

- 1. Read the *IAQ Backgrounder* and the Background Information for this checklist.
- 2. Keep the Background Information and make a copy of the checklist for future reference.
- 3. Complete the Checklist.
 - Check the "yes," "no," or "not applicable" box beside each item. (A "no" response requires further attention.)
 - Make comments in the "Notes" section as necessary.
- Return the checklist portion of this document to the IAQ Coordinator.

Building and Grounds Maintenance Checklist

Name:	Stephen	Marton		
School:	Amity	Middle Sch	ool Orange	
Room or	Area: Buil	ding wide	Date Completed:	1-12-24
Signatur	e: Aly	Alto		

Yes No N/A

1. BUILDING MAINTENANCE SUPPLIES

	Developed appropriate procedures and stocked supplies for spill control		Ò
	Reviewed supply labels		
	Ensured that air from chemical and trash storage areas vents to the outdoors \not		۵
	Stored chemical products and supplies in sealed, clearly labeled containers		
	Researched and selected the safest products available		
	Ensured that supplies are being used according to manufacturers' instructions		
	Ensured that chemicals, chemical-containing wastes, and containers are disposed of according to manufacturers' instructions	D	
1h.	Substituted less- or non-hazardous materials (where possible)		
1i.	Scheduled work involving odorous or hazardous chemicals for periods when the school is unoccupied $\not \Delta$		
1j.	Ventilated affected areas during and after the use of odorous or hazardous chemicals		
		-	-
2.	GROUNDS MAINTENANCE SUPPLIES	-	9
2a.	GROUNDS MAINTENANCE SUPPLIES Stored grounds maintenance supplies in appropriate area(s)		۔ لع
2a. 2b.	GROUNDS MAINTENANCE SUPPLIES Stored grounds maintenance supplies in appropriate area(s)		_
2a. 2b.	GROUNDS MAINTENANCE SUPPLIES Stored grounds maintenance supplies in appropriate area(s)		_
2a. 2b. 2c.	GROUNDS MAINTENANCE SUPPLIES Stored grounds maintenance supplies in appropriate area(s)		p p
2a. 2b. 2c.	GROUNDS MAINTENANCE SUPPLIES Stored grounds maintenance supplies in appropriate area(s) Ensured that supplies are used and stored according to manufacturers' instructions Established and followed procedures to minimize exposure to fumes from supplies		d d d d
2a. 2b. 2c. 2d.	GROUNDS MAINTENANCE SUPPLIES Stored grounds maintenance supplies in appropriate area(s)		
2a. 2b. 2c. 2d. 2e. 2f.	GROUNDS MAINTENANCE SUPPLIES Stored grounds maintenance supplies in appropriate area(s)		
2a. 2b. 2c. 2d. 2e.	GROUNDS MAINTENANCE SUPPLIES Stored grounds maintenance supplies in appropriate area(s)		

3. DUST CONTROL

3a.	Installed and maintained barrier mats for entrances	
3b.	Used high efficiency vacuum bags	
3c.	Used proper dusting techniques	
3d.	Wrapped feather dusters with a dust cloth	
3e.	Cleaned air return grilles and air supply vents	

4. FLOOR CLEANING

4.	FLOOR CLEANING	Yes	No	N/A	
4a.	Established and followed schedule for vacuuming and mopping floors	🗹			
4b.	Cleaned spills on floors promptly (as necessary)	Ø			
4c.	Performed restorative maintenance (as necessary)	⊅			

5. DRAIN TRAPS

5a.	Poured water down floor drains once per week (about 1 quart of water) 💋	
5b.	Ran water in sinks at least once per week (about 2 cups of water)	
5c.	Flushed toilets once each week (if not used regularly)	

6. MOISTURE, LEAKS, AND SPILLS

6a.	Checked for moldy odors	
6b.	Inspected ceiling tiles, floors, and walls for leaks or discoloration (may indicate periodic leaks)	۵
6c.	Checked areas where moisture is commonly generated (e.g., kitchens, locker rooms, and bathrooms)	
6d.	Checked that windows, windowsills, and window frames are free of condensate	
6e.	Checked that indoor surfaces of exterior walls and cold water pipes are free of condensate	
6f.	Ensured the following areas are free from signs of leaks and water damage:	
	Indoor areas near known roof or wall leaks	
	Walls around leaky or broken windows	
	Floors and ceilings under plumbing	
	Duct interiors near humidifiers, cooling coils, and outdoor air intakes	

7. COMBUSTION APPLIANCES

7a.	Checked for odors from combustion appliances	
	Checked appliances for backdrafting (using chemical smoke)	
7c.	Inspected exhaust components for leaks, disconnections, or deterioration	
7d.	Inspected flue components for corrosion and soot	
	PEST CONTROL	
8a.	Completed the Integrated Pest Management Checklist	



NOTES



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Waste Management Checklist

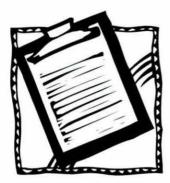
Name:	Stephen	Martoni	
School:	Amity	Middle	School Orange
Room or	Area: Buil	ding with	e Date Completed:
Signature	e:		

1. WASTE MANAGEMENT

Yes No N/A

1a.	Ensured that waste containers are appropriate for use (for example, food waste containers should have lids)	
1b.	Ensured that waste containers are lined	
lc.	Ensured that waste from art, science, vocational classes, etc., are	
	handled separately	
1d.	Labeled recycling bins clearly	
1e.	Ensured number of bins and dumpsters is adequate	
1f.	Ensured appropriate location of dumpsters (i.e., away from air intakes,	
	doors, and operable windows in relation to prevailing winds)	
lg.	Ensured waste containers are emptied regularly	
1h.	Ensured appropriate waste removal schedule	
li.	Ensured waste is stored in a well-ventilated room	
1j.	Ensured any exhaust fans in the room are operating properly	
1k.	Checked waste storage areas for odors, contaminants, or signs of vermin	

