall provide double door TP+N type MCBDB equipped with suitable rating 30mA sensitivity RCBO as incomer and required suitable rating MCBs in the outgoings.
- MCBDBs will be installed at plenum level. The Contractor(s) shall also supply, lay and commission suitable size 1.1 KV grade Aluminium conductor PVC/XLPE insulated armoured overall FRLC PVC outer sheathed cables to the MCBDB's Incomer from spare switches in lighting DB's located in Sub fab.

Any modification in lighting system / fixtures, if required to maintain Lux level of 400 upon detailed engineering for different utility systems / ducts to be installed in the sub-fab, shall be part of the Scope of work of the contractor.

4. Fire detection System & VESDA

Scope for fire detection system includes supply/modification/relocation, installation, testing, commissioning of Apollo make Addressable multisensory Fire detection devices, Manual Call Points, Addressable loop sounders, 2x1.5sqmm fire Cable, MS junction boxes for loop in loop out of cable and integrating the same with fire/repeater panel as per the requirement for the area being modified in the clean room matching with the existing system details to be worked out as per Fab layout drawing.

Shifting of the 10 loop fire panel and LSS (Life safety system) remote node (Rockwell make) from the existing ERT room to the new ERT room including supply of necessary, cable, gland, cable, tray, wire, LAN cable required for relocation of the systems.

Very Early Warning Smoke Detection Aspirators (VESDA) of Xtralis make are installed inside 8'' & 6'' fabrication clean rooms with high air flow environment, intending for faster gas/chemical/smoke detection. VESDA detectors are able to communicate this information through a VESDA monitoring system located at Fire Station, ERT room and FCMS. The scope includes supply/modification/relocation, installation, testing, commissioning of Piping, Xtralis make detection devices, Addressable loop sounders, Cabling, integrating the same with existing fire/repeater panel as per the requirement for the area being modified in the clean room matching with the existing system details to be worked out as per Fab layout drawing.

5. Paging

Scope for paging includes supply/modification/relocation installation, testing, commissioning of Bosch make Cable, MS junction boxes for loop in loop out of cable and integrating the same with SCL paging system as per the requirement for the area being modified in the clean room matching with the existing system details to be worked out as per Fab layout drawing.

6. Cables, wire, conduit, Switchboards, Switches/Sockets etc.

Cables: The scope includes the Supply and installation of ISI marked PVC/XLPE insulated, Extruded PVC inner sheath, GI strip armoured/unarmoured overall FRLS PVC outer sheathed, Copper cable on wall/surface/ existing cable tray as required. Control cables shall be copper

conductor PVC insulated and power cables shall be XLPE insulated. The necessary hardware for installation of cable like cable tie, clamps, tags etc will be in the scope of Contractor.

Instrumentation cables shall be conforming to BS 5308, type II, 300/500 V grade with stranded 0.75sq mm copper conductor, PVC insulated, colour coded, twisted to form a pair/pairs, twisted to form a unit, units laid up, myler taped binding, overall screened with aluminium myler tap with tinned copper drain wire, extruded inner sheathed, galvanized steel round wire /strip armoured, overall FRLS PVC sheathed.

Wire: The scope includes the Supply and installation of stranded Copper conductor wire, 1100-volt grade, FR PVC insulated single core conforming to IS 694 as required.

Conduit: The scope includes the Supply/modification/relocation and installation of ISI make rigid steel, hot dip galvanized conduits of different size for the area being modified. The conduit shall be installed on wall/surface/ metal truss/existing cable tray, as required. Flexible conduit shall be made with bright cold rolled annealed and electro-galvanized mild steel. Installation of conduits shall include all necessary hardware, metal strip, welding, clamps etc.

Switchboards and Switch/Sockets: The scope includes the Supply and installation of Different sizes of Switchboards and switch/socket for Lighting, Power Distribution as per the requirement for the area being modified as per Fab layout drawing. The industrial type sockets of suitable rating will be planned for process tools/utility equipment. Modular power sockets, switches will be planned for clean room lighting, office area, workstations & general-purpose utilities.

7. Cable tray

Scope includes supply/modification/relocation, installation, testing, commissioning of perforated/ladder type etc. hot dipped, galvanized iron (GI)cable tray as per the requirement. All the accessories such as bend, Tee, cross member, reducer, channel, unistrud etc. shall be part of the scope as per the site requirements.

8. Tool Hook Up-Electrical

The scope includes design, supply, installation, testing and commissioning of all material for providing power upto the local isolation for the process tools envisaged to be installed by SCL in the Clean Rooms as per the equipment layout. The power to the process tools shall be bottom/top entry, catered from the electrical panels for the process tools which shall be installed by the Contractor(s) as per the SCL instruction.

The scope of work shall include the following

- Supply of 4/3/2 Core copper flexible PVC/XLPE insulated, unarmored, FRLS PVC outer sheathed cables of suitable size matching the process tool power rating / kVA / kW rating at 400V 3 phase / 230V 1 phase or 208V, 3 phase / 120V, 1 phase. As part of design, the Contractor(s) shall work out the cable size meeting the requirements of KVA/KW/ Specified Feeder rating of each tool.
- Supply of all required hardware viz. cable trays, cable glands, lugs, tie wraps and cable markers etc. from the electrical Panel up to the tool
- Supply of copper earth cable matching the process tool KVA rating for process tool Earthing.
- Installation of all the above material.
- Testing & commissioning up to the Tool isolator.

Supply and installation of Floor mounted TPN SFU for local isolation of the power to the tool. The Switch shall be mounted on an epoxy coated steel frame to be fixed on the false floor tile

G. LIFE SAFETY SYSTEMS (LSS)

SPRINKLER SYSTEM

Wet Type sprinkler system is installed in FAB Area (Clean Room and Grey Areas and under HVAC supply air Ducts) as per NFPA 13 Code for sprinkler installation / IS 15105-2002 for Design and Installation of Fixed Automatic Sprinkler Fire Extinguishing system for ORDINARY HAZARD. In clean room sprinklers are installed with SS sprinkler flexible drop connection of FlexHead make and in Clean room grey areas directly on the MS sprinkler range pipe. The existing Sprinkler installation is fully tested and about 7 Kg/cm^2 is maintained.

Typ. Clean Room sprinkler installation

Scope of Work

The existing Clean rooms will be modified to accommodate new tools/tools relocation. Corresponding to the CR modification, sprinkler modification as required shall be covered under the scope of work.

1) The Contractor(s) shall modify the sprinkler range pipe to match the new clean room layout as may be required. Material such as Flexible sprinkler hose (Flexhead make), sprinkler head shall be supplied & installed to carryout sprinkler modification work
2) Dismantling of existing piping, sprinkler head, pipe support and using them wherever feasible.
3) New supports as may be required shall be provided as per referred code.
4) Pneumatic Testing of overhead lines shall be carried out at minimum4 Kg/cm^2 before final hydraulic testing at 10.5 Kg/cm^2 for 2 hours without any drop in pressure.
5) Painting of new overhead range pipe and support with red synthetic enamel paint of the existing piping providing one coat of red oxide primer with 2 coats of red synthetic enamel paint.
6) Contractor shall list out items along with quantities and shall provide the same to SCL upon detailed engineering.

SAFETY EYE AND BODY SHOWER SYSTEM

Safety Eye and body shower combination units are installed in clean Room/ Clean room grey areas on network of GI piping connected to independent automatic water supply arrangement. Collection containers are provided under the raised floor and drain is connected to the common ACID Waste Drain in SUB FAB. The existing system working pressure is at 4 Kg/cm^2.

Scope of Work

Few safety eye cum body shower units will have to be removed / relocated along with collecting tray underneath raised floor etc. and scope covers the following:

1) The Contractor(s) shall relocate the existing safety shower units including water collection tray and drain piping etc. as may be required to match the new clean room layout approved by SCL.
2) Dismantling of existing safety shower unit, GI piping (size 25mm), collection container, CPVC drains (size 32mm) etc. and providing blanks as may be required.
3) Provision of Drain POC in the existing ACID Drain in SUB FAB.
4) New supports as may be required shall be provided.

5) Pressure Testing of GI line at 1.5 times the working pressure and leak integrity testing for drains.

6) Painting of new overhead range pipe and support with red synthetic enamel paint of the existing piping providing one coat of red oxide primer with 2 coats of red synthetic enamel paint.

TOXIC GAS MONITORING SYSTEM FOR NEW OXIDE ETHER TOOL

Toxic gas monitoring for Hazardous/Toxic process gases in FAB TOOLs is achieved using Fixed Gas Detector per gas type connected to centralized Drager Rack / Concentrator.

Scope of work:

1) Supply of Fixed Gas detector in line with existing detectors of make Honeywell – MIDAS/ RKI – GD70/ Drager – Polytron 7000 with sampling pump PSD 3000 complete with Teflon Air sample tubing for the new tools / New gas cabinets / New VMBs, as required.

2) The Contractor(s) shall supply and install 3 core x 1.5 sq.mm multi strand shielded FRLS cable for interconnection of gas detector up to junction box/ concentrator (located in sub-fab). The cable shall be laid in FRLS PVC conduit/ GI cable tray of size 50mm complete with cable tags etc

3) New supports as may be required shall be provided.

LIQUID LEAK DETECTION (LLD):

TraceTek make Model TTDM LLD system with Sensor cable at 20 point
floor in FAB area for wet Tools.

TRACETEK TTDM -128

Scope of Work

The existing LLD panel will be shifted to the new ERT room and existing POC will be relocated to the 8”Quartz Clean room

1) The Contractor(s) to install PP drip tray underneath the DI water supply/drain connections to tool.

2) Relocate the TraceTek main panel in new ERT Room.

3) Extend the existing jumper cable from TTDM to new 8” Quartz Clean Room and reinstall the TT 3000 aqueous chemical sensor cable with floor clips.

Exclusion items:

1) Arrangement for shutdown of sprinkler system for modification and nitrogen supply for Pneumatic testing as may be required.
2) Configuration of TGM Panel/ concentrator and testing.
3) TGM and LSS SCADA Augmentation to display Alarms & faults, Development of new Screens etc.

Appendix 6A : Existing Utility Generation Plants & System Capacity

#	Description	Total Capacity	Equipment Capacity	Operational Configuration	Remarks
1	**Acid/Toxic Exhaust System (AEX)**				
a)	8" and 6" FAB lines	55000 CFM	3X 27500 CFM @280mm of WC static	2N+1	No Spare Capacity available
b)	6" Expansion area	8000 CFM	2X 8000 CFM @250mm of WC static	N+1	Spare Capacity available
2	**Solvent Exhaust System (SX)**				
a)	8" and 6" FAB lines	5000 CFM	2X5000 CFM @250mm of WC static	N+1	No Spare Capacity available
b)	**6" Expansion area (GEX)**	Nil			
3	**General Exhaust System**				
a)	8" and 6" FAB lines	25000 CFM	2X 25000 CFM @250mm of WC static	N+1	No General exhaust duct in 6" Area ~ **4000 CFM Spare Capacity Available**
b)	6" Expansion area	Nil			
4	**Process Cooling Water System (PCW)**				
	8" & 6" FAB lines and 6" Expansion area	1000 GPM	3X 1000 GPM @ 7 Bar.	2N+1	Two pumps are operational to maintain line pressure and flow in case of changeover **No Spare Capacity Available**
5	**Compressed Dry Air system (CDA)**				
	8" & 6" FAB lines and 6" Expansion area	1000 CFM (FAD)	3X 1200 CFM (FAD) @ 8 Bar each.	N+2	
6	**Process Vacuum System (PVAC)**				
	8" & 6" FAB lines and 6" Expansion area	400 CFM	2X400 CFM @ -27 inch of Hg each.	N+1	
7	**Make-Up air unit (MAUs)**				
a)	8"FAB line	50000 CFM	3X 25000 CFM@200 mm of WC Static	2N+1	
b)	6"Fab line and 6"Expansion area	20000 CFM	2 X 20000 CFM @200 mm WC	N+1	Without water curtain. Not meeting the 8"

					FAB line specifications
8	**Electrical**				
a)	Main 66kV Substation	8 MVA	6.5 MVA	N+1	Running load is 4MW to 4.5MW and there is a margin of approx. 2 MW for augmentation of the additional load
b)	Rotary UPS	3340 kVA	1670 kVA	2N+1	Running load is 2200 kVA and there is a margin of approx. 600kVA for augmentation of the additional load. Spare feeders for 3 Phase 400V & 208V, with current capacity of approx 700A is available.
c)	Emergency Supply (Utlity Plants)	2500kVA	1250kVA	2N	Emergency Supply catering to Chiller Plant, HPN Plant, Admin Building HVAC Load. **No spare capacity available**
d)	Emergency Supply (Fab)	625kVA	625kVA	N	Emergency supply catering to RAH Load for Fab, HVAC Load for Horizontal Expansion. **No spare capacity available.**
9	**Ultra-Pure Water Plant (existing)**				
a)	Capacity of UPW Plant	110 gpm (25 m3/hr)			
b)	Circulation flow rate in PVDF Supply Return loop	180 gpm (41 m3/hr)		N+1 Pump configuration	Common PVDF distribution loop of 3" for 8" & 6" FAB lines at 80psi
10	**BULK GASES**				
a)	**Nitrogen**				
	N2 Plant Cryogenic based Plant	400 Nm3/hr at 8 Bar	350 Nm3/hr at 8 Bar		Catering to FAB and Other areas , No Spare capacity available
	Cryogenic Storage Tank LN2	120KL	250 Nm3/hr at 8 Bar	1x 50KL 2x35KL	Catering to 8" and 6" FAB Line

	N2 PURIFIERS	800 Nm3/hr at 8 Bar	400Nm3/hr at 8 Bar	2N +1	quality
b)	**OXYGEN**				
	Cryogenic Storage Tank LOX	10KL	60 Nm3/hr at 8 Bar	2x5KL	Catering to 8" and 6" FAB Line
	O2 PURIFIERS	120 Nm3/hr at 8 Bar	60 Nm3/hr at 8 Bar	N +1	
c)	**ARGON**				
	Cryogenic Storage Tank LAr	5KL	250 Nm3/hr at 8 Bar	1x5KL	Catering to 8" and 6" FAB Line
	Ar PURIFIERS	250 SLM (15 Nm3/hr) at 8 Bar	2 x 75SLM + 1 X 100SLM at 8 Bar	3N	Catering to 8" and 6" FAB Line
d)	**HYDROGEN**				
	Plant capacity	10Nm3/hr at 8 Bar	10Nm3/hr	1N	Catering to 8" and 6" FAB Line and MOCVD Reactors
	H2 PURIFIERS	450 SLM (27 Nm3/hr) at 8 Bar	150 SLM (9 Nm3/hr) at 8 Bar	3N	

Note: Additional information about the existing plants/systems at SCL shall be provided to the Selected Bidder(s).

Appendix 6B : Constraints of Existing Infrastructure

Cleanroom areas of present 6" fab-line and 6” fab expansion area will be utilized for the expansion of 8" CMOS fab, for capacity enhancement and creating redundancy as far as possible in the 8" fab-line. The extended clean room (6" fab-line + 6” fab expansion area) has its own limitations which are as follows:

- 6” fab expansion area does not meet photolithography equipment vibration specification. So, additional photolithography equipment cannot be placed in 6” fab expansion area.
- Non-waffle slab can only support the equipment which do not need chemical or gas delivery system in sub-fab, because the sub-fab space below non-waffle slab is already occupied and installation of gas/chemical delivery system in Sub-FAB is not possible.
- Non-Waffle Slab area cannot accommodate heavy tools (i.e having distributed load more than 300 kg/m^2) due to structural constraints
- The 6" fab clean room is presently Class-10 and is in the Bay and Chase layout.
- The additional set of photolithography equipment (similar to the existing 8" tools) cannot be housed in present Class-10 clean rooms of 6" FAB, due to their dimensions.

