Ref: EOI-NNFC/HVAC/2022-01

# EOI for Modification/Upgrade of Existing HVAC system for National Nano- fabrication Facility at CeNSE Building

This is an **Expression of Interest (EOI) from Indian vendors** towards "**Modification/Upgrade of Existing HVAC system for National Nano-fabrication Facility"**, at the Centre for Nano Science and Engineering (CeNSE), Indian Institute of science (IISc) Bengaluru.

CeNSE is a multidisciplinary research department at IISc that houses a 14,000 sq. ft. cleanroom and characterization facility used by 200 faculty members from various disciplines at IISc. CeNSE also runs a nationwide program which has allowed 4200 participants from more than 700 universities and institutes all over India to use the facilities at CeNSE. Consequently, any utility/facility at CeNSE receives significant exposure to scientific community at IISc and beyond. The vendors are kindly requested to factor in the value of this exposure in their quotes.

## Procedure : -

1. CeNSE intends to invite Expression of Interest from vendors for the selection of conceptual design for "**Modification/Upgrade of Existing HVAC system for National Nano-fabrication Facility at CeNSE Building"**.

2. CeNSE Intend to float a RFP(Request for Proposal) in the coming months with necessary schedules for the purpose of inviting the Technical and commercial bids to implement the project.

3. Vendors will be required to visit our office, discuss the plan and conduct the site survey. For site visit and verification please contact NNFC office, GF-20, CeNSE, IISc, Bengaluru. Bid**s** without site survey vendors will not be considered for inviting tenders. Bids should reach NNFC office, GF-20, CeNSE, IISc, Bengaluru on or before 7$^{th}$ January 2022, 5.30pm.

4. Please find the Annexure below:
Annexure 1: Existing HVAC system Design statement of NNFC (Cleanroom)
Annexure 2: P & ID of Existing HVAC system of NNFC (Cleanroom)
Annexure 3: AHUs and Exhaust system capacities.

5. Vendors are encouraged to highlight the advantages of their design.

6. The conceptual design proposals must include references of 3 previous design & installations (in India) of similar scope which is of 5 years or older. The referees must belong to semiconductor facilities. Please provide the names and contact addresses of the referees, so that the CeNSE committee can contact them independently.

7. The vendor referees must be able to provide the following information:

a. The capacity of the exhaust system designed & implemented by the vendor.
b. The application for which their system was designed.
c. Certify that the vendor has capability to design and implement HVAC system.
d. Certify that the design implemented by the vendor has stood the test of time. The performance matches design specifications. The system is functional.
e. Certify that the vendor provides high-quality service and support, since installation.

8. For site visit and any questions please contact Dr. Savitha P, GF-20, Centre for Nano Science and Engineering, Indian Institute of Science, Bangalore 560012, India. (savithap@iisc.ac.in)

Thanks,
Savitha P,
Chief Operating Officer
NNfC
Centre for Nano Science and Engineering,
Indian Institute of Science, Bangalore 560012, India.

## Annexure 1

## Existing HVAC system Design statement of NNFC (Cleanroom)

| **Design statement :** | |
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| 1.0 | **NNFC (Cleanroom)HVAC:**<br><br>The NNFC(Cleanroom) HVAC design is based on negative pressure supply plenums (Lithography and all remaining areas). A proportion of over conditioned fresh air is been supplied into the return path via Air Handling Unit plant, mixing with the return air volume before sensible cooling. The sensibly cooled mixed air condition should be that required to maintain the cleanroom lab temperature and relative humidity within the design tolerance.<br><br>Fan HEPA filter modules (FFMs) will deliver air from the plenum into the Cleanrooms. Within the cleanroom a proportion of air is exhausted to atmosphere, a proportion is bleed into adjacent areas of lower differential pressure, with the balance being re-circulated via the raised access floor return air void.<br><br>Air should is re-circulated from the raised access floor void via double wall chases, through sensible cooling coils back into the negative pressure supply plenums.<br><br>By virtue of the local environmental ambient conditions there is a very limited requirement for humidification, but as there is a tight relative humidity control band in the Lithography areas, humidification capability has been incorporated.<br><br>The Air Handling unit plant has been designed for continuous operation, 24 hours per day, contamination controlled environment conditions is achieved subject to appropriate working protocols and routine preventative maintenance. |
| 2.0 | **Air Handling Unit plant :**<br><br>The Air Handling Unit (AHU) Plant is located on Roof Top of the Utility Building. Make up fresh air is appropriately pre-treated to take account of the prevailing hot and dusty local ambient conditions.<br><br>The Air Handling Unit(AHU) Plant will incorporate:<br>• Pre filter – G4.<br>• Chilled water cooling/dehumidification coil.<br>• VFD controlled duty/standby supply fan.<br>• Rigid bag filter – F9.<br>• HEPA filter – H13.<br>• Heating coils. |
| 3.0 | **Make up air distribution :**<br><br>Make up air is distributed from Roof Top vertically down the face of the Utility Building, connecting into the underground, cast concrete make up air trench. |