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Walkthrough Inspection Checklist

Name:	Stephen	Martoni			
School:	Amity	Middle	School	Oronge	
Room or	Area: Area	lding wide	2 Dat	e Completed:	1-12-24
	e: A				

Yes No N/A

1. GROUND LEVEL

la.	Ensured that ventilation units operate properly	
1b.	Ensured there are no obstructions blocking air intakes	
1c.	Checked for nests and droppings near outdoor air intakes	
1d.	Determined that dumpsters are located away from doors, windows, and outdoor air intakes	
le.	Checked potential sources of air contaminants near the building (chimneys, stacks, industrial plants, exhaust from nearby buildings)	
1f.	Ensured that vehicles avoid idling near outdoor air intakes	
1g.	Minimized pesticide application	
1h.	Ensured that there is proper drainage away from the building (including roof downspouts)	
li.	Ensured that sprinklers spray away from the building and outdoor air intakes	ø
1j.	Ensured that walk-off mats are used at exterior entrances and that they are cleaned regularly	

2. ROOF

While on the roof, consider inspecting the HVAC units (use the Ventilation Checklist).

Ensured that the roof is in good condition		
Checked for evidence of water ponding		
Checked that ventilation units operate properly (air flows in)		
Ensured that exhaust fans operate properly (air flows out)		
Ensured that air intakes remain open, even at minimum setting		
Checked for nests and droppings near outdoor air intakes		
Ensured that air from plumbing stacks and exhaust outlets flows away from outdoor air intakes		
	Checked for evidence of water ponding	Checked for evidence of water ponding

3. ATTIC

 3a. Checked for evidence of roof and plumbing leaks
 Image: Checked for evidence of roof and plumbing leaks

 3b. Checked for birds and animal nests
 Image: Checked for evidence of roof and plumbing leaks

4. GENERAL CONSIDERATIONS

4a. Ensured that temperature and humidity are maintained within acceptable ranges
4b. Ensured that no obstructions exist in supply and exhaust vents
4c. Checked for odors
4d. Checked for signs of mold and mildew growth

4. GENERAL CONSIDERATIONS (continued)

4. GENERAL CONSIDERATIONS (continued)	Yes	No	N/A	
4e. Checked for signs of water damage	Þ			
4f. Checked for evidence of pests and obvious food sources	Z			
4g. Noted and reviewed all concerns from school occupants	p			

5. BATHROOMS AND GENERAL PLUMBING

5a.	Ensured that bathrooms and restrooms have operating exhaust fans	
5b.	Ensured proper drain trap maintenance:	
	Water is poured down floor drains once per week (approx. 1 quart of water)	
	Water is poured into sinks at least once per week (about 2 cups of water)	
	Toilets are flushed at least once per week	

6. MAINTENANCE SUPPLIES

6a.	Ensured that chemicals are used only with adequate ventilation and when building is unoccupied		
6b.	Ensured that vents in chemical and trash storage areas are operating properly		
6c.	Ensured that portable fuel containers are properly closed		
6d.	Ensured that power equipment, like snowblowers and lawn mowers, have been serviced and maintained according to manufacturers' guidelines	Q	

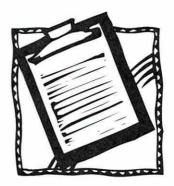
7. COMBUSTION APPLIANCES

7a.	Checked for combustion gas and fuel odors	
7b.	Ensured that combustion appliances have flues or exhaust hoods	
7c.	Checked for leaks, disconnections, and deterioration	
7d.	Ensured there is no soot on inside or outside of flue components	

8. OTHER

8a.	Checked for peeling and flaking paint (if the building was built before	
	1980, this could be a lead hazard)	
	Determined date of last radon test	

NOTES





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Integrated Pest Management Checklist

Name:	Stephen	Marton		
School:	Amity	Middle School	Oronge	
Room or	Area: Bo	ilding wide	-Date Completed:	1-1224
Signatur	e: \$ 2	A		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

1. OFFICIAL POLICY STATEMENT

			10.000
1a.	Developed or located the school's official policy statement for integrated	,	
	pest management (IPM)	Ø	

Yes No N/A

2. DESIGNATING PEST MANAGEMENT ROLES

2a. Assigned and trained a qualified person to be the pest manager 2b. Involved decision makers in the IPM program 2c. Educated students and staff (the occupants of the building) about IPM and asked them to keep their areas clean and free of clutter 2d. Encouraged parents to learn about IPM practices and implement them at home Z 2e. Developed a program to educate and train all IPM participants 2f. Included language about IPM into contracts with pest management

3. SETTING PEST MANAGEMENT OBJECTIVES

3a.	Set appropriate pest management objectives for school buildings (such as preventing pests from interfering with students' learning environment	
	and preserving the integrity of the building structure)	
3b.	Set appropriate pest management objectives for school grounds (such as providing safe plaving areas and the best athletic surfaces possible)	

4. INSPECTING, IDENTIFYING, AND MONITORING

4a.	Inspected all buildings and grounds for pest evidence, entry points, food, water, and harborage sites		
4b.	Identified potential pest habitats in buildings and grounds		
4c.	Pinpointed the source of any current pest problems		
4d.	Monitored to determine the extent of pest problems and to estimate pest populations		
4e.	Developed plans to modify habitat (for example, exclusion, repair, and sanitation efforts) to prevent or resolve any pest problems		
4f.	Established a monitoring program that consists of routine inspections to estimate pest population levels and identify evidence of pests and potential habitat	П	
		_	