Appendix 7 : List of POCs

EXHAUST POCS FEEDING 6" TOOLS

Acid /Toxic Exhaust feeding main FAB				
S.No.	**Main line/ Lateral description**	**Location w.r.t. pillers**	**Size of POC (inch)**	**With Damper or W/o Damper**
1	760 AEX FRP F - Main duct	Sub FAB - Near F 16 Pillar	9"	With Damper
2	760 AEX FRP F - Main duct	Sub FAB - Near crossing of 760 AEX FRP F & 270 SEX 18S	8"	With Damper
3	760 AEX FRP F - Main duct	Sub FAB - Near crossing of 760 AEX FRP F & 270 SEX 18S	8"	With Damper
4	760 AEX FRP F - Main duct	Sub FAB - Near crossing of 760 AEX FRP F & 270 SEX 18S	8"	With Damper
5	500 AEX 16S - Lateral	Sub FAB - Near G 16 Pillar	10"	With Damper
6	500 AEX 16S - Lateral	Sub FAB - Near G 16 Pillar	10"	With Damper
7	500 AEX 16S - Lateral	Sub FAB - Near G 16 Pillar	9"	W/o Damper
8	500 AEX 16S - Lateral	Sub FAB - Near H 16 Pillar	5"	With Damper
9	500 AEX 16S - Lateral	Sub FAB - Near H 16 Pillar	2.5"	W/o Damper
10	500 AEX 16S - Lateral	Sub FAB - Near H 16 Pillar	2"	With Damper
11	500 AEX 18S - Lateral	Near G 18 Pillar	5"	W/o Damper
12	500 AEX 20S - Lateral	Near G 20 Pillar	8"	With Damper
13	500 AEX 20S - Lateral	Sub FAB - Near G 20 Pillar	8"	With Damper
14	500 AEX 20S - Lateral	Sub FAB - Near G 20 Pillar	4"	With Damper
15	500 AEX 20S - Lateral	Sub FAB - B/w G 20 & H 20 Pillar	10"	W/o Damper

16	500 AEX 20S - Lateral	Sub FAB - B/w G 20 & H 20 Pillar	2"	With Damper
17	500 AEX 20S - Lateral	Sub FAB - B/w G 20 & H 20 Pillar	2"	W/o Damper
18	Lateral 18" (Feeding to Post CMOS Lab)	Sub FAB - B/w G 20 & G 22	4"	With Damper
19	Lateral 18" (Feeding to Post CMOS Lab)	Grey area of Post CMOS lab	10" - 02 nos.	W/o Damper
20	Lateral 12" (Feeding to Post CMOS Lab)	Sub FAB - B/w G 20 & G 22	4"	W/o Damper
21	Lateral 12" (Feeding to Post CMOS Lab)	Sub FAB - B/w G 20 & G 22	2.5"	W/o Damper
22	Lateral 12" (Feeding to Post CMOS Lab)	Grey area of Post CMOS lab	10"	With Damper

ACID/TOXIC EXHAUST FOR 6" EXPANSION AREA

23	Main duct	Grey area near back door	14"	With damper
24	Main duct	Above Clean Room	6"	With damper
25	Main duct	Above Clean Room	4"	With damper
26	Main duct	Above Clean Room	4"	With damper
27	Main duct	Implanter Grey area	6"	With damper
28	Main duct	Implanter Grey area	10"	With damper

Solvent Exhaust feeding main FAB

S.No.	Main line/ Lateral description	Location w.r.t. pillars	Size of POC (Inch)	With Damper or W/o Damper
1	270 SEX 18S - Lateral	Near G 18 Pillar	5"	W/o Damper
2	270 SEX 18S - Lateral	B/w G 18 & H 18	4"	With Damper

3	270 SEX 18S - Lateral	B/w G 18 & H 18	6''	With Damper
4	270 SEX 18S - Lateral	B/w G 18 & H 18	5''	W/o Damper
5	270 SEX 18S - Lateral	B/w G 18 & H 18	4''	With Damper

List of POCs for existing 6" line for various utilities				
S. No.	**Utility**	**No. of POCs/ Size (Dia)**	**Dia of Lateral**	**Location**
1	PN2	7 Nos. (½")	1"	Col. F-16 to H-16
2		4 Nos. (½")	1"	Col. F-18 to H-18
3		5 Nos. (½")	1"	Col. F-20 to H-20
4	UN2	7 Nos. (½")	1"	Col. F-16 to H-16
5		3 Nos. (½")	1"	Col. F-18 to H-18
6		1 No. (¾")		
7		7 Nos. (½")	1"	Col. F-20 to H-20
8	PO2	3 Nos. (¼")	½"	Col. F-18 to H-18
9		4 Nos. (¼")	½"	Col. F-20 to H-20
10	Argon	2 Nos. (¼")	¼"	Col. F-18 to H-18
11	Helium	2 Nos. (¼")	¼"	Col. F-18 to H-18
12		1 No. (¼")	¼"	Col. F-20 to H-20
13	CDA	9 Nos. (½")	1"	Col. F-16 to H-16
14		5 Nos. (½")	1"	Col. F-18 to H-18
15		9 Nos. (½")	1"	Col. F-20 to H-20
16	PVAC	6 Nos. (1")	2"	Col. F-18 to H-18
17		6 Nos. (1")	2"	Col. F-20 to H-20
18	PCW (S/R)	7 Sets (2")	3"	Col. F-18 to H-18
19		10 Sets (2")	3"	Col. F-20 to H-20
20	UPW (S/R)	1 Set (1")	Supply - 2"	Col. E-21
21			Return - 2"	
22		Supply: 3 Nos. (¾")	Supply - 1"	Col. F-16 to H-16
23		7 Nos. (½")	Return - ¾"	
24			(Starting Flange size of S/R lateral is 3")	
25		Return: 10 Nos. (½")		
26	Inorganic Drain	1 No. (4" Flanged)	8" CPVC	Col G-20 to H-20
27		2 Nos. (4" Flanged)	8" CPVC	Col H-18 to H-20

List of POCs for existing 6” line for various utilities				
S. No.	**Utility**	**No. of POCs/ Size (Dia)**	**Dia of Lateral**	**Location**
28		2 Nos. (4” Flanged)	8” CPVC	Col H-16 to H-18
29		1 No. (4” Stub)	8” CPVC	Col H-16

List of spare valve sticks available in existing GC/ VMBs/ VMPs				
S.No.	**Specialty Gas**	**No. of POCs/ Size (Dia)**	**Stick #**	**POC Location**
1	CO2	3 Nos. (¼” VCR)	4, 5 & 6	VMP1-CO2-8.1
2	CF4	2 Nos. (¼” VCR)	5 & 6	VMP2-CF4-8.1
3		4 Nos. (¼” VCR)	3, 4, 5 & 6	VMP5-CF4-8.2
4	CHF3	2 Nos. (¼” VCR)	5 & 6	VMP3-CHF3-8.1
5	SF6	1 Nos. (¼” VCR)	1	VMP4-SF6-8.1
6	HBr	2 Nos. (¼” VCR)	1 & 2	VMB3-HBr-8.1
7	Cl2	2 Nos. (¼” VCR)	3 & 4	VMB4-Cl2-8.1
8	C4F6	2 Nos. (¼” VCR)	3 & 4	VMB5-C4F6-8.1
9	CH2F2	3 Nos. (¼” VCR)	1, 2 & 3	VMB6-CH2F2-8.1
10	NH3	2 Nos. (¼” VCR)	3 & 4	VMB8-NH3-8.1
11	Hydrogen	2 Nos. (¼” VCR)	4, 5 & 6	VMB10-H2-8.2

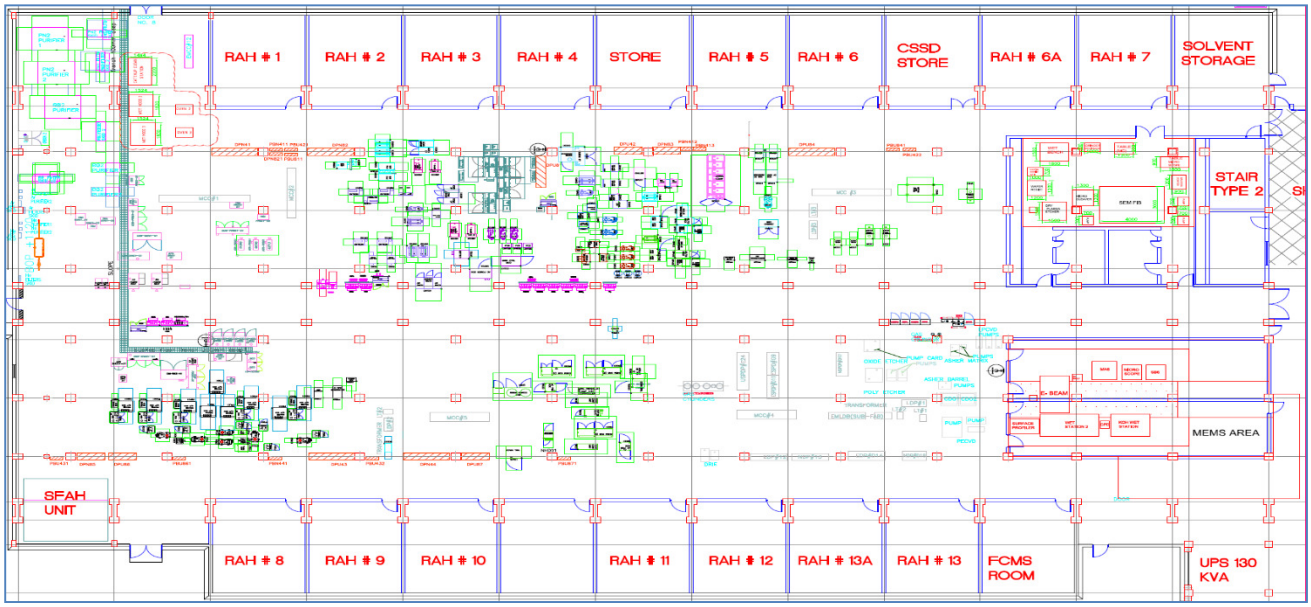
Electrical Panels / POCs

Electrical POC matrix- Availability of existing 6" CMOS & Post-CMOS POC to accommodate Proposed New 8" Tools															
S.No	**Name of the Panel**	**Nature of Supply**	**Feeder Rating**	**Cable Size**	**Max Permissible Load (A)**	**Running Load(A)**	**Feeder Rating**								
							63A			**125A**			**250A**		
							CMOS	**Post CMOS**	**Total**	**CMOS**	**Post CMOS**	**Total**	**CMOS**	**Post CMOS**	**Total**
1	Normal Panel	Normal	630A	2Rx3.5Cx120A1	250	50	11	0	**11**	0	0	**0**	1	0	**1**
2	Emergency Panel	DG supply	630A	2Rx3.5Cx240A1	400	125	1	2	**3**	1	0	**1**	2	0	**2**
3	UPS Panel 1	UPS (Static)	630A	1Rx3.5Cx240A1	160	60	5	3	**8**	2	1	**3**	0	0	**0**
4	UPS Panel 2	UPS (Rotary)	630A	2RX3.5CX240A1	375	250	0	1	**1**	1	1	**2**	0	0	**0**
5	UPS Panel 3 (6" Exp)	UPS (Rotary)	630A	2RX3.5CX240A1	450	50	1	0	**1**	1	0	**1**	1	0	**1**
							18	6		5	2		4	0	
Total Available POCs							**24**			**7**			**4**		

Appendix 8 : List of Specialty Gas Cabinets

List of the specialty Gas Cabinets installed for 8-inch process-line			
S. No.	**Gas Name**	**Formula**	**Gas Cabinet Tag**
1	SILANE	SiH4	GC1-SB-SiH4-8
2	20% SILANE IN HELIUM	20% SiH4 + He	GC4-SB-20%SIH4/He-8
3	AMMONIA	NH3	GC9-GP-NH3-8
4	CHLORINE	Cl2	GC10-GP-Cl2-8
5	HYROGEN CHLORIDE	HCl	GC11-GP-HCl-8
6	HYDROGEN BROMIDE	HBr	GC12-GP-HBr-8
7	NITRIC OXIDE	NO	GC13-GP-NO-8
8	NITROUS OXIDE	N2O	GC14-GP-N2O-8
9	NITROGEN TRIFLUORIDE	NF3	GC15-GP-NF3-8
10	FLUORINE/ KRYPTON IN NEON	F2/Kr/Ne	GC18-GP-F2/Kr/Ne-8
11	SILICON TETRA FLUORIDE	SiF4	GC19-GP-SiF4-8
12	DIFLUOROMETHANE	CH2F2	GC23-GP-CH2F2-8
13	HEXAFLUORO-1,3-BUTADIENE	C4F6	GC24-GP-C4F6-8
14	DICHLORO SILANE (DCS)	SiH2Cl2	GC25-SF-DCS-8
15	BORON TRICHLORIDE	BCl3	GC26-SF-BCl3-8
16	TUNGSTEN HEXAFLUORIDE	WF6	GC27-SF-WF6-8

Appendix 9 : Existing Sub-Fab Layout



Appendix 10 : Existing Equipment Included in CAMC

S.No	Eqp. ID	Description	Tool Type	Make & Model	Mfg. Yr.	Configuration
1	CMWO1	W-CMP	Process	AMAT Mirra 3400 Mesa 200mm + MABAT SDS	2002	Dry-in Dry-out, 3 platen, 4 head, end point based Tungsten CMP with 3 SMIF
2	IMMC1	Medium Current Implantation	Process	Varian E500 EHP	2001	Gas box with three gas bottle and 2 SMIF
3	YEDI1	Bright Field Patterned Wafer Defect Inspection	Yield	KLA 2139	1999	2 station Open cassette with minienvironment
4	MTCD1	Critical Dimension Measurement	Metrology	Hitachi S-9300	2002	2 open cassette interface
5	YESR1	SEM Review Station	Yield	AMAT SEMVision	2001	Equipment with 2 SMIF
6	ASFE1	Resist Asher FEOL	Process	Gasonics/Novellus Aura* 2000LL Asher	1998	Micro wave based downstream Asher with 2 SMIF
7	ASBE1	Resist Asher FEOL	Process	Gasonics/Novellus Aura* 2000LL Asher	1998	Micro wave based downstream Asher with 2 SMIF
8	FRSR1	Vertical Furnace for Liner Anneal	Process	TEL Alpha SE	2001	Furnace with 2 SMIF
9	FROX1	Vertical Furnace for Oxidation	Process	TEL Alpha SE	2001	Furnace with 2 SMIF
10	WTCO1	WET Bench for Cobalt Strip	Process	SES Wet Station	2001	SPM, OF, DI rinse and Dry-in Dry-out with 2 SMIF
11	RTAN1	RTP Anneal	Process	AMAT Centura 5200 TPCC XEPLUS	2000	Three chamber, 2 cooling station with two SMIF
12	FRAN1	Vertical Furnace for Alloy	Process	TEL Alpha SE	2001	1 process tube, with 2 SMIF
13	FRBG1	Vertical Furnace for Oxidation and BPSG Anneal	Process	TEL Alpha SE	2001	1 process tube, with 2 SMIF
14	FRTS1	Vertical Furnace forLPCVD TEOS Oxide	Process	TEL Alpha SE	2001	1 process tube, with 2 SMIF

