Report By:

National TAB
1329 E. KEMPER ROAD
SUITE 4210
CINCINNATI, OH 45246

NATIONAL TAB

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Report: **WWTP - Manhattan, KS: Airnetic FPT**
Function: **Commissioning**
Date: **7/14/2022**

PROJECT

Wastewater Treatment Plant (Manhattan, KS)

None listed

Manhattan, KS 66555

Client

Heartland Oxygen Systems
6441 Vista Dr

Shawnee, KS 66218

National TAB

Project: Wastewater Treatment Plant (Manhattan, KS)

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Project Summary

Introduction

The purpose of the visit to the Wastewater Treatment facility in Manhattan KS was to evaluate a dual A-20 Airnetic system that has had numerous ATF failures. The scope of the testing included an evaluation of the building environment, temperature measurements, and airflow measurements.

Building Environment

The pump room is a small building with concrete walls and there did not appear to be any additional insulation. There are water pipes in the room that enter and leave through the ground of the building. The dual A-20 unit is on an exterior wall and exhausts spent air out the side of the building via a wall louver. The oxygen from the unit is then discharged directly into the pipes to treat the water.

The room is served by a self-contained 3 ton AC unit with electric heat. The unit also has an outside air intake that was cracked open. It is mounted on an exterior wall opposite of the Airnetic unit. The thermostat for this unit is a non-programmable type. It was found set to 74 degrees and was according to the stat, maintaining this temperature. It was also set to Fan Auto.

The actual temperature in the room was initially measured as 77.9 F / 74% RH indicating that the thermostat is about 3 degrees off from thermostat sensor. Turned the thermostat down to 70 degrees to account for this difference and also help with dehumidifying the space. The space temperature was retaken after the unit ran for approximately 15 minutes as 73.5 F / 74% RH.

Temperatures were taken at the AC unit during cooling as:
Return air grille: 73.5 F / 74% RH
Outside air intake: 101 F / 52.4% RH
Outside air in the shade: 88.4 F / 62.9% RH
Discharge: 66.3 F / 83% RH

A significant increase in outside air (OA) temperature was noted between the actual temperature of at the OA intake vs the shade. The condenser for the AC unit is located very close to the outside air intake and this hot air is being re-entrained back into the outside air intake and reducing cooling performance since the unit has to remove additional sensible heat before it can remove latent heat (i.e., humidity).

The pipes in the space were found to have condensation upon arrival. This condensation when it evaporates will increase humidity in the air. The dewpoint of the room air is around 61 degrees which means the pipe is at or below this temperature. The dewpoint in the room will need to be decreased to reduce condensation.

Airnetic Unit Evaluation

Upon arrival the Airnetic unit was found running. Duct traverse measurements were taken at the top and bottom units and airflow was measured as 119 CFM and 199 CFM, respectively. 200 CFM is required for each unit and so the top unit is deficient in airflow. Discharge temperature measurements were taken at each unit with an in-duct psychrometer. The top unit was measured as 96.2 F and 43.2% RH and the bottom unit as 94.5 F and 43.4% RH. The higher temperature on the top unit is evidence that the airflow is lower as was measured.

The duct installation appears to be restricting the airflow. Recommend the duct out of the top unit transition in size from 7” diameter to 8” diameter similar to the bottom unit. Also recommend that one of the two 90 degree fittings above the Airnetics units be eliminated. This could be done by

either moving the unit to the left so that the main duct running vertically is directly under the wall penetration. Or, a new penetration could be made to the right of the current penetration so that only one 90 degree transition is required (vertical to horizontal transition).

Verified that the louver on the side of the building was free of obstruction and that the free area was adequate.

A rotating vane was used to measure velocity at each inlet grille. The airflow was found to be equally distributed between each grille.

Final Findings/Recommendations:

1. Recommend closing off the outside air intake for the self-contained unit to prevent re-entrainment of the hot condenser air and increasing the latent heat performance of the unit.
2. Recommend that the thermostat be left at 70 degrees to reduce the humidity in the room and for better ambient air temperatures.
3. Recommend a portable dehumidifier be installed and set for 65% RH
4. Rework ductwork to improve airflow through each Airnetic unit. Recommend the duct out of the top unit transition in size from 7” diameter to 8” diameter similar to the bottom unit. Also recommend that one of the two 90 degree fittings above the Airnetics units be eliminated. This could be done by either moving the unit to the left so that the main duct running vertically is directly under the wall

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Wastewater Treatment Plant (Manhattan, KS)

CheckList Information

Name :	Oxygen Concentrator Checklist	**Status :**	NotSubmitted
Assigned Organization :	National TAB	**Asset :**	
Requesting Organization :	National TAB		

CheckList Item Details

ROOM CONDITIONS & HVAC	
Room DB temperature and Relative Humidity (RH)	77.9 / 74% RH. The thermostat temp sensor calibration is off. Thermostat setpoint is 74 and it was sensing temperature of 74.
Return DB temperature and Relative Humidity (RH)	73.5 F / 74% RH
AC supply Temperature when unit is in full cooling	66.3 F / 83% RH
Outside air temperature and humidity	88.4 F / 62.9% RH in the shade. 101 F / 52.4% RH by the AC outside air intake. The hot air from the condenser fan is being re-entrained at times through the outside air intake.
Room Thermostat Setpoint (As found)	77 Deg F (Actual setpoint was 74)
Room Thermostat Setpoint (As left)	74 Deg F (Actual setpoint was 70)
Room Thermostat/sensor Calibration offset	Thermostat reads +3 degree's lower than actual room temperature. Therefore the actual room temperature is 3 degree's higher than the thermostat display indicates
TOP UNIT	
Exhaust Air Stream Temperature and Humidity	96.2 F, 43.2% RH
Cabinet Temperature Profile	88 degree surface temp, 94 degree discharge duct surface temp (measured with infrared camera)
Design Exhaust Air flow (CFM)	200 CFM
Actual Exhaust Air flow (CFM)	119 CFM
BOTTOM UNIT	
Exhaust Air Stream Temperature and Humidity	94.5 F, 43.4% RH

Cabinet Temperature Profile	86 degree surface temp, 90.5 degree discharge duct surface temp (measured with infrared camera)
Design Exhaust Air flow (CFM)	200 CFM
Actual Exhaust Air flow (CFM)	199 CFM
Static Pressure Profile	
Bottom fan discharge	0.53" wc
Top discharge	0.35" wc
Main discharge (after top fan transition)	0.27" wc

Notes/Comments :

Room had condensate on the floor under the water pipe due to condensation forming and dripping. Highly suggest adding a dehumidifier to the space and set below 65% RH.

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CheckList Information

Name :	Pictures	**Status :**	NotSubmitted
Assigned Organization :	National TAB	**Asset :**	
Requesting Organization :	National TAB		

CheckList Item Details

BUILDING

IMG_8538.JPEG

IMG_8558.JPEG

IMG_8537.JPEG

BUILDING

IMG_8564.JPEG

IMG_8559.JPEG

IMG_8563.JPEG

AIRNETIC UNIT

IMG_8549.JPEG

IMG_8550.JPEG

IMG_8548.JPEG

AIRNETIC UNIT

IMG_8552.JPEG

IMG_8560.JPEG

IMG_8561.JPEG

AC UNIT

IMG_8542.JPEG

IMG_8546.JPEG

IMG_8541.JPEG

Notes/Comments :

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