5. SETTING ACTION THRESHOLDS

5a.	Evaluated all available data obtained through inspecting, identifying,	Yes	No	N/A
	and monitoring	. 🗖		
5b.	Determined how many pests the school buildings, grounds, and			
	occupants can tolerate	. 🗖		
5c.	Set action thresholds	. 🗖		

6. PREVENTIVE STRATEGIES

INDOOR SITES

6a. Implemented appropriate strategies to prevent pests from inhabiting the following areas:

• Entryways	
• Classrooms	
• Gymnasiums	
• Locker rooms	
• Offices	
• Staff lounges	
• Bathrooms	
• Food preparation and serving areas	
• Rooms with extensive plumbing	
• Maintenance areas	
• Other	

OUTDOOR SITES

6b. Implemented appropriate strategies to prevent pests from inhabiting the following areas:

• Playgrounds	8
Parking lots	
• Lawns and athletic fields	
• Teaching gardens or greenhouses	
• Loading docks	
• Dumpsters	
• Areas with ornamental shrubs and trees	
• Other	

7. PESTICIDE USE AND STORAGE

7a.	Explored alternative pest management methods before concluding that pesticides were necessary	
7b.	Ensured that pest management professionals integrate IPM into their pest management methods	D
7c.	Identified the least toxic, target-specific chemical (or pesticide formulation) that is the most effective to address the pest problem, preferably as baitsand granules	
7d.	Reviewed and followed all label instructions on pesticides and learned how to properly apply and handle these chemicals	Q
7e.	Used spot-treatment (or bait, crack, and crevice applications) to apply pesticides whenever possible and only treated the obviously infested	-
70	plants in the area	
7f.	Used protective clothing or equipment when applying pesticides	A
/g.	Placed all pesticides in tamper-resistant bait boxes or locations that are inaccessible to children and non-target species	S.





7. PESTICIDE USE AND STORAGE (cont.)

7h.	Locked or fastened lids of all bait boxes and placed bait away from the runway of the box		No	N/A
7i.	Applied pesticides when occupants were not present or in areas where they would not be exposed to the chemicals	ſ		
7j.	Ensured that school occupants (students and staff) are notified of upcoming pesticide applications through posted notices and/or letters	ſ		
7k.	Ensured that parents are notified of upcoming pesticide applications through letters	í		
71.	Kept copies of current pesticide labels and information on pesticides easily accessible	٢		
7m.	Stored pesticides off site or in areas that are locked and accessible only to designated personnel	/		
7n.	Ensured that storage areas are adequately ventilated and are located away from areas prone to flooding or where spills or leaks may contaminate the environment		П	П
70.	Ensured that flammable liquids are stored away from ignition sources			
	Ensured that pesticides are stored in their original containers and all lids are securely fastened			ø
7q.	Ensured that air in the storage space cannot mix with the air in the central ventilation system	i		Ē
8.	EVALUATING RESULTS AND RECORD KEEPING			
8a.	Ensured that accurate, up-to-date records of IPM practices and a pest management log for each property are kept	(

	management log for each property are kept	
8b.	Ensured that pesticide records necessary to meet all state, local, and school board requirements are maintained	
8c.	Ensured that each log book contains the following items:	
	• Copy of the pest management plan	
	• Service schedules for maintenance of buildings and grounds	
	• Current EPA-registered labels	
	• Current Material Safety Data Sheets (MSDS) for each pesticide project	
	Pest surveillance data sheets	
	• Diagram noting the location of pest activity, traps, and bait stations	

NOTES NO pesticides stored in District. The District uses a

Pest Monagement Company, Monthly inspections



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Food Service Checklist

Theresa Lumas Name: Amity Middle School - Orange a: _______ Date Completed: _______ School: Room or Area: eresa Lumas Signature:

1. COOKING AREA

la.	Determined that local exhaust fans operate properly (note if fans are excessively noisy)	s	No	N/A
1b.	Checked for odors near cooking, preparation, and eating areas	4		
1c.	Ensured that exhaust fans are used whenever cooking, washing dishes, and cleaning	¢	D	
1d.	Determined that gas appliances function properly	Ľ		
1e.	Verified that gas appliances are vented outdoors	4		
1f.	Ensured there are no combustion gas or natural gas odors, leaks, back- drafting, or headaches when gas appliances are used	đ	D	
1g.	Ensured that kitchen is clean after use	x		
1 h.	Checked for signs of microbiological growth in the kitchen, including the upper walls and ceiling (for example, mold, slime, and algae)	4		
1i.	Selected biocides registered by EPA (if required), followed the manufacturer's directions for use, and carefully reviewed the			
	method of application	4		
lj.	Verified the kitchen is free of plumbing and ceiling leaks (signs include stains, discoloration, and damp areas)	£	D	۵

2. FOOD HANDLING AND STORAGE

2a.	Checked food preparation, cooking, and storage areas for signs of insects and vermin (for example, feces or remains)	
	Stored leftovers in well-sealed containers with no traces of food on outside surfaces	
2c.	Ensured that food preparation, cooking, and storage practices are sanitary	
2d.	Disposed of food scraps properly and removed crumbs	
	Cleaned counters with soap and water or a disinfectant (according to school policy)	
2f.	school policy) Swept and wet mopped floors	
3.	WASTE MANAGEMENT	
3a.	Selected and placed waste in appropriate containers	

3b. Ensured that containers' lids are securely closed M 3c. Separated food waste and food-contaminated items from other wastes, if possible <u>Recycle 15 Separated</u>
3d. Stored waste containers in a well-ventilated area X 3e. Ensured that dumpsters are properly located (away from air intake vents, operable windows, and food service doors in relation to