S.No	Eqp. ID	Description	Tool Type	Make & Model	Mfg. Yr.	Configuration
15	FRND1	Vertical Furnace for LPCVD Nitride	Process	TEL Alpha SE	2001	1 process tube, with 2 SMIF
16	WTNT1	WET Bench for Nitride Strip	Process	SES Wet Station	2001	Two Chemical bath with DI rinse and Dry-in Dry-out with 2 SMIF
17	CDWO1	W-CVD	Process	AMAT Centura WXZ	2001	MCVD Two chamber, 1 orientor, 1 cooling station with two SMIF
18	CDTS1	TEOS Oxide CVD	Process	AMAT Centura DXZ	2000	PECVD Two chamber, 1 orientor, 1 cooling station with two SMIF
19	WTRS1	WET Bench for Resist Strip	Process	SES Techno200	2001	Three chamber bath (SPM with QDR, Two APR) and Dry-in Dry-out with 2 SMIF
20	WTPD1	WET Bench for Pre-Diffusion Clean	Process	SES Techno200	2001	Two chemical bath (DHF, HOR with O3), One Overflow and Dry-in Dry-out with 2 SMIF
21	WTSL1	Solvent strip for Metal and Via	Process	Semitool Spectrum	2001	Two chemical chamber along with rinse, WIP with 2 SMIF
22	YEOI1	Optical Inspection Station	Yield	Zeiss Axiosprint	2000	Equipment with two SMIF
23	CDNT1	CVD Silane	Process	Novellus C2-Sequel Express	2001	PECVD 1 cooling station,1 chamber for Oxide Nitride Deposition with two SMIF
24	MTOP1	Film Thickness	Metrology	KLA-Optiprobe 5240	2002	Equipment with Two SMIF
25	MTAG1	Overlay Measurement	Metrology	KLA Archer 10	2002	Equipment with two SMIF
26	MTFR1	FTIR for Si-H and N-H bond	Metrology	BIORAD QS 2200	1996	Equipment with one SMIF
27	MTHR1	Step Height Profiler for Trench Depth	Metrology	KLA HRP220SMIF	2000	Equipment with one SMIF

S.No	Eqp. ID	Description	Tool Type	Make & Model	Mfg. Yr.	Configuration
28	MTMS1	ICP-MS	Metrology	Agilent ICP-MS 7900	2016	ICPMS including Pad Scan and Pad Fume
29	YEOR1	Optical Review Station	Yield	Zeiss Axiospect	2000	Equipment with two SMIF
30	RESP1	BARC, Oxide and Nitride etch	Process	TEL UNITY2-85DD	2001	2 MERIE process chamber with End point, 1 orientor with 2 SMIF
31	IMHC1	High Current Implantation	Process	Axcelis NV-GSD-200E2	2001	Gas box with four gas bottle, Chiller and 1 SMIF
32	WTSE1	Single Wafer Spin Processor	Process	LAM RST223 Spin processor	2001	Two process module to handle three chemical with 4 SMIF
33	REOX1	Oxide and Nitride Etch	Process	AMAT Oxide Etch Centura II	2004	3 MERIE process chamber, 1 orienter with 2 SMIF
34	REML1	Metal Stack Etch	Process	AMAT Metal Etch Centura II	2000	1 DPS with DTCU & End point system, 1 ASP process chamber, 1 cooldown, 1 orientor with 2 SMIF
35	MTID1	Ion Implantation Damage	Metrology	KLA TP500	1996	Equipment with Open cassette 2 station
36	MTRS1	Sheet Resistance for Conducting Thin Film	Metrology	KLA RS75TCA	2001	Equipment with Open cassette 2 station
37	MTOP2	Film Thickness	Metrology	KLA-Optiprobe 3290	1999	Equipment with Open cassette
38	MTST1	Film Stress Measurement	Metrology	KLA Tencor FLX - 5400	2000	Equipment with Open cassette
39	YEDR1	CP Measurements	Yield	KLA Tencor SurfaceScan CP Measurement	2001	Equipment with one SMIF
40	SBXC1	Pod & Cassette Cleaner	Support	Fluoroware HTC 8020	1997	Handle two POD and two cassette cleaning at a time
41	SLSM1	Laser Mark	Support	GSI Lumonics - WMSCDPL	2002	Equipment with 3 station open cassette

S.No	Eqp. ID	Description	Tool Type	Make & Model	Mfg. Yr.	Configuration
42	SPLR1	PVD Ti and MOCVD TiN	Process	AMAT Endura-5500	2004	Six chamber; 2 degas/orientor, 1 PC, 1 IMP Ti, 2 MOCVD TiN, with 2 SMIF
43	MTRU1	Film Thickness (Ellipsometer)	Metrology	RUDOLPH FE-VIID	1997	Equipment with 3 station open cassette
44	MTXA1	XRF based Film Thickness for Ti/Tin & PH/B concentration in BPSG	Metrology	RIGAKU SYS 3640	1997	Equipment with orientor open cassette
45	SSRT2	Wafer Sorter	Support	Brooks PRI SCS 3000	2001	Equipment with Three SMIF
46	SSRT1	Wafer Sorter	Support	Brooks PRI SCS 3000	2001	Equipment with three SMIF
47	FRPL1	Vertical Furnace forLPCVD Poly-Si	Process	TEL Alpha SE	2001	1 process tube, with 2 SMIF
48	CDHD1	HDP-CVD	Process	AMAT C-5200 HDP Ultima Plus	2001	Three Process Chamber, 1 orientor, 1 cooling chm with 2 SMIF
49	SPCO1	Sputter Cobalt and Ti	Process	AMAT Endura-5500	2006	Six chamber; 2 degas/orientor, 1 PC, 2 PVD Ti, 1 PVD Co with 2 SMIF
50	ETTS1-Prober	Wafer Prober 200mm	E-Test	Electroglas EG4090	2000	Test head manipulator, HT chuck, EG Commander 6.x
51	ETTS1-Tester	Electrical Test	E-Test	Keysight 4072A	2001	1 HPSMU, 7 MPSMU, GNDU, HF Switch Matrix, PGU, LCR Meter, SPECS 3.x, Unix Controller
52	FRGO1	Vertical Furnace forGate Oxidation	Process	TEL Alpha SE	2001	1 process tube, with 2 SMIF
53	SDBG1	SACVD BPSG	Process	CANON CVD APT-4800	2001	2 reactors with 3 SMIF
54	SPAL1	Sputter for Al, Ti and TiN (reactive poisoning mode)	Process	ULVAC ENTRON W-200 TANDEM	2001	3 Process Chamber PVD with 4 SMIF

S.No	Eqp. ID	Description	Tool Type	Make & Model	Mfg. Yr.	Configuration
55	MTND1	Amine NMP detection	Support	IMS AirSentry	2016	Standalone tabletop equipment
56	CMOX1	CMP Oxide Mira with MABAT SDS	Process	AMAT Mirra 3400 Mesa 200mm + MABAT SDS	2000	Dry in Dry out, 3 platen, 4 head, Oxide CMP with 3 SMIF
57	SPOD1	SMIF POD Opener	Support	-	-	One SMIF POD open and close
58	MTCV1	CV Plotter	Metrology	MDC 490B-8NI-D3	2000	LCR 4062 UH
59	TRDU1	DUV Track	Process	TEL ACT8	2001	4 coating station, 3 developer station, 4 SMIF
60	STMU1	MUV Stepper	Process	Nikon NSR 2205i14E2	2001	I-line (365nm) stepper integrated with MUV track
61	TRMU1	MUV Track	Process	TEL ACT8	2001	2 coating station, 3 developer station, 4 SMIF
62	IMHE1	High Energy Implantation	Process	Axcelis NV-GSD-HE	2000	Gas box with four gas bottle, Chiller and 1 SMIF
63	SNDU1	DUV Scanner	Process	Nikon NSR S204B	2001	Kr F Laser (248nm) scanner integrated with DUV track
64	REPL1	Silicon and Poly-Si etch	Process	AMAT Poly Etch Centura II	2000	2 DPS with DTCU & End point system, 1 cooldown, 1 orientor with 2 SMIF
65	FRST1	Vertical Furnace for Shallow Trench Oxidation	Process	TEL Alpha SE	2001	1 process tube, with 2 SMIF
66	MTCD2	Critical Dimension Measurement CD-SEM	Metrology	AMATVeritySEM2	2016	2 SMIF for 8inch and 1 cassette for 6inch
67	MTAG2	Overlay Measurement System	Metrology	Inspectrology IVS200	2017	2 SMIF
68	SPQC1	Quartz Cleaner	Process	Felcon UK FD318	2011	3 Acid Tank

Appendix 11 : List of 6” Equipment to be Removed and Packed

S. No.	Type of tool	Equipment Description	Existing Tool model no	Current Installed area
1	Process	APCVD	Tempress Model No: TS 969	6" Diffusion
2	Process	Cluster Etch Tool	Plasmtherm Model No: Versaline	6" Dry
3	Process	FSI Clean stn	FSI Corp	6" Wet
4	Process	High Current Implanter	Eaton, Axcellis, USA Model No: NV10-80	6" Dry
5	Process	KOH wet station	MOT GmBH, Germany Model No: CH-OP/2200/2-2	Post CMOS
6	Process	LPCVD	Tempress Model No: TS968	6" Diffusion
7	Process	Mask Aligner MA6	SUSS Microtech Model No: MA6	6"Litho
8	Process	Medium Current Implanter	IBS, France Model No: FlexIon IMC-200	MEMS Fab Extension
9	Process	Metal Sputter	M/sVarian, UK Model No: 3290 STQ	Opposite ERT Room
10	Process	Metal Sputter (Cluster)	Deton Vacuum Model No: Versa	6" Wet
11	Process	PECVD	Novelous Model No: Concept1	6" Diffusion
12	Process	Rinser/Drier 1	Verteq, USA Model No: Superclean-1600	6" Wet
13	Process	Rinser/Drier 2	Verteq, USA Model No: Superclean-1600	6" Wet
14	Process	S. Micromachining wet station	MOT GmBH, Germany Model No: CH-OP/2200/2-2	Post CMOS
15	Process	Stepper	GCA Corp Model No: AUTOSTEP200	6"Litho
16	Process	Surface Profiler	Veeco Model No: Wyko NT1100	Post CMOS

S. No.	Type of tool	Equipment Description	Existing Tool model no	Current Installed area
17	Process	UV Bake System	Fusion Semiconductor	6" Dry
18	Process	Wet station 1	Ultra Fab, USA Model No:	6" Wet
19	Process	Wet station 2	Ultra Fab, USA Model No:	6" Wet
20	Metrology	Film thickness measurement	Leica,Germany Model No: Lietz LTS-M/SP	6" Diffusion
21	Metrology	Microscope	Olympus	6" Dry
22	Support	Hot Plate		Post CMOS
23	Metrology	Confocal Microscope	Leica,Germany Model No: DM8000M	6"Litho
24	Metrology	Microscope	Olympus	6" Diffusion
25	Metrology	Stress Measurement Equipment	k-Space Associates, USA Model No: kSA MOS	6" Diffusion

Appendix 12 : SCL's 180nm CMOS Process Features

SCL has standard 180nm CMOS baseline process technology. It enables the development of single- or dual-voltage circuits requiring 1.8V, 1.8/3.3V, or 1.8V/5V power- supplies using its dual-gate oxide process, which features 4-6 Al-metal layers with thick-last metal. The process has add-on modules, namely 1.8V-HVt transistors for low leakage, high-density precision MIM capacitors (1 or 1.7 or 2.8fF/um2), high-resistance poly (1 and 2 Kohms/square), Deep N-well for noise isolation, and more.

1) Baseline Process Technology Features

    a) 1.8V Core CMOS.

    b) 1.8V or 3.3V I/O.

    c) 5V I/O

    d) Single poly & upto 6 Metal Layers with USG-BEOL.

    e) 23-34 Mask layers (depending on Metal Layers and Analog modules).

2) Analog Process Modules

    a) High-Vt (Low leakage current ~one order less).

    b) Metal Insulator Metal capacitor: Single MIM (1fF/µm2) & stacked MIMs (2x).

    c) Deep N-Well (Isolated p-wells for substrate noise isolation).

    d) High resistance poly silicon resistor: HIPO (1kΩ/sq; 2kΩ/sq).

    e) Thick Last metal (2µm).

    f) 5V-MOSFETs (Gox: 110A).

    g) HD-MIMs (1.7 & 2.8fF/um2)

    h) Thick Last metal- 2.8um modules including FSG-BEOL is recently added

    i) e-POLY fuse, and Low-Vt modules under evaluation

Appendix 13 : Detailed Scope of Work for RFCMOS Technology in SCL 180nm CMOS Process

The baseline 180nm standard logic process at SCL supports USG / FSG BEOL with four to six metal layers. The process supports standard (0.9µm), thick (2.0µm) and thicker (2.8µm) last metal. The standard logic process can be extended to include additional modules like MIM (1/1.7/2.8fF/um2) capacitors, high resistive poly resistor, buried N-well, etc. The comprehensive list of available process module options may be referred from ***Appendix 12 : SCL's 180nm CMOS Process Features***.

Following paragraph details the broad scope of work required for development of RFCMOS process and its design enablement in existing 180nm CMOS process at SCL.

1) Contractor(s) shall review the performance of the physical and electrical parameters of the baseline process and add-on modules for the intended RFCMOS integration.
2) Contractor(s) shall evaluate hardware and software resources available at SCL, namely, DC-RF characterisation, device modelling and EDA software and suggest the necessary augmentation, if required for development and design enablement of the RFCMOS process.
3) Contractor(s) shall provide comprehensive test chip and the work plan of wafer experiments and execution support for fabrication of RF-Test chips at SCL.
4) Contractor(s) shall perform RF characterization of the test chip, finalize candidate RF-designs, perform model tuning including model-QA as per industry standard and provide scalable RF-models, for Active & Passive components, from DC to 20GHz. These models should be valid at room temperature.
5) Contractor(s) shall provide model parameter extraction strategy/routine, test structures and measurement data used for the step-wise optimization/extraction of model parameters in the extraction flow, complete raw database (for model tweaking, development etc.)
6) Contractor(s) shall release the model as per industry standard model QA/Success criteria.
7) Contractor(s) shall provide hands on training to SCL on model parameter extraction tool such as IC-CAP or any other industry standard tool.
8) Contractor(s) shall provide initial set of RFCMOS PDK documents. Contractor(s) shall upgrade existing SCL PDK for enablement of RFCMOS designs along with suggestion and assistance to establish EDA flow for RFIC design. Contractor(s) shall integrate RFCMOS PDK into existing baseline PDK of SCL CMOS 180nm process. Design enablement should include, I/O Pad libraries, Reference Design Flows, Design Rule Manual (DRM), Model file, Symbol library, Pcell library, DRC & ERC rule file, LVS rule file, PEX rule file, DFM rule file / utility, dummy fill file / utility, Antenna file / utility, Process stack information for Electro-Magnetic (EM) simulation (applicable

for RFCMOS), documentation, other relevant files, etc. Preferably all PDKs should have coverage for industry-leading EDA vendors (Synopsys, Cadence, Siemens and Keysight) catering to their respective strengths

9) Contractor(s) shall perform models tuning & qualification to reliability verification and update the SCL PDK as per the optimized performance in SCL process

10) Contractor(s) shall provide mask data preparation guidelines and provide runset(s) for data preparation and verification.

11) Contractor(s) shall perform functional demonstration of TD and accordingly update the SCL PDK.

12) Contractor(s) shall provide design infrastructure like but not limited to I/O pads, any other basic building block circuits, which is essential for circuit designers.

