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Standard Operating Procedure for

## MAU Particle Filter Monitoring at NY CREATES' Albany NanoTech Complex

**REVISION**

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1	DCN3831	Initial release	July 2024	Prasanna Loganatha	Claire Lukasiewicz

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## 1 PURPOSE AND SCOPE

The purpose of this document is to establish a robust control limit for Differential Pressure (DP) at Makeup Air Unit (MAU) particle filters and to determine the frequency of replacement and lifetime of particle filters.

Differential Pressure (DP) above the control limit is just being an early signaling of particle filters deteriorated. The replacement strategy of particle filters solely based on cleanroom particle performance either the cleanroom particle counts worsen than normal or doesn't meet the ISO 14644-1 standard.

The locations of DP reading monitor at pre (30%), primary (60%), final (95%) and HEPA (99.97%) filters DP gauge meters located at MAU.

The procedures described herein apply to those buildings located on the Albany NanoTech Complex, which include NanoFab South (NFS), NanoFab South Extension (NFSX) NanoFab Central (NFC), NanoFab North (NFN) and NanoFab Xtension (NFX).

This procedure is for manual DP monitoring at the unit of Inches WC.

## 2 DEFINITIONS & ACRONYMS

- 2.1 **Action Level** – A limit that, when exceeded, requires immediate intervention and/or corrective action.
- 2.2 **Alert Level** – Early warning of a drift condition that, when exceeded, should result on increased attention to the MAU particle filters.
- 2.3 **Differential Pressure (DP)** – The difference in pressure between two points of a system, such as between the inlet and outlet of a filter.
- 2.4 **Heating, Ventilation, and Air Conditioning (HVAC)** – System that regulates and moves heated and cooled air throughout a building.
- 2.5 **High Efficiency Particulate Air (HEPA)** – A type of air filter that can remove at least 99.97% of any airborne particles with a size of 0.3(µm).
- 2.6 **Inches of Water Column (WC)** – Non-SI Unit of pressure.
- 2.7 **International Organization for Standardization (ISO)** – As referenced in this document, ISO14644-1 specifies classes of air cleanliness in terms of the number of particles expressed as a concentration in air volume.

- 2.8 **Makeup Air Unit (MAU)** – Units are designed to provide a building with tempered fresh air, both heated and cooled, to offset air that is exhausted by other mechanical means.
- 2.9 **Monitoring** – Observations made by measurements taken in accordance with a defined method and plan to provide evidence of the performance of an installation.
- 2.10 **NFC** – NanoFab Central
- 2.11 **NFN** – NanoFab North
- 2.12 **NFS** – NanoFab South
- 2.13 **NFSX** – NanoFab South Extension
- 2.14 **NFX** – NanoFab Xtension
- 2.15 **Pressure Gauge (PG)** – Devices that measure the internal pressure of media within a system.
- 2.16 **Test** – A procedure that is undertaken in accordance with a defined method to determine the performance of an installation.

### **3 RESPONSIBILITIES**

#### **3.1 Heating, Ventilation, and Air Conditioning (HVAC) Support Team Supervisors**

HVAC Support Team Supervisor shall:

- Provide their employees with all of the safety requirements of their jobs, including but not limited to: personal protective equipment requirements and availability, the location and use of Safety Data Sheets, and all appropriate emergency procedures.
- Effectively implement Hazard communication activities in the line level.

#### **3.2 HVAC Support Team Technicians**

HVAC Support Team Technicians shall:

- Take the DP readings on a Quarterly basis at the predetermined locations on appropriate building as MAUs listed.
- Notify reading that are above action level to Facilities HVAC Supervisor/Mechanical/Contamination Control Engineer.
- Maintain records for all DP readings.

### 3.3 HVAC Supervisor/Mechanical/Contamination Control Engineer

HVAC Supervisor/Mechanical/Contamination Control Engineer shall:

- Assist the HVAC support team technician when there are questions about DP reading and instrument etc.
- Provide training to take the readings to HVAC support team technician, when needed.
- Perform investigative DP reading out of spec and will provide the investigation results with necessary solutions.

## 4 EQUIPMENT

- Differential pressure meter gauge
- Particle filters (Pre 30%, Primary 60%, Final 95% and High Efficiency Particulate Air (HEPA) 99.97%)
- Printed log sheet paper

## 5 SAFETY

Do not open the MAU doors while operating in high pressure condition. Use the proper ladder or support to climb when the MAU pressure gauge meter located above the human height level.

## 6 PROCEDURE – DIFFERENTIAL PRESSURE MEASUREMENT

This procedure is for manual reading at MAU location only. DP monitoring will be Inches of Water Column (WC) and the reading is displayed in MAU pressure gauge at real time.

### 6.1 Differential Pressure Monitoring

- 1) Prior to take the reading, print the log sheet which has filled with all the information of fab, filter and MAU, etc.
- 2) Check the operating condition of the MAU.
- 3) Take the reading of the pressure gauge (PG) mounted at the MAU wall side. There is a dedicated PG located for each filter types.
- 4) Fill all the information measurement date, who measured, and PG readings.

- 5) Compile all the information into an Excel sheet and forward to the HVAC Supervisor/Mechanical/Contamination Control Engineer for review.

## **6.2 Out-of-Spec Condition**

When there is a DP out of Spec condition, these are the checks to be followed to verify the filter condition.

- 1) Spot check particle filter has any clogging, wear and tear, more wet and any loose fitting with grills.
- 2) Verify the particle filter installation and expiration date.
- 3) Check the particle performance in the cleanroom locations if any baseline changes or doesn't meet the ISO14644-1 standards.
- 4) If there is no impact on cleanroom particle performance, closely monitor the DP readings continuously. If it is repeatedly DP reading out of spec, the HVAC Supervisor/Mechanical Contamination Control Engineer will investigate the cause.
- 5) If cleanroom locations' particle baselines drift or don't meet the International Organization for Standardization (ISO) 14644-1 standards, it needs immediate action from the HVAC Supervisor/Mechanical Contamination Control Engineer to initiate the particle filter replacement process or containment action.

## **7 RECORDS**

All the DP data recorded in an Excel sheet and saved in folder V:\FOG Shared Access\HVAC\MAU Particle Filters Differential Pressure Monitoring