4. DELIVERIES

4.	DELIVERIES	Yes	No	N/A	
4a.	Instructed vendors to avoid idling their engines during deliveries	X		Ó	
4b.	Posted a sign prohibiting vehicles from idling their engines in receiving areas	. 🗆	Ø	D	J
4c.		X			



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- 1. Read the *IAQ Backgrounder* and the Background Information for this checklist.
- 2. Keep the Background Information and make a copy of this checklist for **each** ventilation unit in your school, as well as a copy for future reference.
- 3. Complete the Checklist.
 - Check the "yes," "no," or "not applicable" box beside each item. (A "no" response requires further attention.)
 - Make comments in the "Notes" section as necessary.
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Ventilation Checklist

Name:	Stephen Martoni
School:	Amity Middle School Orange
	tilator/AHU No:
Room or .	Area: Media Centel Date Completed: 1-25-24
Signature	si ty fto

1. OUTDOOR AIR INTAKES

1a.	Marked locations of all outdoor air intakes on a small floor plan (for Ye example, a fire escape floor plan)			
1b.	Ensured that the ventilation system was on and operating in "occupied" mode	,		
AC	TIVITY 1: OBSTRUCTIONS			
1c.	Ensured that outdoor air intakes are clear of obstructions, debris, clogs, or covers			
1d.	Installed corrective devices as necessary (e.g., if snowdrifts or leaves frequently block an intake)		ø	
AC	TIVITY 2: POLLUTANT SOURCES			
	Checked ground-level intakes for pollutant sources (dumpsters, loading docks, and bus-idling areas)	ľ		
1f.	Checked rooftop intakes for pollutant sources (plumbing vents; kitchen, toilet, or laboratory exhaust fans; puddles; and mist from air-conditioning cooling towers)	r		
1g.	Resolved any problems with pollutant sources located near outdoor air intakes (e.g., relocated dumpster or extended exhaust pipe)	/		
AC	TIVITY 3: AIRFLOW			,
	Obtained chemical smoke (or a small piece of tissue paper or light plastic). \Box	l.	a	
	Confirmed that outdoor air is entering the intake appropriately			
2.	SYSTEM CLEANLINESS			
	TIVITY 4: AIR FILTERS			
	Replaced filters per maintenance schedule	í.		
	Shut off ventilation system fans while replacing filters (prevents dirt from blowing downstream)	Ι.		
2c	blowing downstream)			
	Confirmed proper fit of filters to prevent air from bypassing (flowing around) the air filter			

2. SYSTEM CLEANLINESS (continued) **ACTIVITY 5: DRAIN PANS** Yes, No N/A 2f. Ensured that drain pans slant toward the drain (to prevent water from accumulating) 2g. Cleaned drain pans 2h. Checked drain pans for mold and mildew **ACTIVITY 6: COILS** 2i. Ensured that heating and cooling coils are clean **ACTIVITY 7: AIR-HANDLING UNITS, UNIT VENTILATORS** 2i. Ensured that the interior of air-handling unit(s) or unit ventilator 2k. Ensured that ducts are clean **ACTIVITY 8: MECHANICAL ROOMS** 2m. Ensured that mechanical rooms and air-mixing chambers are free of trash, chemical products, and supplies 3. CONTROLS FOR OUTDOOR AIR SUPPLY 3a. Ensured that air dampers are at least partially open (minimum position) 3b. Ensured that minimum position provides adequate outdoor air for occupants **ACTIVITY 9: CONTROLS INFORMATION** 3c. Obtained and reviewed all design inside/outside temperature and humidity requirements, controls specifications, as-built mechanical drawings, and controls operations manuals (often uniquely designed) **ACTIVITY 10: CLOCKS, TIMERS, SWITCHES** 3e. Set time clocks appropriately Ø 3f. Ensured that settings fit the actual schedule of building use (including night/weekend use) **ACTIVITY 11: CONTROL COMPONENTS** 3g. Ensured appropriate system pressure by testing line pressure at both the occupied (day) setting and the unoccupied (night) setting Б 3h. Checked that the line dryer prevents moisture buildup 3i. Replaced control system filters at the compressor inlet based on the compressor manufacturer's recommendation (for example, when you blow down the tank)..... Ø 3j. Set the line pressure at each thermostat and damper actuator at the proper Ø level (no leakage or obstructions) **ACTIVITY 12: OUTDOOR AIR DAMPERS** 3k. Ensured that the outdoor air damper is visible for inspection 31. Ensured that the recirculating relief and/or exhaust dampers are visible for inspection 3m. Ensured that air temperature in the indoor area(s) served by each outdoor air damper is within the normal operating range

NOTE: It is necessary to ensure that the damper is operating properly and within the normal range to continue.





31	a. Checked that the outdoor air damper fully closes within a few minutes Yes No of shutting off appropriate air handler	N/A
30	b. Checked that the outdoor air damper opens (at least partially with no delay) when the air handler is turned on	
31	 If in heating mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 85°F 	₽ ∕
30	 If in cooling mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 60°F and mixed air thermostat is set to 45°F 	, ,
31	. If the outdoor air damper does not move, confirmed the following items:	1
	• The damper actuator links to the damper shaft, and any linkage set screws or bolts are tight	
	• Moving parts are free of impediments (e.g., rust, corrosion)	
	• Electrical wire or pneumatic tubing connects to the damper actuator	
	The outside air thermostat(a) is functioning properly (e.g. in the right t	

The outside air thermostat(s) is functioning properly (e.g., in the right location, calibrated correctly).....

Proceed to Activities 13-16 if the damper seems to be operating properly.