13) Contractor(s) shall provide active and passive devices compatible with SCL 180nm CMOS baseline process having USG/FSG-BEOL comprising upto five to six metal layers having last metal thickness as standard, thick or thicker.

    a) RF-MOSFETs

        i) 1.8V MOSFETs (P & N-channel, Iso-NMOS)

        ii) 3.3V MOSFETs (P & N-channel, Iso-NMOS)

    b) RF-Inductors

        i) Single-ended Inductors with thick metal as last and (last-1) layers in both 5 and 6-metal flows

        ii) Stacked multi-metal inductors

        iii) Differential Inductors with MT (both 5 and 6-metal flows; stacked multi-metal inductors

    c) RF-Capacitors

        i) MIM Capacitor: 1fF/um2, 1.7fF/um2 or 2.8fF/um2 single and stacked MIMs (2X) in both 5 and 6-metal option

        ii) Metal fringe Capacitor (MFC) upto 5 and 6-metal option

        iii) MOS Accumulation Capacitors (1.8V)

    d) Varactors & Diodes

        i) MOS Varactor (1.8V and 3.3V)

        ii) Junction Varactors (1.8V and 3.3V)

        iii) Schottky diodes (1.8V and 3.3V)

iv) RF ESD protection Diode ((1.8V and 3.3V)

e) RF ESD and Pads

i) RF I/O pads (5 and 6-metal option)

ii) RF pads with ESD protection diode with 5 and 6-metal option (1.8V and 3.3V)

14) Training:

a) Contractor(s) shall provide generic training on RFCMOS basics, active and passive device, device characterization and modelling, model tuning and QA, design enablement, mask data preparation, etc.

b) Contractor(s) shall provide on-job training of SCL engineers participating in below mentioned activities

i) RF-Test Chips and technology demonstrator circuits

ii) DC-RF measurement and characterization

iii) DC-RF device model extraction

iv) PDK updates

Appendix 14 : Detailed Scope of Work for BCD (HV LDMOS) Technology in SCL 180nm CMOS Process

This scope of work proposes the requirements of BCD (HV LDMOS) technology flavours in existing baseline 180nm CMOS process at SCL. The transfer & support include demonstration of device technology with supply of updated-PDK along with relevant design Infrastructure for BCD (HV LDMOS) technology to enable in-house design and fabrication of PMIC for high voltage (≥40V) operation. Contractor(s) shall provide feedback and necessary technical suggestions required for the successful integration of this technology in SCL. Detailed scope of work includes following:

1) Contractor(s) shall review the performance of the process/metrology equipment along with the physical and electrical parameters of the baseline process and add-on modules for the intended BCD (HV LDMOS) process technology with the focus on no major capital equipment addition.
2) Contractor(s) shall evaluate hardware and software resources available at SCL, namely, device characterisation, device modelling, TCAD and EDA software and suggest the necessary augmentation, if required for development and design enablement.
3) Contractor(s) shall provide comprehensive test chip and the work plan of wafer experiments and execution support for fabrication of BCD (HV LDMOS) test chips at SCL.
4) Contractor(s) shall perform device characterization of the test chip, finalize candidate device designs, perform model tuning including model-QA as per industry standard and provide high voltage industry standard scalable models. These models should be valid over junction temperature range of -40ºC to 125ºC.
5) Contractor(s) shall provide model parameter extraction strategy/routine, test structures and measurement data used for the step-wise optimization/extraction of model parameters in the extraction flow, complete raw database (for model tweaking, development etc.)
6) Contractor(s) shall release the model as per industry standard model QA/Success criteria.
7) Contractor(s) shall provide hands on training to SCL on model parameter extraction tool such as IC-CAP or any other industry standard tool.
8) Contractor(s) shall demonstrate the functionality and high voltage performance of the technology demonstrator (TD) circuits like power switches, DC-DC converters, etc., in SCL BCD (HV LDMOS) process. Contractor(s) to also provide design and characterization database and acceptance criteria of these TD designs. .
9) Contractor(s) shall provide initial set of BCD (HV LDMOS) PDK documents. Contractor(s) shall upgrade existing SCL PDK for enablement of BCD (HV LDMOS) designs along with suggestion and assistance to establish EDA flow. Contractor(s) shall ensure that BCD (HV LDMOS) PDK is

compatible with existing Baseline PDK of SCL CMOS 180nm process. Design enablement should include, I/O Pad libraries, Reference Design Flows, Design Rule Manual (DRM), Model file, Symbol library, Pcell library, DRC & ERC rule file, LVS rule file, PEX rule file, DFM rule file / utility, dummy fill file / utility, Antenna file / utility, Process stack information for Electro-Magnetic (EM) simulation (if applicable), documentation, other relevant files, etc. Preferably all PDKs should have coverage for industry-leading EDA vendors (Synopsys, Cadence, Siemens and Keysight) catering to their respective strengths.

10) Contractor(s) shall provide mask data preparation guidelines and provide runset(s) for data preparation and verification.

11) Contractor(s) shall perform functional demonstration of TD & reliability verification of high voltage devices and accordingly update the SCL PDK.

12) Contractor(s) shall carry out reliability qualification (such as HCI, TDDB as relevant) of all delivered LDMOS / DEMOS variants as per JEDEC standards

13) Contractor(s) shall provide design infrastructure like but not limited to I/O pads, any other basic building block circuits, which is essential for circuit designers.

14) Contractor(s) shall provide following active and passive devices in SCL 180nm CMOS baseline alongwith the device performance and comprehensive characterization data:

    a) LDMOS & DEMOS Devices

        i) Medium Voltage scalable N&P LDMOS (|Vgs|=1.8 & 5V, |Vds|=7-15V)

        ii) High Voltage scalable N&P LDMOS (|Vgs|=1.8 & 5V, |Vds|=15-40V)

        iii) Scalable N&P DEMOS (|Vgs|=5V, |Vds|=up to 40V)

    b) HV Bipolar Devices

        i) HV Vertical NPN BJT (β~40, BV_{CBO}~50V, BV_{CEO}~10V)

        ii) HV Vertical PNP BJT (β~100, BV_{CBO}~50V, BV_{CEO}~15V)

    c) Passive Devices

        i) High Voltage Diodes, BV~55V

        ii) Zener Diode with reverse BV~ 5V, Jcathode~0.2µA/µm2

        iii) Schottky Diode BV ~40V

15) Training:

a) Contractor(s) shall provide general training on BCD (HV LDMOS) technology basics, device characterization and modelling, model tuning and QA, design enablement, mask data preparation, etc.

b) Contractor(s) shall also provide on-job training to SCL engineers participating in below mentioned activities.

   i) BCD (HV LDMOS) test chips and technology demonstrator circuits design.

   ii) High Voltage including Ron, SOA critical measurement and characterization.

   iii) High Voltage device model extraction methodology for industry standard compact models for BCD (HV LDMOS) devices.

   iv) PDK updates

Appendix 15 : Detailed Scope of Work for CIS Technology in SCL 180nm CMOS Process

This scope of work proposes the requirements of CIS technology in existing baseline 180nm CMOS process at SCL. The scope of technology transfer will include a systematic work plan for both process and design enablement in SCL flow and support for all the characterization requirements with no additional hardware requirement. It should also provide sub-modules and PDK (wherever applicable). Detailed scope of work includes following:

1) The technology provider shall demonstrate a completely functional 1Kx1K CIS detector with global shutter operation in SCL 180nm fab meeting the performance parameters as under:
   a) Support pixel sizes ranging from 5 to 40 micron in 3.3V
   b) Compatible with front side and backside illumination
   c) Pinned photo-diode (PPD) with <1% image lag
   d) Fully depleted thick substrate for Near IR for soft Xray sensitivity and global shutter operation
   e) Enhanced sensitivity in NIR region (> 70% QE for wavelengths above 800nm)
   f) The main target parameters are:

Parameter	**Value**
Image lag (%)	<1
QE (%), 400-700nm	>70
Conversion factor (uV/e)	>45
Read noise@5MHz (erms)	< 5
Dark signal @25C, e/pix/s	<25
Frame rate (2k rows), fps	>10

2) The Contractor(s) shall demonstrate:
   a) Windowed mode of operation
   b) Rolling & Global shutter operation
   c) 3T and 4T pixels in small arrays
3) Contractor(s) should demonstrate functionality stated in point no. 2 above along with target parameters stated in point no. 1)(f) above preferably with pixel sizes of at least 5µm, 10µm and 40µm in array size of at least 5 x 5.

4) Contractor(s) shall review the performance of the process/metrology equipment alongwith the physical and electrical parameters of the baseline process and add-on modules for the intended CIS technology with the focus on no major capital equipment addition.

5) Contractor(s) shall evaluate hardware and software resources available at SCL, namely, device characterisation, device modelling, TCAD and EDA software and suggest the necessary augmentation, if required for development and design enablement.

6) Design enablement should include, where relevant, Design Rule Manual (DRM), DRC & ERC rule file, LVS rule file, dummy fill file / utility and model parameters for pixel design.

7) For CIS Technology enablement and demonstration:

   a) Contractor(s) shall provide comprehensive technology transfer vehicle for evaluating the performance as mentioned above along with the success criteria.

   b) Contractor(s) shall provide the detailed work plans of wafer experiments for fabrication of CIS-technology transfer vehicle at SCL and execution support.

   c) Contractor(s) shall carry out device characterization and electro-optical measurement for demonstration purpose.

   d) Contractor(s) shall support design infrastructure (device toolkits) to establish EDA flow for design.

   e) Contractor(s) shall provide mask data preparation guidelines and provide runset(s) for data preparation and verification

8) Training:

   a) Contractor(s) shall provide training on CIS technology basics, electrical and optical device characterization, design enablement, mask data preparation, etc.

   b) Contractor(s) shall also provide on-job training to SCL engineers participating in below mentioned activities.

      i) CIS-Test Chips and technology demonstrator circuits design.

      ii) Electro-Optical Characterization

Appendix 16 : Detailed MES Specifications

I. Basic Manufacturing Execution System- MES

MES should be a customizable module-based software system that is supposed to help in achieving and maintaining paperless fab operations by allowing engineers to run lot as per predefined process flow in software, incorporate run time changes in lot flow in software, collect, correlate, analyze and share critical data including defect, inline parametric, inline, review, and WIP tracking. Scheduling of lots, Maintaining QC & Maintenance records and back trace the same to timeline of Lots running in fab.

MES has to support end to end (Design, Fab, Electrical Testing, SORT, RNQA and Package & Assembly) process flow, tracking and tracing.

MES should be having a user friendly GUI for modelling the process, making any run time changes, incorporating splits & joins, incorporating and tracking reworks etc.

It should have Open Database supporting Structures Query Language (SQL) so that user can create his own queries and fetch the data in user required format from one or more tables from database.

A. FAB Modeling

Ability to define:

- Location definition: FAB, ET, SORT, Assembly, Work Area, WIP location, Stocker etc.
- Work Area definition: Litho, Diffu, Dry Etch, Wet etch, thin Film, Implant etc.
- Equipment Modeling: provide 3 Level definition, include: Main EQP, Chamber/Load port, sub chamber etc.
- Stocker definition: Carrier Stocker, Reticle Stocker etc.
- EQP State definition (according to the standard E10 status): provides transition rules between EQP states
- Reason Code definition: Hold, Release, Scrap, Terminate
- Carrier types: SMIF Pods etc.
- Durable material type: Reticle, Probe Card etc.
- Material Type: Photo Resist, slurry, chemicals, gases etc.
- Product definition: Production wafers, Non production wafers (monitor, seasoning, dummy), Engineering wafers, Test Wafers etc.
- Specify product and process (Technology) association
- Process flow of the specified product in production
- Raw material code (raw wafer product) correspondence that can be used when wafer start
- Raw material code (raw wafer product) information includes vendor and vendor qualification status

management

- Configure Flow Spec according to Product+ Sub Plan+ Step (Recipe, Reticle, EDC Plan, Process Location, etc.). Spec settings shall be maintained by using either "fixed value" or “variable" ($parameter) "
- Configure "parameter" according to the product. This shall be done through a variable conversion mechanism. Capability to adjust the "value" that the flow spec uses in the lot runtime
- Lots classification into different types; e.g., production, dummy, monitor, engineering etc.
- Process flow definition:
    - Process Flow level, include: Top Plan, Sub Plan, Path, Step
    - Process Flow type, include: Production, NPW, Rework, Ad hoc Plan
- Step Type definition: Process, Measurement, YE Step, Dummy, Inspection
- Adjust manufacturing resources of a process flow according to the product:
    - Limit the running EQP by the previous step processed EQP
    - Limit the running Recipe by the previous step processed EQP
    - Limit the running EDC Plan by the previous step processed EQP
    - Determine which path to go after step post rule by the Product parameter
    - Determine which Recipe to use by the previous step's lot measurement result
    - Determine which path to go after step post rule by the previous step's lot measurement result"
- EQP Type：
    - Support the management of all equipment required by the fab. The equipment can include process EQP, measurement EQP, load port, storage EQP, test EQP, OHB, NTB, Reticle storage EQP, Reticle inspection EQP, sorter, N2 purge, and other related EQPs
    - In addition to the general EQP, the definition of Main EQP shall also be able to meet the needs of some specific EQPs, such as non-buffer EQP / internal buffer EQP (furnace, WET, etc.), inline EQP (the combination of litho's Scanner + track, process + Metrology), sorter, etc.
    - The definition of Child EQP also needs to support different types such as chamber, furnace, slot, etc.
    - Support multi-level structure of EQP, including Main EQP, Sub EQP(Chamber/Tank/Port), Sub Chamber
    - Equipment properties, include: type, state, contamination level, area, owner, construct type, process type
- EQP State：
    - Ability to define Auto1, Auto2, Auto3 by Load port
    - Support the state management of process EQP (including child EQP)

- Support E10 main state defined by SEMI standard and provide sub-state
- Provide EQP state change diagram and corresponding events
- EQP state will be changed according to the preset state diagram in runtime
- The EQP state can be automatically changed by an event or manually switched from the IUI
- The manual switch of EQP state shall be user-restricted access and it shall be changed according to the EQP state change diagram
- The user can define the available status of EQP / chamber by EQP state
- Support status change at the same time to the same EQP's multiple chambers
- EQP state can be related to Chamber's state. EQP state changes to down if the key chamber is down

- EQP Capability:
  - Provide EQP capacity management
  - Provide EQP capability management
  - Provide equipment batch size management
  - EQP internal buffer capacity management
- Engineering Data Collection definition：
  - Data Collection shall include process information (Lot ID, Process EQP/Chamber, Process Recipe/PPID), test data
  - Data Collection shall provide Manual and auto-collect mode
  - Data Collection items shall support Lot, Wafer, Site level configuration
  - DC Item data type shall include float/integer/string, etc.
  - Support EDC Spec configuration, support SPC configuration
- Version update：
  - Version control includes Product, process flow, step etc.
  - Version control shall support Active version configuration; each Object can only have one Active version. The engineer can specify the active version from the multiple versions
  - Version number will automatically increase when updating the next version
  - When Active new version Flow, it will not take effect on the lots original version
  - Ability to version up manually by selecting multiple lots according to the lot list; Support to show the updated result
  - Support Lot can be manually versioned at the current step, or do plan version up in future steps
  - Flow version up shall inherit the original Q-Time definition; The Q-time which is already triggered shall be kept when the lot version up

- User and Security Modeling：
    - User Group/User definition
    - User/User Group security definition with each function
    - User/User Group security definition with Eqp Type, Technology, EQP State Transition, Equipment
- Integrating modeling tools
    - Support the following Objects import/export by Excel:
        - Product/Parameter Family/Plan (Top, Sub, Step)/EQP/EQP Constrain etc.
        - Product/Parameter Family/ Rework Plan.
        - Support Query, ability to export the result to excel file to modify and import the Excel File to Loader for Submit
    - Modeling tool operation
    - Support standard functions like Load/ Query/ Modify/ Compare/ Copy, etc.
    - Provide Interactive User Interface for the user to maintain and view all process information
    - The creation of a new process can be done by copying an existing process and then modifying it partly
    - The existing product / process information can be completely copied to the new product / process through Excel

B. Process Flow & Process Flow Management

- Process structure:
    - Ability to define the rework steps and instructions. The rework process can be called by multiple main processes
    - Multiple Products can use the same process Top Plan
- Process Maintenance:
    - Users with specific permissions can modify product information according to technology and users can batch load / modify product information (including parameters)
    - Users with specific permissions can modify flow information individually or in batches according to technology
- Non-Product Wafer (NPW) process modeling:
    - Support define NPW flow settings such as monitor/season/furnace monitor/dummy, etc.
    - Support define NPW route
    - NPW Attribute definition: Configure Max Usage Count, Max Recycle Count on Product and support maintain Downgrade Mapping