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| | At the foot of the Nano-fab Cleanroom parent building the make-up air distribution duct is transformed to a fabricated galvanised steel vertical riser duct and run up the southeastern side of the building.<br><br>The riser is turned through $90^0$ and entered the upper ground floor level beneath the perimeter beam. The duct is then transformed as it passes into the plenum perimeter walkway and enters the supply plenum (headroom should be restricted).<br><br>In the supply plenum the makeup air hea der duct is split and distributed along the two outer walls above the return air chases. Make up air should be delivered into the return air chases where it is mixed with the return air volume. |
| 4.0 | **Process Exhaust Systems :**<br><br>Process exhaust ductwork has been distributed through the supply plenums, with capped off terminal spigots being provided which has been hooked up to process tools.<br><br>The process exhaust ducts exit the parent building through the southeastern facade in the upper ground floor level.<br><br>The ductwork is then turn vertically through $90_0$ and run up the side of the building through past first and second floor levels, turning through $90_0$ to make its way across the parent building roof to the extract fan plinths and exhaust system scrubbers.<br><br>**Process Exhaust systems will comprise of:**<br><br>**i. General Exhaust.**<br><br>General exhaust serves the Cleanroom process areas, comprising:<br>• GI ductwork, associated ancillaries and fan blower.<br>• There is a stand by motor/blower driven by VFD<br><br>**ii. a) Wet Exhaust.**<br><br>Wet exhaust serves the wet benches in the Wet Etch area and the Lithography areas, comprising:<br><br>• Polypropylene (PP) acid/alkali exhausts ductwork, associated ancillaries and fan blower.<br>• There is a stand by motor/blower driven by VFD.<br><br>**b) Wet Scrubber :**<br><br>Wet scrubber is located externally on a plinth on the top floor of the Nanofab Cleanroom parent building. The exhaust system scrubbers serve acid and solvent wet benches and semiconductor process tools.<br><br>The wet exhaust system scrubbers should be aqueous, being dosed with a reagent solution to neutralise the fumes being exhausted to atmosphere and should contain the following elements:<br>• A saturation chamber.<br>• Scrubbing vessel.<br>• Entrainment separator or mist eliminator.<br>• Recirculation pumping system.<br>• Exhaust stacks system.<br><br>**iii. Dry Exhaust.**<br><br>Dry exhaust serves the Diffusion, Deposition & Dry Etch areas, comprising: |

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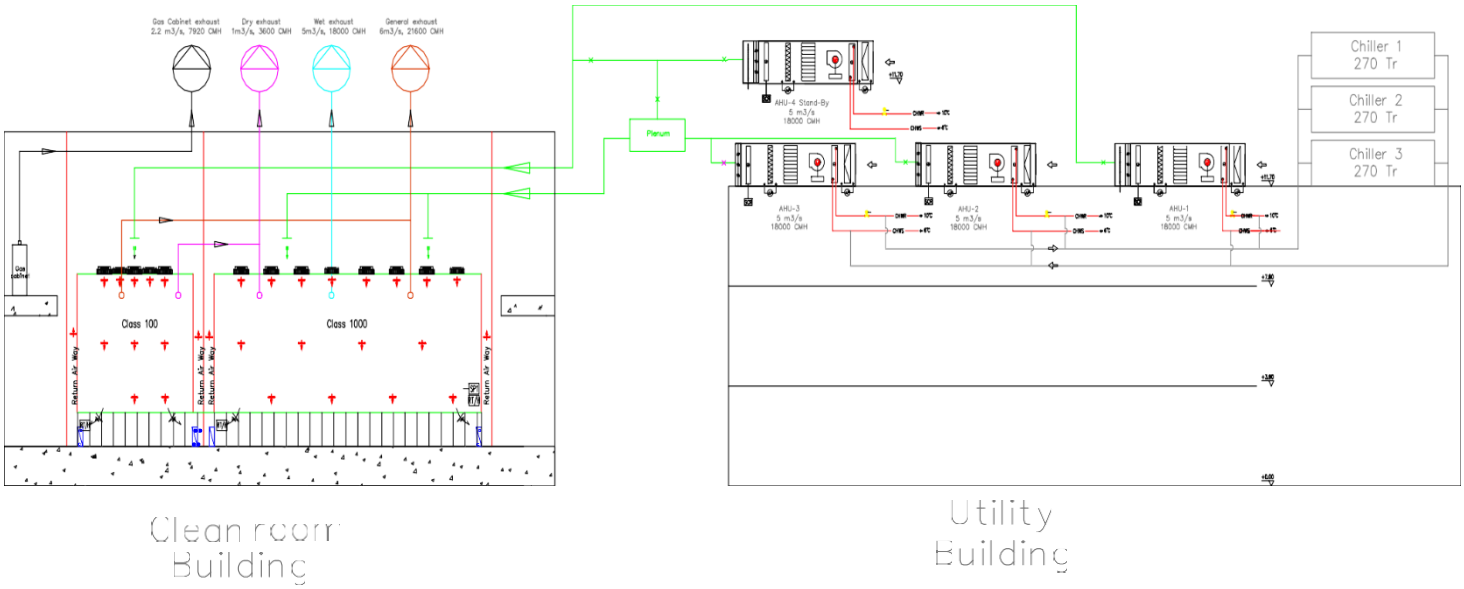
| | • Stainless steel exhaust ductwork, associated ancillaries and fan.<br>• There is a stand by motor/blower driven by VFD.<br><br>**iv. Gas cabinet Exhaust.**<br><br>Gas cabinet exhaust system serves the<br>Gas cylinder housing cabinets , comprising:<br>• GI ductwork, associated ancillaries and fan blower.<br>• There is a stand by motor/blower driven by VFD. |

## Annexure 2

### P & ID of Existing HVAC system of NNFC (Cleanroom)



## Annexure 3

AHUs and Exhaust system capacities.

| AHU & Exhaust system | Current Capacity in CMH | Requirement in CMH |
|---|---|---|
| | | |
| General Exhaust | 22000 | 22000 |
| Wet exhaust | 10000 | 20656 |
| Dry exhaust | 3500 | 7600 |
| Gas cabinet Exhaust | 8000 | 8000 |
| **Total** | **43500** | **58256** |
| | | |
| | | |
| AHU 1 | 18000 | 18000 |
| AHU 2 | 18000 | 18000 |
| AHU 3 | 18000 | 18000 |
| AHU for Gas cabinets(proposed) | 0 | 18000 |
| **Total** | **54000** | **72000** |