ACTIVITY 13: FREEZE STATS

3s.	Disconnected power to controls (for automatic reset only) to test continuity across terminals		ø
OR			,
3t.	Confirmed (if applicable) that depressing the manual reset button (usually red) trips the freeze stat (clicking sound indicates freeze stat was	_	_
	tripped)	Ч	Ц
3u.	Assessed the feasibility of replacing all manual reset freeze-stats with automatic reset freeze-stats	ø	

NOTE: HVAC systems with water coils need protection from the cold. The freeze-stat may close the outdoor air damper and disconnect the supply air when tripped. The typical trip range is $35^{\circ}F$ to $42^{\circ}F$.

ACTIVITY 14: MIXED AIR THERMOSTATS

3v.	Ensured that the mixed air stat for heating mode is set no higher than 65°F	
3w.	Ensured that the mixed air stat for cooling mode is set no lower than the room thermostat setting	

ACTIVITY 15: ECONOMIZERS

3x.	Confirmed proper economizer settings based on design specifications or		
	local practices	3⁄ 🗅	

NOTE: The dry-bulb is typically set at 65°F or lower.

- 3y. Checked that sensor on the economizer is shielded from direct sunlight \square \square \square

NOTE: Economizers use varying amounts of cool outdoor air to assist with the cooling load of the room or rooms. There are two types of economizers, dry-bulb and enthalpy. Dry-bulb economizers vary the amount of outdoor air based on outdoor temperature, and enthalpy economizers vary the amount of outdoor air based on outdoor temperature and humidity level.

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C

ACTIVITY 16: FANS

3aa. Ensured that all fans (supply fans and associated return or relief fans)			
that move outside air indoors continuously operate during occupied	Yes	∕No	N/A
hours (even when room thermostat is satisfied)	🗹		

NOTE: If fan shuts off when the thermostat is satisfied, adjust control cycle as necessary to ensure sufficient outdoor air supply.

4. AIR DISTRIBUTION

ACTIVITY 17: AIR DISTRIBUTION

4a. Ensured that supply and return air pathways in the existing ventilation system perform as required	
4b. Ensured that passive gravity relief ventilation systems and transfer grilles between rooms and corridors are functioning	
NOTE: If ventilation system is closed or blocked to meet current fire codes, consult with a professional engineer for remedies.	
4c. Made sure every occupied space has supply of outdoor air (mechanical system or operable windows)	
4d. Ensured that supply and return vents are open and unblocked \Box	

NOTE: If outlets have been blocked intentionally to correct drafts or discomfort, investigate and correct the cause of the discomfort and reopen the vents.

4e.	Modified the HVAC system to supply outside air to areas without an outdoor air supply	a	
4f.	Modified existing HVAC systems to incorporate any room or zone layout and population changes	D	
4g.	Moved all barriers (for example, room dividers, large free-standing blackboards or displays, bookshelves) that could block movement of air in the room, especially those blocking air vents	ū	⊿
4h.	Ensured that unit ventilators are quiet enough to accommodate classroom activities		
4i.	Ensured that classrooms are free of uncomfortable drafts produced by air from supply terminals	۵.	

ACTIVITY 18: PRESSURIZATION IN BUILDINGS

NOTE: To prevent infiltration of outdoor pollutants, the ventilation system is designed to maintain positive pressurization in the building. Therefore, ensure that the system, including any exhaust fans, is operating on the "occupied" cycle when doing this activity.

4j.	Ensured that air flows out of the building (using chemical smoke) through		,
	windows, doors, or other cracks and holes in exterior wall (for example,	/	/
	floor joints, pipe openings)	ď	Ľ.

5. EXHAUST SYSTEMS

ACTIVITY 19: EXHAUST FAN OPERATION

5a. Checked (using chemical smoke) that air flows into exhaust fan grille(s) \Box

If fans are running but air is not flowing toward the exhaust intake, check for the following:

- Inoperable dampers
- Obstructed, leaky, or disconnected ductwork
- Undersized or improperly installed fan
- Broken fan belt



·



5. EXHAUST SYSTEMS (continued)

ACTIVITY 20: EXHAUST AIRFLOW

NOTE: Prevent migration of indoor contaminants from areas such as bathrooms, kitchens, and labs by keeping them under negative pressure (as compared to surrounding spaces).

5b.			N/A
	adjacent spaces	¤	
		;	

Stand outside the room with the door slightly open while checking airflow high and low in the door opening (see "How to Measure Airflow").

ACTIVITY 21: EXHAUST DUCTWORK

6. QUANTITY OF OUTDOOR AIR

ACTIVITY 22: OUTDOOR AIR MEASUREMENTS AND CALCULATIONS

NOTE: Refer to "How to Measure Airflow" for techniques.

6a.	Measured the quantity of outdoor air supplied (22a) to each ventilation unit	ū	D
6b.	Calculated the number of occupants served (22b) by the ventilation unit under consideration	۵	Q
6c.	Divided outdoor air supply (22a) by the number of occupants (22b) to determine the existing quantity of outdoor air supply per person (22c)		
AC	TIVITY 23: ACCEPTABLE LEVELS OF OUTDOOR AIR QUANTITIES		
	COMPared the existing outdoor air per person (22c) to the recommended levels in Table 1		

NOTES All HVAC units through the BAS have advanced ventilation control logic deployed associated with the spaces they serve. The system will modulate the outdoor air damper and return dampers to provide the proper amount of air as needed to maintain space CO2 levels. This type of control is called CO2 based Demand-Controlled Ventilation (DCV). DCV provides proper ventilation air quantities as well as energy savings by reducing the amount of required ventilation air based on the CO2 levels measured by the sensor. The CO2 levels in parts per million (PPM) is used as an indicator of the number of occupants in a room. When the room has less than design occupancy, the required volume of ventilation is reduced. The CO2 sensor allows the VFD to reduce the fan speed to deliver a reduced volume of outside air for ventilation during these periods. An increase in the CO2 level is an indication that more people are in the room, so the fan speed is increased to maintain the required volume of ventilation air under all occupancy conditions.