C. Queue Time Management

- Queue Time Definition
    - Queue Time include two types: Max and Min
    - Queue Time start and end can be defined (Track in/out, Lot process start/end, wafer process start/end)
    - Support Lot Queue Time and wafer Queue Time
    - Support multiple Queue Time. Queue Time interval support Nesting and Overlay
    - Support Queue Time across main flow and branch flow, such as Rework and Alternative Flow
    - Queue Time can include multiple time levels (customizable), and corresponding actions can be customized, including email, hold lot, speed up
- Queue Time Execution
    - Provide RQT (Remaining Queue Time) as the priority of dispatch
    - Child lot shall inherit the parent lot's Queue Time after split
    - Check the Queue Time of the child lot and parent lot, and automatically bring back the shorter Queue Time of the child lot to the parent lot when merging lots
    - Queue Time needs to be inherited if the action of Cancel tracking or Reposition rule occurs when lot is at the end step of Queue Time
    - Ability to trigger hold lot action after track out if lot is over Queue Time during processing
    - Queue Time shall be supported in Split Run Card
    - Need to support Cancel Queue Time function

D. Engineering Data Collection (EDC)

- Data collection execution:
    - It shall be able to support the data collection
    - Data coordinate information needs to be collected and stored
    - Data collection shall be able to support spec check and chart check
    - When OOC/OOS is not out of date, it shall be able to support the relevant resource restrictions, such as limiting the number of cells, limiting the number of equipment, chamber, batch/lot, etc.
    - When OOC occurs, the system shall automatically hold lot and trigger ocap (or not)
    - When offline OOC occurs, the system can hold the equipment according to the setting and trigger ocap
    - Special case processing: If the number of wafers in a lot is less than the number of samples defined by the data collection, the number of wafers allowed to collect data shall be less than the number of samples defined
    - Engineers can input and collect data manually through the interface

- Historical query: Data collection shall have historical data and query function

E. WIP management

- Create / Cancel Create lot:
  - Users need to provide naming rules for the lot ID. Different lot types shall have different naming rules which shall not be duplicated. The extensibility of naming rules for subsequent use shall be considered, so that the system can generate lot ID automatically.
  - The naming rules of wafer Id need to be included in the naming rules of lot ID and defined at the same time. For example, the baseline number of wafer ID shall be consistent with the slot ID of Carrier when wafer start.
  - When creating a lot, users can select product, lot type, cost center, and wafer number. The lot ID and wafer ID are generated automatically
  - Ability to define multiple types of Lot priority
  - Allows the user to cancel a created lot before starting lot.
- Wafer Start Management:
  - Provide manual and automatic operation modes of wafer start
  - Start lot must follow the rules, such as:
  - Product and Source Product mapping
  - Source Product and Material Number and Vendor mapping
  - Lot Type and material cost center mapping
  - After starting lot, need to record the relationship between Lot and Wafer ID.
- Lot Split/Merge：
  - Need to support logical/physical split
  - After physical split, shall trigger Split sorter action automatically, using the sorter step standard operation in the future.
  - Need to support logical/physical merge
  - After the physical merge, it shall trigger the Merge sorter action automatically using the sorter step standard operation in the future.
  - When split child lot, child lot shall inherit parent lot attribute, e.g., Queue time, wafer pre-measurement data etc.
  - Shall support future merge after the split at the current step
  - The changes in the process plan's version shall have no effect for future split
  - Parent lot shall inherit child lot future action when child lot merge to parent lot.
  - Shall support set future merge action.
  - The changes in the process plan's version has no effect for the future merge.
  - Split Run Card: Shall support automatic adjustment of the resources needed by each step

according to the wafer (such as: recipe, recipe parameter, data collection, EQP)

- Split Run Card (SRC)：
  - Support using SRC for rework or reposition step
  - Support creating future Split Run Card
  - For the same lot in a step, it shall support different wafers to do different experiments
  - For the same lot in multiple steps, it shall support different wafers to do different experiments
  - Shall support Split Run Card support copy function
  - Different split run card services shall be customized according to different services of module
  - Shall Support Split Run Card EDC Data, when sent to SPC Chart
  - Shall Support define process flow, EQP Capability, EQPID, Chamber ID, Process Location, EDC SPEC, Recipe, Reticle, Probe Card, support set split/merge step
  - When the Run Card settings are submitted, the process shall check the compliance of the run card spec (such as process location, recipe, EQP)
- SRC execution：
  - For a lot that already has split run card, after setting the trigger split action, the child lot performs the WIP according to the flow and spec of the split run card
  - After the Child lot run card flow completed, it can merge to parent lot at the future merge step.

- Lot Hold & Release：
  - Different reason codes can be used to hold the same lot at the same time
  - Support Batch Hold
  - Hold and Release need record history, can clearly track the release action, corresponding to the hold action, and can query the history.
  - Release hold must select the corresponding hold code and release comment
  - Have privilege Control of hold/release action according to work area and reason code
  - In case single Lot has multiple Hold Code, capability shall be there to select multiple hold and release using the same “release hold” at the same time.
  - Hold a running Lot Capability to Hold running lot due to EQP failure (generation of recovery run card to deal with the situation).
- Future Hold：
  - Shall support “set future hold” at the current step.
  - According to the effective time, future hold can be divided into pre-future hold and post-future hold

- Lot's future hold shall support the setting of multi-future hold. The setting of future hold can be changed or deleted
- After lot future hold takes effect, it has nothing to do with the version (future hold shall be inherited after version upgrade)

- Reassign：
  - Support lot to perform product, version upgrade of the plan, or change product, plan on the current step.
- Bank in/Out:
  - Single lot or multiple lots can do ban kin / bank out action at the same time
- Rework:
  - Max rework count can be set according to the stage and rework count can be controlled according to the wafer level.
  - Support dynamic rework (can be planned rework or ad hoc rework)
  - When the child lot routes to rework flow, it shall hold the parent lot automatically and wait at the secure step
  - When the lot routes to rework flow, it shall display rework information from lot detail information.
  - Shall support lot ad hoc routes to rework flow to add process step dynamically

- Recovery Due to Misprocessing/Abrupt Equipment Breakdown Whenever lot processing is interrupted due to abrupt equipment breakdown or any misprocessing Facility to generate Recovery Run Card (RRC) shall be there
  - It shall trigger recovery run card when running hold occurs during processing
  - Recovery Run Card (RRC) needs to support single and batch
  - Shall provide facility for manual trigger recovery run card generation
  - Different modules shall facilitate customizable rework flows
  - After the recovery run card is triggered, the processed wafers shall be selected and processed in batches
  - Shall support split unprocessed wafer and cancel track in
  - Shall support split processed wafer and track out
  - Shall support split processing wafer and routes to rework flow.
  - Shall support Nested Run Card. When WIP is in split run card/recover run card short flow, users shall open a recover run card for a lot
- Lot/wafer query:
  - Query condition: Lot ID, Lot Type, Lot Priority, Location, Process Location, Work Area, Carrier ID, Lot State, Lot Status, Technology, Product, Plan, Stage, EQP Capability, EQP

ID, Lot Owner, Customer Lot ID, Vendor Lot ID, Production/NPW/Engineer, Normal/Run Card/All

- Highlight the special lot, such as hold, Queue time, high priority, etc.
- Query Lot future action: may select to view the Q-time triggered by lot, Future hold, available EQP information

- Lot/Wafer History query:
  - The operation of lot/wafer will record history and provide a detailed and convenient history search function. The query of lot/wafer history can't affect the production
  - Lot Comment: Can mark a lot comment for each step.
- Scrap/Terminate:
  - Support full lot scrap and un-scrap
  - Support terminate or un-terminate lot
- Flow View: View flow information by lot
- "Batch/Cancel Batch:
- Provide the capability to form batch process, and allow to cancel batch
- Support lot Ship/Un Ship
- Lot Reposition：
  - Support reposition at current step, future reposition, reposition to previous and future steps.
- Lot Skip：
  - Support skip to next step.
- Other queries:
  - Lot Detail including wafer information
  - Full Lot Report: Query the history of the lot manufacturing process
  - Wafer Chamber Tracking History: Query the event history related to the chamber location / process of the wafer in a specific EQP
  - Wafer History: Query wafer manufacturing process history
  - Wafer Slot History: Query the history of wafer, Carrier and slot position changes
  - Inventory Info Query
  - Bank Information Query
  - Production Lot Information Query
  - NPW Lot Information Query
  - Engineer Lot Information Query

F. OCAP (Out of Control Action Plan)

- Discrepancy Management

- Ability to record discrepancies/dispositions / comments
- Ability to attach documents to discrepancies / dispositions

- Trigger OCAP
  - OCAP needs a graphical interface and a convenient work flow
  - Users can customize OCAP Flow
  - OCAP need to support re-measure/add-measure/change measurement EQP
  - Different types may have the different actions; the action is configurable
  - The OOC of the SPC chart triggers ocap and then enters the ocap flow
- Trigger point：
  - Single EDC triggers single OCAP
  - Current and historical query: After the ocap occurs, the system shall be able to display the specific reason for the ocap triggering, the current status, and the processing history information"
  - Special closing: under special circumstances, ocap can be specially closed
- Re-measure/Add-measure：
  - If the user selects Re-measure or Add-measure, the system will automatically set lot to the appropriate state
  - The user can select the wafer that has not been measured to add measure
- OCAP Action：
  - Release Lot and Track Out
  - Lot Hold
  - Lot Hold to Scrap
  - Lot Rework
  - Lot Terminate
  - Process EQP Release
  - Process EQP Hold
- Integrated with SPC：OCAP needs to provide SPC link to view chart information
- OCAP processing needs to be defined according to the predefined reason / action / disposition principle, and the system shall provide the specified format fields

G. General Basic Feature

- Lot Movement & Flow management (GUI based)
  - Monitor Wafer Management and data collection with in product lot w.r.t. Monitor wafer.
  - Automatic/Manual as well as programmable Rework based upon real time data from equipment. Tracking, reporting and correlation of reworks. Facility of automatic/Manual Split / Join & Hold options in lot flow.

- Ability to make dynamic/ on the fly changes and tracking these. Real time Non Conformance & DMR initialization, execution, tracking and reporting.
- Facility with user friendly GUI where in user can fetch data of all sorts from database, analyze as per need in real time and generate reports
- Process Flow architecture.
- Lot Tracking and Equipment Tracking
- Production and Engineering Data Extraction/Analysis.
- Equipment QC & maintenance scheduling, tracking and generation of reports.
- Real-Time Production Monitor (RPM). Tool/WIP Status.
- Standard Production Reporting. Historical and Current.
- Reporting capabilities covering WIP, Equipment, Cycle-Time, Activity, dispatch summary and Yield.
- Configurable user security (user authorization by function, location, process, or any combination thereof)
- Lot in-line change capability.
- Full lot history and archiving.
- Paperless lot tracking.
- FAB status reporting that includes- Lot Status, Equipment Status, rework, scarp, WIP, relation between WIP quantity and Run WIP quantity etc.
- All other standard reports
- Special Work Requests
- Instructions on lot at defined process (Area/Stage/Recipe)
- Discrepancy Material Report (DMR)
- Reporting and Handling any deviations/events
- Set lot actions (rework, scrap, high risk etc.)
- Set corrective actions, owner, status, defects
- Add files, pictures, comments etc.
- Status of DMR (Open/Close)

- Traceability:(GUI Based)
  - In built Raw material, consumables management and back tracing up to lot & unit step level w.r.t. batch id. GUI for analysis & reporting of same
  - Batch, Lot, Wafer, Die-level Tracking and Management
  - Complete Wafer-level traceability from Raw Material Batch.
- Data Analytic Capabilities (GUI Based)
  - Inbuilt Basic SPC software with automatic Cp, Cpk calculations, generation of various charts and plots.
  - Generation of QC parameter charts, Defect Density charts

- Monitoring process variation over time, so that the process can be adjusted to reduce variations
- Maintaining process stability
- Providing information about process capability
- Detect any deviation in the process
- Graphical representation of data

- Work floor Management & Planning (GUI Based)
  - Real time lot scheduling and planning in automatic as well as manual mode.
  - Defining lot priority and facility to change the same in real time
  - Real time alarms, notification and feedback mechanism
  - Reports & alarms to be sent directly through email to users

H. Communication

Shall have capability to integrate with standard communication buses like TIBCO, Apache Pulsar etc.

I. Integration with CIM module

Shall have capability to seamlessly integrate with other CIM modules like:

- Maintenance management
- Statistical process control (SPC)
- Advanced process control (APC/R2R)
- Real time scheduling/decision making with ability to dynamically change the decision rules
- Real-time and scheduled reporting
- Planning and Production Control solutions
- Automated data collection
- Equipment automation
- Yield management
- Defect management
- Inventory Management
- ERPs

II. Hardware /Software Required for running MES

1) Contractor(s) to provide Hardware (Application Servers, Database Server, Backup Server) required for installing and running the MES. Configuration should also include required

database and application backup management system.

2) Contractor(s) to provide Required Operating systems for Application & Database servers, Required Database (e.g. Oracle 12c, SQL Server, DB2, KDM etc.) and any additional third-party software required to be installed on servers and clients.

III. Data Capturing & Interface

1) Automatic Interface with Yield Management system (YMS), Inventory Management System, Facility Control Management System (FCMS), Air Borne Particulate Measurement system etc.
2) Contractor(s) to provide all of the required Hardware & Software for capturing/parsing equipment & process data from existing metrology and process equipment mentioned below:

Sr. No.	Tool ID	Area	Description
Process Tools			
1	CMWO1	CMP	Tungsten MP
2	CMOX1	CMP	Oxide CMP
3	STMU1	PHOTO	Exposure MUV Stepper
4	SNDU1	PHOTO	Exposure DUV Scanner
5	WTPD1	WET	Pre Diffusion Clean
6	WTCO1	WET	Cobalt Strip
7	WTNT1	WET	Cluster Nitride Strip Wet Station
8	WTRS1	WET	Photoresist Strip
Metrology Tools			
9	MTOP1	CMP	Film Thickness Reflectance
10	MTOP2	CMP	Film Thickness Reflectance Lithography
11	SSRT2	CMP	Wafer Sorter Common Area
12	MTID1	IMP	Implant Damage
13	MTAG1	PHOTO	Overlay Measurement
14	MTAG2	PHOTO	Overlay Measurement
15	MTCD1	PHOTO	Critical Dimension Scanning Electron Microscope
16	MTCD2	PHOTO	Critical Dimension Scanning Electron Microscope

3) Supplied equipment under Bid Package 1 that are deemed compatible with SECS/GEM protocol shall also be in scope for equipment automation for data capturing and parsing and feeding into MES.

IV. Additional Requirements:

A. Licensing:
a. The software along with all modules requiring separate licenses must have perpetual, floating licenses.
B. License Re-hosting:
a. In the event the host-ID / server hosting the licenses becomes unusable due to failure or obsolescence or in case of upgradation of hardware infrastructure, re- hosting of licenses of all products on a new host-ID should be provided free of cost during the period covered by the maintenance contract. b. Contractor(s) to mention post-maintenance contract re-hosting policy.
C. Training:
a. On-site training on operation and maintenance for SCL engineers free of cost. The duration of the training shall be specified by the Contractor(s).
D. Annual Maintenance:
a. The Contractor(s) must provide free software updates and maintenance releases for two years from the date of acceptance at SCL.
b. As an option, the Contractor(s) must also quote for software updates and maintenance releases for three years and five years.
E. Acceptance Procedure:
a. Contractor(s) to demonstrate full process flow creation for SCL process in MES b. Contractor(s) to run 3 dummy lots in MES without any bugs c. Contractor(s) to demonstrate Data Capturing/Parsing from equipment selected by SCL for automatic data capturing in accepted bid. d. Contractor(s) to demonstrate data fetching and analysis capability of said 3 dummy lots e. Contractor(s) to demonstrate generation of all reports mentioned in RFP f. Contractor(s) to demonstrate Equipment Management and Equipment Maintenance modules by generating dummy QC/ Maintenance Schedule. Contractor(s) to demonstrate generation of emails/alerts and auto equipment down in MES in case of QC/Maintenance due or fail. g. Contractor(s) to demonstrate Track in not available in case of equipment is down h. Contractor(s) to demonstrate various QC & Process parameter charts generation i. Contractor(s) to demonstrate automatic/manual split, join & reworks through dummy lot runs Additional acceptance criteria jointly decided by SCL and the Contractor(s).

3. Annexures

Annexure A : Format of Letter comprising the Pre-Qualification Bid

(on the letterhead of Bidder /Lead Member)

Date: Place:

To,
[insert name and address of the Authority]

Sub: Bid for Project – Augmentation & Enhancement of Existing 8-inch Fab of Semi-Conductor Laboratory, India

Dear Sir / Madam,

1) With reference to the RFP document dated ……., I/we, having examined the RFP document and understood its contents, hereby submit my/our Bid for the aforesaid Project. The Bid is unconditional and unqualified.
2) I/ We acknowledge that the Authority will be relying on the information provided in the Bid and the documents accompanying such Bid of the Bidders, and we certify that all information provided in the Bid including any Annexures is true and correct; nothing has been omitted which renders such information misleading; and all documents accompanying such Bid are true copies of their respective originals.
3) I/ We shall make available to the Authority any additional information it may find necessary or require to supplement or authenticate the Bid.
4) I/ We acknowledge the right of the Authority to reject our Bid without assigning any reason or otherwise and hereby waive our right to challenge the same on any account whatsoever.
5) I/ We certify that in the last three years, we/ any of the Consortium Members or our/ their Associates have neither failed to perform on any contract, as evidenced by imposition of a penalty by an arbitral or judicial authority or a judicial pronouncement or arbitration award, nor been expelled from any project or contract nor have had any contract terminated for breach on our part.
6) I/ We declare that:
    a) I/ We have examined and have no reservations to the RFP document, including any Addendum issued by the Authority.
    b) I/ We do not have any conflict of interest in accordance with *section 1.7 (Eligibility of Bidders)* of the RFP document; and
    c) I/We have not directly or indirectly or through an agent engaged or indulged in any corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice, as defined in *section 1.10 (Fair Practices & Anti-Corruption)* of the RFP document, in respect of

any tender or request for proposal issued by or any agreement entered into with the Authority or any other public sector enterprise or any government, Central or State; and

d) I/ We hereby certify that we have taken steps to ensure that in conformity with the provisions of *section 1.10 (Fair Practices & Anti-Corruption)* of the RFP document, no person acting for us or on our behalf has engaged or will engage in any corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice.

7) I/ We understand that the Authority may cancel the Bid Process at any time and that the Authority is neither bound to accept any Bid that it may receive nor to invite the Bidders to submit a Bid for the Project, without incurring any liability to the Bidders, in accordance with *section 1.9 (Rights of the Authority)* of the RFP document.
8) I/ We certify that in regard to matters other than security and integrity of the country, we/ any Member of the Consortium or any of our/ their Associates have not been convicted by a Court of Law or indicted or adverse orders passed by a regulatory authority which could cast a doubt on our ability to undertake the Project or which relates to a grave offence that outrages the moral sense of the community.
9) I/ We further certify that in regard to matters relating to security and integrity of the country, we/ any Member of the Consortium or any of our/ their Associates have not been charge-sheeted by any agency of the Government or convicted by a Court of Law.
10) I/ We further certify that no investigation by a regulatory authority is pending either against us/ any Member of the Consortium or against our/ their Associates or against our CEO or any of our Directors/ Managers/ employees.
11) I/ We undertake that in case due to any change in facts or circumstances during the Bid Process, we are attracted by the provisions of disqualification in terms of the provisions of this RFP, we shall intimate the Authority of the same immediately.
12) The power of attorney for signing of Bid and the power of attorney for Lead Member of the Consortium, as per format provided at ***Annexures E1*** *and* ***E2*** respectively of the RFP, are also enclosed.
13) I/ We hereby irrevocably waive any right or remedy which we may have at any stage at law or howsoever otherwise arising to challenge or question any decision taken by the Authority in connection with the selection of the Bidder, or in connection with the selection/ Bid Process itself, in respect of the above mentioned Project and the terms and implementation thereof.
14) Our Bid shall remain **valid for a period of not less than 12 (twelve) months from the Bid Due Date**
15) I/ We agree and undertake to abide by all the terms and conditions of the RFP document.

In witness thereof, I/ we submit this Bid under and in accordance with the terms of the RFP document.

For and on behalf of :

Signature :

(Authorised Representative and Signatory)

Name of the Person :

Designation :

Annexure B : Format of details of Bidder / Member

(on the letterhead of Bidder /Lead Member)

1. Particulars of the Bidder
   a) Name
   b) Country of Incorporation
   c) Address of the corporate headquarters and its branch office (s), if any, in India
   d) Date of incorporation and / or commencement of business

2. Brief description of the Company including details of its main lines of business and proposed roles and responsibilities in the Project.

3. Particulars of individual(s) who will serve as the point of contact/ communication for the Bidder:
   a) Name:
   b) Designation:
   c) Company:
   d) Address:
   e) Telephone No:
   f) E-mail Address:
   g) Fax No:
4. Particulars of the Authorised Signatory of the Bidder:
   a) Name:
   b) Designation:
   c) Address:
   d) Telephone No.
   e) E-mail address:
   f) Fax No.:
5. In case of Consortium:
   a) The information above (1-4) should be provided for all the Members of the Consortium
   b) A copy of the Consortium Agreement as envisaged in ***Annexure I*** should be attached to the Bid.
   c) Information regarding role of each Member should be provided as per table below:

S. No	Name of the Member	Role of the Member	Percentage of equity in the Consortium
1			
2			
3			

6. The following information shall also be provided for the Bidder, including each Member of the Consortium:

S. No	Criteria	Yes	No
1	Has the Bidder/ Member of the Consortium been barred by the Central / State / Foreign Government, or any entity controlled by it, from participating in any project?		
2	If the answer to 1 is yes, does the bar subsist as on the date of Bid?		
3	Has the Bidder/ Member of the Consortium paid liquidated damages of more than 5% of the contract value in a contract due to delay or has been penalised due to any other reason in relation to execution of a contract, in the last three years?		

7. A statement by the Bidder and each of the Members of its Consortium (where applicable) disclosing material non-performance or contractual non-compliance in past projects, contractual disputes and litigation/ arbitration in the recent past is given below: *(attach extra sheets, if necessary)*

Annexure C : Format of Execution Capacity

Name of Bidder / Member of Consortium		
Nature of Experience *(Own Fab / Client Contract)*		
Project/Client Name & Description		
Project Location		
Type of Project Scope Delivered *(SITC of Equipment; SITC of Equipment Upgrades; Detailed Engineering for Wafer Fab Cleanroom and Utilities Setup or Modifications; Setup of Cleanroom and Utilities Plants/Sources and Distribution Network; De-hooking and Crating /Packing of Equipment; Annual Maintenance Service/ Contract; Supply and Qualification of Technology IPs; Supply and Implementation of MES Software with Equipment Automation)*		
Details of Activities/Experience (e.g., types of equipment, upgrades, utilities and cleanroom works, technology IPs, installed/ commissioned/qualified, scope of AMC services provided, scope of MES implementation, etc.)		
Project/Client Fab Specifications for above experience	Node size(es) and process technologies	
	Cleanroom class(es) and size	
	Wafer size and capacity (WSPM)	
Start Month and Year of Project		
End Month and Year of Project		

For and on behalf of :

Name of the person:

Designation:

Signature:

(Authorised Representative and Signatory)

CLIENT CERTIFICATION

*(*If Bidder / Member claiming experience for project executed for client contracts)*

I,_____(*name*), holding the position of (*designation of signatory of relevant partner/client*) at _____(*name of relevant partner/client*) hereby certify that the _____ (*name of Bidder/Member/Associate)* has executed the _____ (*project name / description*) project for which information has been provided above in accordance with the terms of the contract executed for such project and the information provided above is true and correct.

Signature:
Name:
Designation:

Notes:

1) The provided format shall be duplicated and appended for each type of experience required for Qualification (see *section 1.23 (Technical Evaluation)*) for the Bid Package(s)/Item(s) quoted in the Bid.
2) SITC shall mean Supply, Installation, Testing and Commissioning of equipment, equipment upgrades, cleanroom and utilities modifications/augmentations as described in this RFP
3) Supply and Qualification of Technology IPs shall mean technology transfer, process/design enablement, PDK delivery and other documentation as described in this RFP
4) Supply and Implementation of MES software shall mean MES software deployment with all requisite hardware and software along with equipment automation as described in this RFP
5) For Bidder(s) bidding for Bid Package 1, in addition to the proof of claimed Annual Maintenance Contract/Service experience as per above format, the Bidder(s) shall furnish CVs of service/equipment engineers proposed to be maintained on-site as described in *section 1.23 (Technical Evaluation) and section 1.5.1[V] (Comprehensive Annual Maintenance Contract)*

Annexure D : Format of Financial Capacity

Bidder type	Bidder / Member Name	Annual Turnover		
		Year 1	Year 2	Year 3
Single Entity Bidder				
Consortium Member 1 (Lead Member)				
Consortium Member 2				
Consortium Member 3				
TOTAL				

Notes:

1) Audited financial statements shall be submitted along with the Pre-Qualification Bid as evidence for the above claim
2) Year 1 will be the latest completed financial year for which audited financial statement is available, preceding the Bid Due Date. Year 2 shall be the year immediately preceding Year 1 and so on.
3) A Bidder consisting of a single entity should fill in details as per the row titled Single Entity Bidder and ignore the rows titled Consortium Members. In case of a Consortium, row titled Single Entity Bidder should be ignored.
4) In case of a Consortium, the average annual turnover will be based on percentage participation of each member.
   Example: Let Consortium Member 1 has percentage participation = M, Consortium Member 2 has = N and Consortium Member 3 has = O. Let the average annual turnover of Consortium Member 1 is 'A', that of Consortium Member 2 is 'B', and that of Consortium Member 3 is 'C', then the average annual turnover of Consortium will be = [(A*M + B*N + C*O) / 100]

Annexure E1 : Format of Power of Attorney authorizing the Signatory of the Bid

(on stamp paper)

Know all men by these presents, We, ... (name of the firm and address of the registered office) do hereby irrevocably constitute, nominate, appoint and authorize Mr. / Ms (Name) ....., son/daughter/wife of ..... and presently residing at ....., who is presently employed with us/ the Lead Member of our Consortium and holding the position of ....., as our true and lawful attorney (hereinafter referred to as the **"Attorney"**) to do in our name and on our behalf, all such acts, deeds and things as are necessary or required in connection with or incidental to submission of our Bid for Augmentation & Enhancement of Existing 8-inch Fab of Semi-Conductor Laboratory, India (hereinafter referred to as the **"Project"**) being undertaken at Mohali, Punjab (India) by the Semi-Conductor Laboratory, India (the **"Authority"**) including but not limited to signing and submission of all applications, bids and other documents and writings, participate in Bidders' and other conferences and providing information / responses to the Authority, representing us in all matters before the Authority, signing and execution of all contracts including the Contract Agreement(s) and undertakings consequent to acceptance of our Bid, and generally dealing with the Authority in all matters in connection with or relating to or arising out of our Bid for the said Project and/or upon award thereof to us and/or till the entering into of the Contract Agreement(s) with the Authority.

AND we hereby agree to ratify and confirm and do hereby ratify and confirm all acts, deeds and things done or caused to be done by our said Attorney pursuant to and in exercise of the powers conferred by this Power of Attorney and that all acts, deeds and things done by our said Attorney in exercise of the powers hereby conferred shall and shall always be deemed to have been done by us.

IN WITNESS WHEREOF WE, ..., THE ABOVE-NAMED PRINCIPAL HAVE EXECUTED THIS POWER OF ATTORNEY ON THIS ..... DAY OF ....., 20.....

For

.....

(Signature, name, designation, and address)

Witnesses:

1) [insert name and signature]

2) [insert name and signature]

(Notarized)

Accepted

……

(Signature, name, designation and address of the Attorney)

Notes:

1) The Mode of execution of the Power of Attorney should be in accordance with the procedure, if any, laid down by the applicable Law and the charter documents of the executant(s) and when it is so required, the same should be under common seal affixed in accordance with the required procedure.
2) The Bidder should submit for verification the extract of the charter documents and documents such as a board or shareholders resolution/ power of attorney in favor of the person executing this Power of Attorney for the delegation of power hereunder on behalf of the Bidder.
3) For a Power of Attorney executed and issued overseas, the document will also have to be legalized by the Indian Embassy and notarized in the jurisdiction where the Power of Attorney is being issued. However, the Power of Attorney provided by Bidders from countries that have signed the Hague Legislation Convention 1961 are not required to be legalized by the Indian Embassy if it carries a conforming Apostille certificate.

Annexure E2 : Format Of Power Of Attorney for appointing Lead Member of the Consortium

(on requisite stamp paper)

Whereas the Authority has invited bids from Bidders (as defined in the RFP) for the Project (as defined in the RFP), pursuant to the Request for Proposal number *[insert]* issued by the Authority dated *[insert]* ("**RFP**");

Whereas *[insert name of all members of the Consortium]* (collectively, the "**Consortium**") being members of the Consortium are interested in submitting a Bid for the Project in accordance with the terms and conditions of the RFP and other connected documents in respect of the Project.

AND

Whereas it is necessary for the members of the Consortium to designate one of them as Lead Member to act for and on behalf of the Consortium, and vest in such member all necessary powers and authority to do for and on behalf of the Consortium, all acts, deeds and things as may be necessary in connection with the Bid being submitted by the Consortium for the Project, in accordance with the provisions of the RFP, and the execution thereof.

NOW, THEREFORE, KNOW ALL MEN BY THESE PRESENTS:

We, *[insert names and registered office addresses respectively of all members of the Consortium other than the member in favour of which the power of attorney is being issued]* (hereinafter collectively referred to as the "**Principals**") do hereby irrevocably designate, nominate, constitute, appoint and authorize *[insert name of the Member of the Consortium in whose favour the power of attorney is being issued]*, having its registered office at *[insert registered office address of the member in whose favour this power of attorney is to be issued]*, being a member of the Consortium, true and lawful attorney of the Consortium (the "**Attorney**"), and hereby irrevocably authorize the Attorney (with the power to sub-delegate the same) to conduct all business for and on behalf of the Consortium and any one of us during the Bid Process and, in the event the Consortium is awarded the Project, during the implementation of the Project and in this regard, to do on our behalf and on behalf of the Consortium, all or any of such acts, deeds or things as are necessary or required or incidental to the submission of the Consortium's Bid for the Project, including but not limited to:

1) the signing and submission of all documentation and applications, the Bid, any undertakings in connection therewith, and other documents and writings.

2) participating in meetings involving the Consortium as a Bidder, and other conferences.
3) responding to queries.
4) submitting information / documents.
5) signing and executing contracts and undertakings consequent to acceptance of the Bid of the Consortium; and
6) generally, to represent the Consortium in all its dealings with the Authority, and/or any other agency appointed by the Authority and/or any person, in all matters in connection with or relating to or arising out of the Bid submitted by the Consortium for the Project and/or upon award thereof till the Contract Agreement is executed with the Authority.