Active DCV control is an acceptable alternate method to determine if ventilation requirements are met and could supersede rooms that may fail otherwise using traditional measured data collection procedures prescribed by established ASHRAE guidelines.

The ideal supply of outside air to interior occupied spaces should be based upon the 2018 Connecticut Building Code, which is based on the most currently adopted 2015 International Mechanical Code and coincides with ASHRAE-62.1, (2010) guidelines



BAS: Building Automation System VFD: Variable Frequency Drive (Controls the speed of the fan motor) ASHRAE: American Society of Heating, Refrigerating and Air Conditioning Engineers

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- 1. Read the *IAQ Backgrounder* and the Background Information for this checklist.
- 2. Keep the Background Information and make a copy of this checklist for each ventilation unit in your school, as well as a copy for future reference.
- 3. Complete the Checklist.
 - Check the "yes," "no," or "not applicable" box beside each item. (A "no" response requires further attention.)
 - Make comments in the "Notes" section as necessary.
- Return the checklist portion of this document to the IAQ Coordinator.

Ventilation Checklist

Martoni Stephen Name: Amity Middle School Orange School: Unit Ventilator/AHU No: __ Reading Date Completed: 1-25-24 Room or Area: MUSIC Signature:

1. OUTDOOR AIR INTAKES

1a.	Marked locations of all outdoor air intakes on a small floor plan (for Yes example, a fire escape floor plan)		N/A
1b.	Ensured that the ventilation system was on and operating in "occupied" mode	۵	
AC	TIVITY 1: OBSTRUCTIONS		
lc.	Ensured that outdoor air intakes are clear of obstructions, debris, clogs,	-	
	or covers		
ld.	Installed corrective devices as necessary (e.g., if snowdrifts or leaves frequently block an intake)	ø	
AC	TIVITY 2: POLLUTANT SOURCES		
le.	Checked ground-level intakes for pollutant sources (dumpsters, loading		-
1.6	docks, and bus-idling areas)		
11.	Checked rooftop intakes for pollutant sources (plumbing vents; kitchen, toilet, or laboratory exhaust fans; puddles; and mist from		
	air-conditioning cooling towers) \not		
1g.	Resolved any problems with pollutant sources located near outdoor air		
	intakes (e.g., relocated dumpster or extended exhaust pipe)		
AC	TIVITY 3: AIRFLOW		1
1h.	Obtained chemical smoke (or a small piece of tissue paper or light plastic) \Box	a	
	Confirmed that outdoor air is entering the intake appropriately		
2.	SYSTEM CLEANLINESS		
	TIVITY 4: AIR FILTERS		
2a.	Replaced filters per maintenance schedule		
	Shut off ventilation system fans while replacing filters (prevents dirt from		
	blowing downstream)	U	
2c.	Vacuumed filter areas before installing new filters	0	
2d.	Confirmed proper fit of filters to prevent air from bypassing (flowing around) the air filter.		

2. SYSTEM CLEANLINESS (continued)

ACTIVITY 5: DRAIN PANS 2f. Ensured that drain pans slant toward the drain (to prevent water from Yes, No N/A accumulating) 2g. Cleaned drain pans 2h. Checked drain pans for mold and mildew **ACTIVITY 6: COILS** 2i. Ensured that heating and cooling coils are clean \Box **ACTIVITY 7: AIR-HANDLING UNITS, UNIT VENTILATORS** 2i. Ensured that the interior of air-handling unit(s) or unit ventilator 2k. Ensured that ducts are clean **ACTIVITY 8: MECHANICAL ROOMS** 2m. Ensured that mechanical rooms and air-mixing chambers are free of trash, chemical products, and supplies 3. CONTROLS FOR OUTDOOR AIR SUPPLY 3a. Ensured that air dampers are at least partially open (minimum position) 🗋 🛛 💆 3b. Ensured that minimum position provides adequate outdoor air for occupants **ACTIVITY 9: CONTROLS INFORMATION** 3c. Obtained and reviewed all design inside/outside temperature and humidity requirements, controls specifications, as-built mechanical drawings, **ACTIVITY 10: CLOCKS, TIMERS, SWITCHES** 3d. Turned summer-winter switches to the correct position 3e. Set time clocks appropriately ø 3f. Ensured that settings fit the actual schedule of building use (including night/weekend use) **ACTIVITY 11: CONTROL COMPONENTS** 3g. Ensured appropriate system pressure by testing line pressure at both the occupied (day) setting and the unoccupied (night) setting Ъ 3i. Replaced control system filters at the compressor inlet based on the compressor manufacturer's recommendation (for example, when you blow down the tank)..... Ø Set the line pressure at each thermostat and damper actuator at the proper 3i. level (no leakage or obstructions) Ü **ACTIVITY 12: OUTDOOR AIR DAMPERS** 3k. Ensured that the outdoor air damper is visible for inspection 31. Ensured that the recirculating relief and/or exhaust dampers are visible for inspection 3m. Ensured that air temperature in the indoor area(s) served by each

NOTE: It is necessary to ensure that the damper is operating properly and within the normal range to continue.



2 of 5



3n.	Checked that the outdoor air damper fully closes within a few minutes of shutting off appropriate air handler	Yes	No 0	N/A
30.	Checked that the outdoor air damper opens (at least partially with no delay) when the air handler is turned on	ø	a	Q
Зр.	If in heating mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 85°F	. 🗆	Q	ø
3q.	If in cooling mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 60°F and mixed air thermostat is set to 45°F		G	, ,
3r.	If the outdoor air damper does not move, confirmed the following items:			6
	 The damper actuator links to the damper shaft, and any linkage set screws or bolts are tight 	ď	_ _	D
	• Moving parts are free of impediments (e.g., rust, corrosion)	Ľ	٦	D,
	· Electrical wire or pneumatic tubing connects to the damper actuator	Q⁄		
	• The outside air thermostat(s) is functioning properly (e.g., in the right location, calibrated correctly)	9		D

Proceed to Activities 13-16 if the damper seems to be operating properly.

ACTIVITY 13: FREEZE STATS

3s.	Disconnected power to controls (for automatic reset only) to test continuity across terminals	۵	ø
OR			*
3t.	Confirmed (if applicable) that depressing the manual reset button (usually red) trips the freeze stat (clicking sound indicates freeze stat was		
	tripped)	Q	
3u.	Assessed the feasibility of replacing all manual reset freeze-stats with automatic reset freeze-stats	-	

NOTE: HVAC systems with water coils need protection from the cold. The freeze-stat may close the outdoor air damper and disconnect the supply air when tripped. The typical trip range is $35^{\circ}F$ to $42^{\circ}F$.

ACTIVITY 14: MIXED AIR THERMOSTATS

	nsured that the mixed air stat for heating mode is set no higher nan 65°F		
3m/ F	nsured that the mixed air stat for cooling mode is set no lower nan the room thermostat setting	• ,	

ACTIVITY 15: ECONOMIZERS

3x. Confirmed proper economizer settings based on design specifications or local practices

NOTE: The dry-bulb is typically set at 65°F or lower.

3y. Checked that sensor on the economizer is shielded from direct sunlight \square

- 3z. Ensured that dampers operate properly (for outside air, return air,
- exhaust/relief air, and recirculated air), per the design specifications

NOTE: Economizers use varying amounts of cool outdoor air to assist with the cooling load of the room or rooms. There are two types of economizers, dry-bulb and enthalpy. Dry-bulb economizers vary the amount of outdoor air based on outdoor temperature, and enthalpy economizers vary the amount of outdoor air based on outdoor temperature and humidity level.

ACTIVITY 16: FANS

NOTE: If fan shuts off when the thermostat is satisfied, adjust control cycle as necessary to ensure sufficient outdoor air supply.

4. AIR DISTRIBUTION

ACTIVITY 17: AIR DISTRIBUTION

4a. Ensured that supply and return air pathways in the existing ventilation system perform as required		
4b. Ensured that passive gravity relief ventilation systems and transfer grilles between rooms and corridors are functioning		ū
NOTE: If ventilation system is closed or blocked to meet current fire codes, consult we professional engineer for remedies.	ith a	
 4c. Made sure every occupied space has supply of outdoor air (mechanical system or operable windows)		
NOTE: If outlets have been blocked intentionally to correct drafts or discomfort, inves and correct the cause of the discomfort and reopen the vents.	tigat	е
4e. Modified the HVAC system to supply outside air to areas without an outdoor air supply		
4f. Modified existing HVAC systems to incorporate any room or zone layout and population changes	۵	
4g. Moved all barriers (for example, room dividers, large free-standing blackboards or displays, bookshelves) that could block movement of air in the room, especially those blocking air vents	ò	ø

4h.	Ensured that unit ventilators are quiet enough to accommodate classroom activities		
4i.	Ensured that classrooms are free of uncomfortable drafts produced by air from supply terminals	.	

ACTIVITY 18: PRESSURIZATION IN BUILDINGS

NOTE: To prevent infiltration of outdoor pollutants, the ventilation system is designed to maintain positive pressurization in the building. Therefore, ensure that the system, including any exhaust fans, is operating on the "occupied" cycle when doing this activity.

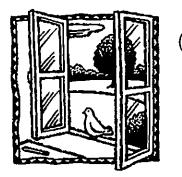
4j.	Ensured that air flows out of the building (using chemical smoke) through		,
	windows, doors, or other cracks and holes in exterior wall (for example,		·
	floor joints, pipe openings) 🖵	ত্র	

5. EXHAUST SYSTEMS

ACTIVITY 19: EXHAUST FAN OPERATION

5a. Checked (using chemical smoke) that air flows into exhaust fan grille(s) D

- If fans are running but air is not flowing toward the exhaust intake, check for the following:
 - Inoperable dampers
 - Obstructed, leaky, or disconnected ductwork
 - Undersized or improperly installed fan
 - Broken fan belt





5. EXHAUST SYSTEMS (continued)

ACTIVITY 20: EXHAUST AIRFLOW

NOTE: Prevent migration of indoor contaminants from areas such as bathrooms, kitchens, and labs by keeping them under negative pressure (as compared to surrounding spaces).

5b. Checked (using chemical smoke) that air is drawn into the room from adjacent spaces	Yes.No ,⊠ □	N/A
Stand outside the room with the door slightly open while checking airflow high the door opening (see "How to Measure Airflow").	i and low i	n
5c. Ensured that air is flowing toward the exhaust intake		

ACTIVITY 21: EXHAUST DUCTWORK

5đ.	Checked that the exhaust ductwork downstream of the exhaust fan (which is	/	
	under positive pressure) is sealed and in good condition	a	

6. QUANTITY OF OUTDOOR AIR

ACTIVITY 22: OUTDOOR AIR MEASUREMENTS AND CALCULATIONS

NOTE: Refer to "How to Measure Airflow" for techniques.