AND

We hereby agree to ratify and confirm, and do hereby ratify and confirm, all acts, deeds and things lawfully done or caused to be done by our said Attorney pursuant to and in exercise of the powers conferred by this Power of Attorney, and that all acts, deeds and things done by our said Attorney in exercise of the powers hereby conferred shall and shall always be deemed to have been done by us / the Consortium, and shall be binding on us / the Consortium.

IN WITNESS WHEREOF WE THE PRINCIPALS ABOVE NAMED HAVE EXECUTED THIS POWER OF ATTORNEY ON THIS *[insert]* DAY OF *[insert month]*, *[insert year]*.

For:

……..

(Signature)
(Name & Title)

[To be executed by all the Members of the Consortium. Please modify the signature block appropriately.]

Accepted by:

……..

[Insert name of the member in whose favour power of attorney is issued]

(Signature)
(Name & Title of the Attorney)

Witnesses:

1) [insert name and signature]

2) [insert name and signature]

Person identified by me / personally appeared before me / signed before me / Attested / Authenticated*
(*Notary to specify as applicable)

……..

(Signature, Name and Address of the Notary)

Seal of the Notary

Registration Number of the Notary: [insert]

Date: [insert]

Notes:

1) The mode of execution of the Power of Attorney should be in accordance with the procedure, if any, laid down by applicable Law and the charter documents of the executant(s).
2) The executant shall submit for verification, the relevant extract of the charter documents and/or documents such as a resolution of the board of the executant, for demonstrating that the person executing this Power of Attorney for and on behalf of the executant has been validly authorized by the executant in this regard.
3) In the event that the Power of Attorney is executed in India, the Power of Attorney should be executed on a non-judicial stamp paper of appropriate value as relevant to the place of execution.
4) For a Power of Attorney executed and issued overseas, the document will also have to be legalized by the Indian Embassy and notarized in the jurisdiction where the Power of Attorney is

being issued. However, the Power of Attorney provided by Members from countries that have signed the Hague Legislation Convention, 1961 are not required to be legalized by the Indian Embassy if it carries a conforming Apostille certificate.

Annexure F : Format of Bank Guarantee for Earnest Money Deposit

(on stamp paper)

B.G. No. [___] **Dated:**

1) In consideration of you, the Semi-Conductor Laboratory, India (referred to as **the Authority**, which expression will, unless it is repugnant to the subject or context thereof include, its successors and assigns), represented by [***insert name of Nodal Officer***], the Authority having agreed to receive the Bid of [***insert name of Bidder***] / the Consortium, represented by [***insert name of Lead Member***]] with its registered office at [i***nsert Address***] (referred to as the **Bidder** which expression shall unless it be repugnant to the subject or context thereof include its/their executors, administrators, successors and assigns), for the Augmentation & Enhancement of Existing 8-inch Fab of Semi-Conductor Laboratory, India (referred to as the **Project**), pursuant to the Request for Proposal dated [***insert RFP Issue Date***] (referred to as the **RFP**) issued in respect of the Project and other related documents, we [***insert name of the Bank***] having our registered office at [***insert Address***] and one of its branches at [***insert Location***] (referred to as the **Bank**), at the request of the Bidder, do hereby in terms of *section 1.18 (Bid Security)* of the RFP, irrevocably, unconditionally and without reservation guarantee the due and faithful fulfilment and compliance of the terms and conditions of the RFP by the said Bidder and unconditionally and irrevocably undertake to pay forthwith to the Authority an amount of INR **[.] Crores** *{amount to be filled in by the Bidder(s) in accordance with section 1.18 (Bid Security)}* (referred to as the **Guarantee**) as our primary obligation without any demur, reservation, recourse, contest or protest and without reference to the Bidder, if the Bidder fails to fulfil or comply with all or any of the terms and conditions contained in the RFP.
2) Any such written demand made by the Authority stating that the Bidder is in default of due and faithful compliance with the terms and conditions contained in the RFP will be final, conclusive and binding on the Bank.
3) We, the Bank, do hereby unconditionally undertake to pay the amounts due and payable under this Guarantee without any demur, reservation, recourse, contest or protest and without any reference to the Bidder or any other person and irrespective of whether the claim of the Authority is disputed by the Bidder or not, merely on the first demand from the Authority stating that the amount claimed is due to the Authority by reason of failure of the Bidder to fulfil and comply with the terms and conditions contained in the RFP, for the following events:
   a) if a Bidder engages in corrupt, fraudulent, coercive or undesirable practice or restrictive

practice as specified in *section 1.10* (*Fair Practices & Anti-Corruption*);

b) if a Bidder is disqualified in accordance with, *section 1.7.1* (General *Eligibility*);

c) if, a Bidder withdraws its Bid; or

d) if a Bidder is selected as the Selected Bidder and it fails, within the specified time limit, to:

i) sign and return, as acknowledgement, the duplicate copy of the LOA;

ii) furnish the Performance Security;

iii) fulfil any other condition precedent to the execution of the Contract Agreement; or

iv) fails to execute the Contract Agreement.

Any such demand made on the Bank shall be conclusive as regards amount due and payable by the Bank under this Guarantee.

4) This Guarantee shall be irrevocable and remain in full force for a period of 390 (three hundred and ninety) days from the Bid Due Date inclusive of a claim period of 30 (thirty) days or for such extended period as may be mutually agreed between the Authority and the Bidder, and agreed to by the Bank, and will continue to be enforceable till all amounts under this Guarantee have been paid.

If the Bidder(s) is declared as the Selected Bidder(s), then the validity of the Guarantee of such Selected Bidder shall be extended until the date on which the Selected Bidder(s) submits the Performance Security. The Guarantee of the Selected Bidder(s) will be returned upon the Selected Bidder(s) furnishing the Performance Security.

5) We, the Bank, further agree that the Authority will be the sole judge to decide as to whether the Bidder has failed to comply with the terms and conditions contained in the RFP including, those events listed at paragraph 3 above. The decision of the Authority that the Bidder is in default as aforesaid will be final and binding on us, notwithstanding any differences between the Authority and the Bidder or any dispute pending before any court, tribunal, arbitrator or any other authority.

6) The Guarantee will not be affected by any change in the constitution or winding up of the Bidder or the Bank or any absorption, merger or amalgamation of the Bidder or the Bank with any other person.

7) In order to give full effect to this Guarantee, the Authority will be entitled to treat the Bank as the principal debtor.

8) The obligations of the Bank under this Guarantee are absolute and unconditional, irrespective of the value, genuineness, validity, regularity or enforceability of the RFP or the Bid submitted by the Bidder.

9) The obligations of the Bank under this Guarantee shall not be affected by any act, omission, matter or thing which, but for this provision, would reduce, release or prejudice the Bank from or prejudice or diminish its liability under this Guarantee, including (whether or not known to it, or the Authority):

a) any time or waiver granted to, or composition with, the Bidder or any other person;

b) any incapacity or lack of powers, authority or legal personality of or dissolutions; or change in

the Bidder, as the case may be;

c) any variation of the RFP, so that references to the RFP in this Guarantee shall include each such variation;

d) any unenforceability, illegality or invalidity of any obligation of the Bidder or the Authority under the RFP or any unenforceability, illegality or invalidity of the obligations of the Bank under this Guarantee or the unenforceability, illegality or invalidity of the obligations of any Person under any other document or guarantee or security, to the extent that each obligation under this Guarantee shall remain in full force as a separate, continuing and primary obligation, and its obligations be construed accordingly, as if there were no unenforceability, illegality or invalidity; and

e) any extension, waiver, or amendment whatsoever which may release a guarantor or surety (other than performance of any of the obligations of the Bidder(s) under the RFP).

10) Any notice by way of request, demand or otherwise will be sufficiently given or made if addressed to the Bank and sent by courier or by registered mail to the Bank at the address set forth herein.

11) We undertake to make the payment on receipt of your notice of claim on us addressed to [***name of Bank along with branch address***] and delivered at our above branch which will be deemed to have been duly authorised to receive the notice of claim.

12) It shall not be necessary for the Authority to proceed against the Bidder(s) before proceeding against the Bank and the Guarantee will be enforceable against the Bank, notwithstanding any other security which the Authority may have obtained from the Bidder(s) or any other person and which will, at the time when proceedings are taken against the Bank, be outstanding or unrealised.

13) We, the Bank, further undertake not to revoke this Guarantee during its currency except with the previous express consent of the Authority in writing.

14) The Bank represents and warrants that it has power to issue this Guarantee and discharge the obligations contemplated herein, and the undersigned is duly authorised and has full power to execute this Guarantee for and on behalf of the Bank.

15) For the avoidance of doubt, the Bank's liability under this Guarantee will be restricted to **INR [.] Crores** *{amount to be filled in by the Bidder(s) as determined and specified in point 1) above}*. The Bank will be liable to pay the amount or any part of the Guarantee only if the Authority serves a written claim on the Bank in accordance with paragraph 11 of this Guarantee, on or before …….. *{indicate date falling 390 (three hundred and ninety) days after the Bid Due Date}.*

16) Capitalised terms used but not defined herein shall have the meanings given to them in the RFP.

Signed and Delivered by……Bank

By the hand of Mr./Ms. …….. its …… and authorised official.

(Signature of the Authorised Signatory)

(Official Seal)

In the presence of:

Name of the witness:

Signature of the witness:

Address of the witness:

Annexure G : Pre-Contract Integrity Pact

General

1. Whereas the Semi-Conductor Laboratory, India, hereinafter referred to as the Authority and the first party, proposes to select Contractor(s) for Augmentation & Enhancement of Existing 8-inch Fab of Semi-Conductor Laboratory, India, hereinafter referred to as services, and M/s [*insert name*] represented by [*insert name*], [*insert designation*] (which term, unless expressly indicated by the Contract, shall be deemed to include its successors and its assignees), hereinafter referred to as the Bidder and the second party, is willing to offer the services.
2. Whereas the Bidder is a private company/public company/partnership/registered export agency, constituted in accordance with the relevant law in the matter and the Authority is an autonomous body under the Ministry of Electronics and Information Technology (MeitY), Government of India.

Objectives

3. Now, therefore, the Authority and the Bidder agree to enter into this pre-contract agreement, hereinafter referred to as "**Integrity Pact**", to avoid all forms of corruption by following a system that is fair, transparent and free from any influence/unprejudiced dealings prior to, during and subsequent to the currency of the Contract to be entered into with a view to:
   3.1. Enabling the Bidder to obtain the desired services at a competitive price in conformity with the defined specifications of the services by avoiding the high cost and the distortionary impact of corruption on public procurement.
   3.2. Enabling Bidder to abstain from bribing or any corrupt practice in order to secure the contract by providing assurance to them that their competitors will also refrain from bribing and other corrupt practices and the Authority will commit to prevent corruption, in any form, by their officials by following transparent procedures.

Commitments of the Authority

4. The Authority commits itself to the following:
   4.1. The Authority undertakes that, no official of the Authority, connected directly or indirectly with the Contract will demand, take a promise for or accept, directly or through intermediaries, any bribe, consideration, gift, reward, favour or any material or immaterial benefit or any other advantage from the Bidder, either for themselves or for any person, organisation or third party related to the contract in exchange for an advantage in the Bidding Process, contracting or implementation process related to the Contract.

4.2. The Authority will, during the pre-contract stage, treat all Bidder alike and will provide to all Bidder the same information and will not provide any such information to any particular Bidder which could afford an advantage to that particular Bidder in comparison to other Bidder.

4.3. All the officials of the Authority will report to the appropriate Government office any attempted or completed breaches of the above commitments as well as any substantial suspicion of such a breach.

5. In case of any such preceding misconduct on the part of such official(s) is reported by the Bidder to the Authority with full and verifiable facts and the same is prima facie found to be correct by the Authority, necessary disciplinary proceedings, or any other action as deemed fit, including criminal proceedings may be initiated by the Authority and such a person shall be debarred from further dealings related to the Contract process. In such a case while an enquiry is being conducted by the Authority the proceedings under the Contract would not be stalled.

Commitments of Bidders

6. The Bidder commits itself to take all measures necessary to prevent corrupt practices, unfair means and illegal activities during any stage of the Bidding Process or during any pre-Contract or post-Contract stage in order to secure the Contract or in furtherance to secure it and in particular commits himself to the following:

6.1. The Bidder will not offer, directly or through intermediaries, any bribe, gift, consideration, reward, favour, any material or immaterial benefit or other advantage, commission, fees, brokerage or inducement to any official of the Authority, connected directly or indirectly with the Bidding Process, or to any person, organisation or third party related to the Contract in exchange for any advantage in the bidding, evaluation, contracting and implementation of the Contract.

6.2. The Bidder further undertakes that it has not given, offered or promised to give, directly or indirectly any bribe, gift, consideration, reward, favour, any material or immaterial benefit or other advantage, commission, fees, brokerage or inducement to any official of the Authority or otherwise in procuring the Contract or forbearing to do or having done any act in relation to the obtaining or execution of the Contract or any other Contract with the Government for showing or forbearing to show favour or disfavour to any person in relation to the Contract or any other Contract with the Government.

6.3. The Bidder will not collude with other parties interested in the Contract to impair the transparency, fairness and progress of the Bidding Process, contracting and implementation of the Contract.

6.4. The Bidder will not accept any advantage in exchange for any corrupt practice, unfair means and illegal activities.

6.5. The Bidder further confirms and declares to the Authority that the Bidder has not engaged any individual or firm or company whether Indian or foreign to intercede, facilitate or in any way to recommend to the Authority or any of its functionaries, whether officially or unofficially to the award of the contract to the Bidder, nor has any amount been paid, promised or intended to be paid to any such individual, firm or company or agent in respect of any such intercession, facilitation or recommendation.

6.6. The Bidder would not enter into conditional contract with any agents, brokers or any other intermediaries wherein payment is made or penalty is levied, directly or indirectly, on success or failure of the award of the Contract.

6.7. The Bidder while presenting the Bid, shall disclose any payments it has made during the 12 months prior to Bid submission or is committed to or intends to make to officials of the Authority or their family members, agents, brokers or any other intermediaries in connection with the Contract and the details of such services agreed upon for such payments. Within the validity of this Integrity Pact, Bidder shall disclose to the Authority any payments made or has the intention to pay any amount, gift, reward, fees, commission or consideration to such person, party, firm or institution as an annual report during the procurement process.

6.8. The Bidder shall not use improperly, for purposes of competition or personal gain or pass on to others, any information provided by the Authority as part of the business relationship regarding plans, technical proposals and business details, including information contained in any electronic data carrier. The Bidder also undertakes to exercise due and adequate care lest any such information is divulged.

6.9. The Bidder commits to refrain from giving any complaint directly or through any other manner without supporting it with full and verifiable facts. Complaint will be processed as per Guidelines for Handling of Complaints in vogue. In case the complaint is found to be vexatious, frivolous or malicious in nature, it would be construed as a violation of Integrity Pact.

6.10. The Bidder shall not instigate or cause to instigate any third person to commit any of the actions mentioned above.

7. Previous Transgression

7.1. The Bidder declares that no previous transgression occurred in the last 5 years immediately before signing of this Integrity Pact, with any other company in any country in respect of any corrupt practices envisaged hereunder or with any Public Sector Enterprise in India or any Government Department in India.

7.2. If the Bidder makes incorrect statement on this subject, Bidder can be disqualified from the Bidding Process or the Contract and if already awarded, can be terminated for such reason.

8. Company Code of Conduct

8.1. Bidders are also advised to have a company code of conduct (clearly rejecting the use of

bribes and other unethical behaviour) and a compliance program for the implementation of the code of conduct throughout the company.

9. Sanctions for Violations

9.1. Any breach of the aforesaid provisions by the Bidder or any one employed by him or acting on his behalf (whether with or without the knowledge of the Bidder) or the commission of any offence by the Bidder or any one employed by him or acting on his behalf, as defined in Chapter IX of the Indian Penal Code, 1860 or the Prevention of Corruption Act 1988 or any other act enacted for the prevention of corruption shall entitle the Authority to take all or any one of the following actions, wherever required:

(a) To immediately call off the pre-contract negotiations without assigning any reason or giving any compensation to the Bidder. However, the proceedings with the other Bidder(s) would continue.

(b) EMD or Bid Security for pre-contract period, Performance Security post signing of Contract shall stand forfeited either fully or partially, as decided by the Authority and the Authority shall not be required to assign any reason therefore.

(c) To immediately cancel the Contract, if already signed, without any compensation to the Bidder.

(d) To recover all sums already paid by the Authority, in case of an Indian Bidder with interest thereon at 2% higher than the prevailing Base Rate of State Bank of India and in case of a Bidder from a country other than India with interest thereon at 2% higher than the LIBOR. If any outstanding payment is due to the Bidder from the Authority in connection with any other contract for any other services, such outstanding payment could also be utilised to recover the aforesaid sum and interest.

(e) To encash the EMD and/or Performance Security if furnished by the Bidder, in order to recover the payments, already made by the Authority, along with interest.

(f) To cancel all or any other Contracts with the Bidder.

(g) To put on hold or suspend or debar the Bidder as per the extant policy.

(h) To recover all sums paid in violation of this Integrity Pact by Bidder(s) to any agent or broker with a view to securing the contract.

(i) If the Bidder or any employee of the Bidder or any person acting on behalf of the Bidder, either directly or indirectly, is closely related to any of the officers of the Authority, or alternatively, if any close relative of an officer of the Authority has financial interest/stake in the Bidder's firm, the same shall be disclosed by the Bidder at the time of filing of tender. Any failure to disclose the interest involved shall entitle the Authority to debar the Bidder from the Bidding Process or rescind the Contract without payment of any compensation to the Bidder.

(j) The term 'close relative' for this purpose would mean spouse whether residing with the Government servant or not, but not include a spouse separated from the Government servant by a decree or order of a competent court; son or daughter or step son or step daughter and wholly dependent upon Government servant, but does not include a child or step child who is no longer in any way dependent upon the Government servant or of whose custody the Government servant has been deprived of by or under any law; any other person related, whether by blood or marriage, to the Government servant or to the Government servant's wife or husband and wholly dependent upon Government servant.

(k) The Bidder shall not lend to or borrow any money from or enter into any monetary dealings or transactions, directly or indirectly, with any employee of the Authority and if he does so, the Authority shall be entitled forthwith to rescind the contract and all other contracts with the Bidder. The Bidder shall be liable to pay compensation for any loss or damage to the Authority resulting from such rescission and the Authority shall be entitled to deduct the amount so payable from the money(s) due to the Bidder.

(l) In cases where irrevocable Letters of Credit have been received in respect of any contract signed by the Authority with the Bidder, the same shall not be opened.

9.2 The decision of the Authority to the effect that a breach of the provisions of this Integrity Pact has been committed by the Bidder shall be final and binding on the Bidder, however, the Bidder can approach the Independent Monitor(s) appointed for the purposes of this Integrity Pact.

10. Independent Monitors

10.1. The Authority has appointed Independent Monitors for this Pact in consultation with the Central Vigilance Commission. The names and addresses of nominated Independent Monitors (at the time of issue of RFP) are as follows (however the Contractor(s) must refer to the Authority's website at www.scl.gov.in to check for changes to these details):

Controller, Semiconductor laboratory (SCL), Sector-72, SAS Nagar Mohali Punjab 160071

All communications to Independent Monitors will be copied to Chief Vigilance Officer (CVO), MeitY, GOI.

10.2. After the Integrity Pact is signed, the Authority shall provide a copy thereof, along with a brief background of the case to the Independent Monitors, if required by them.

10.3. The Bidder (s), if they deem it necessary, may furnish any information as relevant to their bid to the Independent Monitors.

10.4. If any complaint with regard to violation of the Integrity Pact is received by the Authority in a procurement case, the Authority shall refer the complaint to the Independent Monitors for their comments/enquiry.

10.5. If the Independent Monitors need to peruse the relevant records of the Authority in connection with the complaint sent to them by the Authority, the Authority shall make arrangement for such perusal of records by the Independent Monitors.

10.6. The report of enquiry, if any, made by the Independent Monitors shall be submitted to the Authority for a final and appropriate decision in the matter keeping in view the provision of this Integrity Pact.

11. Examination of Books of Accounts

11.1. In case of any allegation of violation of any provisions of this Integrity Pact or payment of commission, the Authority or its agencies shall be entitled to examine the Books of Accounts of the Bidder and the Bidder shall provide necessary information of the relevant financial documents in English and shall extend all possible help for the purpose of such examination.

12. Law and Place of Jurisdiction

12.1. This Pact is subject to Indian Law. The place of performance and jurisdiction is the seat of the Authority i.e., Chandigarh.

13. Other Legal Actions

13.1. The actions stipulated in this Integrity Pact are without prejudice to any other legal action that may follow in accordance with the provisions of the extant law in force relating to any civil or criminal proceedings.

14. Validity

14.1. The validity of this Integrity Pact shall be from date of its signing and extend up to the complete execution of the Contract Agreement to the satisfaction of both the Authority and the Bidder, whichever is later.

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

15. The Parties hereby sign this Integrity Pact at [*insert location*] on [*insert date*].

Authority	**Bidder**
Semi-Conductor Laboratory, India	**[insert name]**
[Nodal Officer]	**[Authorized Signatory]**
Witness:	Witness:
(1) [insert witness]	(1) [insert witness]
(2) [insert witness]	(2) [insert witness]

Annexure H : Format Of Undertaking regarding Blacklisting / Debarment / Suspension / Ban

(on letterhead of Bidder / Lead Member)

To,

[insert details]

We hereby confirm and declare that we, M/s ----------, having registered office at our [insert address] represented by [name of authorized representative] do here by solemnly declare that we and our sub-contractor(s)/ current supplier(s)/ technology partner is/are neither in any way insolvent/ blacklisted/ suspended/ debarred/ banned by any State/Central Government organization or their agencies for which we have executed/ undertaken the works/ services during the last 5 (five) years as on date of issue of this RFP. In case of any such event is found during Bid evaluation and award of contract, I/We have no objection if my/our Bid is rejected.

For ----------

Authorized Signatory

Date:

Annexure I : Format Of Consortium Agreement

(To be executed on stamp paper of appropriate value)

THIS **CONSORTIUM AGREEMENT** is entered into on this …… day of 2024

AMONGST

1) {…..}, having its registered office at……(hereinafter referred to as the "**First Part**" or the **"Lead Member"** which expression shall, unless repugnant to the context include its successors and permitted assigns)

AND

2) {…..}, having its registered office at……(hereinafter referred to as the "**Second Part**" or the "**1st Consortium Member**" which expression shall, unless repugnant to the context include its successors and permitted assigns)

AND

3) {…..}, having its registered office at……(hereinafter referred to as the "**Third Part**" or the "**2nd Consortium Member**" which expression shall, unless repugnant to the context include its successors and permitted assigns)

The above-mentioned parties of the FIRST, SECOND, and THIRD PART are collectively referred to as the **"Parties"** and each is individually referred to as a **"Party"**

WHEREAS:

(A) Semi-Conductor Laboratory, India (SCL) (referred to as the **"Authority"** which expression shall, unless repugnant to the context or meaning thereof, include its administrators, successors and assigns) has invited "**Bids**" by its RFP vide reference no. [insert reference number], dated [insert date] for the Augmentation & Enhancement of Existing 8-inch CMOS Line of Semi-Conductor Laboratory, India (the **"Project"**).

(B) The Parties are interested in jointly bidding for the Project as Members of a Consortium and in accordance with the terms and conditions of the RFP, and

(C) It is a necessary condition under the Bidding Documents that the Members of the Consortium shall enter into a Consortium Agreement and furnish a copy of it with the Bid.

NOW IT IS HEREBY AGREED as follows:

1) Definitions and Interpretations:

   In this Consortium Agreement, the capitalized terms shall, unless the context otherwise requires, have the meaning ascribed thereto under the RFP.

2) Consortium:

   The Parties do hereby irrevocably constitute a consortium (the "**Consortium**") for the purposes of jointly participating in the Bid Process for the Project.

3) Role of the Parties:

   a) The Parties hereby undertake that the Consortium is fulfilling the Eligibility Criteria as per the requirement of **"RFP"** in all respects and the **"First Part"** shall be the **"Lead Member"** of the Consortium and shall have the Power of Attorney from all Parties for conducting all business for and on behalf of the Consortium during the Bid Process and until the signing of the Contract Agreement when all the obligations of the Consortium shall become effective.

   b) The project shall be executed by the **Consortium** as a whole and solely responsible to the Authority for all the activities mentioned in the RFP Document.

4) Joint and Several Liability:

   The Parties do hereby undertake to be jointly and severally responsible for all obligations and liabilities relating to the Project and in accordance with the terms of the RFP Documents and the Contract Agreement, during subsistence of the Contract Agreement.

5) Representation of the Parties:

   Each Party represents to the other Parties as of the date of this Consortium Agreement that:

   a) Such Party is duly organised, validly existing and in good standing under the laws of India and has all requisite power and authority to enter into this Consortium Agreement;

   b) The execution, delivery and performance by such Party of this Consortium Agreement has been authorised by all necessary and appropriate corporate or governmental action and a copy of the extract of the charter documents and board resolution or any other resolution/ Power of Attorney in favour of the person executing this Consortium Agreement for the delegation of power and authority to execute this Consortium Agreement on behalf of the Consortium Member is annexed to this Agreement, and will not,:

      i) require any consent or approval not already obtained;

      ii) violate any Applicable Law presently in effect and having applicability to it;

      iii) violate the memorandum and articles of association, bye-laws or other applicable organisational documents thereof;

      iv) violate any clearance, permit, concession, grant, license or other Governmental authorisation, approval, judgment, order or decree or any mortgage agreement, indenture or any other instrument to which such Party is a party or by which such Party or any of its properties or assets are bound or that is otherwise applicable to such Party; or

v) create or impose any liens, mortgages, pledges, claims, security interests, charges or encumbrances or obligations to create a lien, charge, pledge, security interest, encumbrances or mortgage in or on the property of such Party, except for encumbrances that would not, individually or in the aggregate, have a material adverse effect on the financial condition or prospects or business of such Party so as to prevent such Party from fulfilling its obligations under this Consortium Agreement.

c) This Consortium Agreement is the legal and binding obligation of such Party, enforceable in accordance with its terms against it; and

d) There is no litigation pending or, to the best of such Party's knowledge, threatened to which it or any of its Associates is a party that presently affects or which would have a material adverse effect on the financial condition or prospects or business of such Party in the fulfillment of its obligations under this Consortium Agreement.

6) Conflict of Interest:

The Parties herein undertake to take all necessary measures in order to avoid any conflict of interest during the performance of the Project and also to identify any conflict of interest so that the Authority can consult with the Lead Member and other Parties to sort out such conflicts.

7) Post Contract Agreement Liabilities:

For any loss or damage on account of any breach of this Consortium Agreement or the Contract Agreement between the Authority and the Partner(s) or any shortfall in the execution of the Project, meeting the guaranteed performance / parameters as per technical specifications / documents relating to the RFP, **"Lead Member"** undertake to promptly make good such loss or damage on the Authority's demand without any demur. The Authority shall have the right to proceed against any one of the Parties herein in this regard without establishing the individual liability of such party and it shall neither be necessary nor obligatory on the part of the Authority to proceed against the **"Lead Member"** before proceeding against the other Parties herein.

8) Assignment:

The rights and obligations of First and Second Consortium Member under this Agreement shall not be assigned to any third party without the prior written consent of the Authority

9) Employers' Responsibility:

Each Party will be responsible according to the applicable laws and rules for their own personnel and property.

10) Insurance:

The Parties herein shall at their own expense take out and maintain insurance cover as may be necessary to cover their liabilities.

11) Applicable Law:

This Consortium Agreement shall be governed, construed and interpreted in accordance with the laws of India and the Courts in Chandigarh shall have the exclusive jurisdiction in all matters

arising hereunder.

12) Termination:

This Agreement shall be effective from the date hereof and shall continue till the expiry of the Contract Agreement between the Authority and the Selected Bidder(s). However, in case the Consortium is either not eligible or does not get selected for award of the Contract, the Consortium Agreement will stand terminated in case the Consortium is not eligible or upon return of the Bid Security by the Authority to the Consortium, as the case may be. None of the parties will be entitled to terminate their association with the Consortium, till return of the Bid Security by the Authority or payment of the Performance Security by the Consortium, whichever is later.

13) Indemnification:

All Consortium Members of this agreement shall fully indemnify, hold harmless and defend the Authority and its officers etc., from and against all claims, liabilities, suits, damages including any criminal liability due to false declaration by the Consortium Members with regard to this Consortium Agreement (or) RFP (or) Project (or) Contract Agreement etc., caused due to negligence/commission/omission of the any of the Consortium Members (or) its employees and agents including representatives (or) sub-contractors (or) any other person claiming (or) any other person claiming under this RFP (or) under the applicable laws of India.

14) The Parties acknowledge and accept that this Agreement shall not be amended by the Parties without the prior approval of the Authority.

IN WITNESS WHEREOF THE PARTIES ABOVE NAMED HAVE EXECUTED AND DELIVERED THIS AGREEMENT AS OF THE DATE FIRST ABOVE WRITTEN.

SIGNED, SEALED AND DELIVERED For and on behalf of LEAD MEMBER by:	SIGNED, SEALED AND DELIVERED For and on behalf of SECOND PART
(Signature)	(Signature)
(Name)	(Name)
(Designation)	(Designation)
(Address)	(Address)

SIGNED, SEALED AND DELIVERED

For and on behalf of THIRD PART by:
(Signature)

(Name)
(Designation)

(Address)
In the presence of:

1. 2.

Notes:

1) The mode of the execution of the Consortium Agreement should be in accordance with the applicable laws.
2) Each Consortium Agreement should attach a copy of the extract of the charter documents and documents such as resolution / Power of Attorney in favour of the person executing this Agreement for the delegation of power and authority to execute this Agreement on behalf of the Consortium Member.

Annexure J : Pre Bid Queries Format

Bidders requiring specific points of clarification may communicate with SCL during the specified period in Bid Schedule using the following format:

Bidder's Request for Clarification

Name of the Bidder			
Representative Name			
Position/Designation			
Email Address			
Contact Details	Mob:	Email Id:	
Clarifications Requested			
S.No.	RFP Page No– Section– Sub-section	Content of the RFP	Points of Clarification
1			
2			
3			

Yours faithfully,

Designated Contact Person

Designation

Company Name

Company Seal

Annexure K : Technical Proposal Format

Bidder(s) are required to submit their Technical Proposal in the following format:

Scope Description	Quoted (Yes/No)	Remarks, if any
Bid Package 1 as per the scope defined in *section 1.5.1* of this RFP for • Detailed Engineering & Execution of Cleanroom & Utilities Modifications / Augmentations & Tools Hook-up • Supply, Installation, Testing and Commissioning of equipment (35 nos.) and equipment upgrades (22 nos.) • De-hook, roll-out and crating/packing of 6-inch tools (25 nos.) • Comprehensive Annual Maintenance Contract (CAMC) for existing and supplied equipment and upgrades post-warranty		
Bid Package 2 as per the scope defined in *section 1.5.2* of this RFP for Supply and Qualification of 180nm technology IPs:	*To be quoted at Item level for Bid Package 2*	
1) Item 1 – RF-CMOS Technology		
2) Item 2 – BCD (HV LDMOS) Technology		
3) Item 3 – CIS Technology		
Bid Package 3 as per the scope defined in *section 1.5.3* of this RFP for supply and implementation of MES software along with equipment automation		