6a. Measured the quantity of outdoor air supplied (22a) to each ventilation 6b. Calculated the number of occupants served (22b) by the ventilation unit under consideration 6c. Divided outdoor air supply (22a) by the number of occupants (22b) to determine the existing quantity of outdoor air supply per person (22c) **ACTIVITY 23: ACCEPTABLE LEVELS OF OUTDOOR AIR QUANTITIES** 6d. Compared the existing outdoor air per person (22c) to the recommended levels in Table 1 6e. Corrected problems with ventilation units that supplied inadequate quantities of outdoor air to ensure that outdoor air quantities (22c) meet the recommended levels in Table 1

NOTES All HVAC units through the BAS have advanced ventilation control logic deployed associated with the spaces they serve. The system will modulate the outdoor air damper and return dampers to provide the proper amount of air as needed to maintain space CO2 levels. This type of control is called CO2 based Demand-Controlled Ventilation (DCV). DCV provides proper ventilation air quantities as well as energy savings by reducing the amount of required ventilation air based on the CO2 levels measured by the sensor. The CO2 levels in parts per million (PPM) is used as an indicator of the number of occupants in a room. When the room has less than design occupancy, the required volume of ventilation is reduced. The CO2 sensor allows the VFD to reduce the fan speed to deliver a reduced volume of outside air for ventilation during these periods. An increase in the CO2 level is an indication that more people are in the room, so the fan speed is increased to maintain the required volume of ventilation air under all occupancy conditions.

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- 3. Complete the Checklist.
 - Check the "yes," "no," or "not applicable" box beside each item. (A "no" response requires further attention.)
 - Make comments in the "Notes" section as necessary.
- Return the checklist portion of this document to the IAQ Coordinator.

Ventilation Checklist

Name:	Stephen	Martoni	
School:	Amity	Middle School Orange	
Unit Vent	ilator/AHU No:	3	
Room or .	Area: Comp	Duter JOOM Date Completed: 1.25-24	
Signature	in Sin /	46	

1. OUTDOOR AIR INTAKES

1a.	Marked locations of all outdoor air intakes on a small floor plan (for example, a fire escape floor plan)			N/A
1b.	Ensured that the ventilation system was on and operating in "occupied" mode	,		
AC	TIVITY 1: OBSTRUCTIONS			
1c.	Ensured that outdoor air intakes are clear of obstructions, debris, clogs, or covers	Z		
1d.	Installed corrective devices as necessary (e.g., if snowdrifts or leaves frequently block an intake)		ø	
AC	TIVITY 2: POLLUTANT SOURCES			
1e.	Checked ground-level intakes for pollutant sources (dumpsters, loading docks, and bus-idling areas)	.Z		
1f.	Checked rooftop intakes for pollutant sources (plumbing vents; kitchen, toilet, or laboratory exhaust fans; puddles; and mist from air-conditioning cooling towers)	R		
1g.	Resolved any problems with pollutant sources located near outdoor air intakes (e.g., relocated dumpster or extended exhaust pipe)	1		
AC	TIVITY 3: AIRFLOW			
1h.	Obtained chemical smoke (or a small piece of tissue paper or light plastic). Confirmed that outdoor air is entering the intake appropriately	. 0 . 0/	'0	
2.	SYSTEM CLEANLINESS			
AC	TIVITY 4: AIR FILTERS			
2a.	Replaced filters per maintenance schedule	A		
2b.	Shut off ventilation system fans while replacing filters (prevents dirt from blowing downstream)	Z,		
2c.	Vacuumed filter areas before installing new filters	A		
2d.	Confirmed proper fit of filters to prevent air from bypassing (flowing			

2. SYSTEM CLEANLINESS (continued)

ACTIVITY 5: DRAIN PANS

ACTIVITY 5: DRAIN PANS			
2f. Ensured that drain pans slant toward the drain (to prevent water from Y	es,	No	N/A
accumulating)	<u>م</u>		
2g. Cleaned drain pans	1	ū	
2h. Checked drain pans for mold and mildew	<u>í</u>		Q
ACTIVITY 6: COILS			
2i. Ensured that heating and cooling coils are clean	\checkmark	a	
21. Ensured that heating and cooling cons are crean	2	a	4
ACTIVITY 7: AIR-HANDLING UNITS, UNIT VENTILATORS			
2j. Ensured that the interior of air-handling unit(s) or unit ventilator	1	_	_
(air-mixing chamber and fan blades) is clean	<u>,</u>		
2k. Ensured that ducts are clean	1		
,			
ACTIVITY 8: MECHANICAL ROOMS			
21. Checked mechanical room for unsanitary conditions, leaks, and spills	<u>1</u>		
2m. Ensured that mechanical rooms and air-mixing chambers are free of trash.			
2m. Ensured that mechanical rooms and air-mixing chambers are free of trash, chemical products, and supplies	∡		
	-	-	—
3. CONTROLS FOR OUTDOOR AIR SUPPLY			
3. CONTROLS FOR OUTDOOR AIR SUPPLY			_
3a. Ensured that air dampers are at least partially open (minimum position)	ב		
3b. Ensured that minimum position provides adequate outdoor air	-	_	<i>•</i> ,
for occupants	า	Π	
	_	-	~
A OPTIMENT & CONTROL & INFORMATION			
ACTIVITY 9: CONTROLS INFORMATION			
3c. Obtained and reviewed all design inside/outside temperature and humidity			
requirements, controls specifications, as-built mechanical drawings,	1		_
and controls operations manuals (often uniquely designed)	1	Ч	D
ACTIVITY 10: CLOCKS, TIMERS, SWITCHES	_		
3d. Turned summer-winter switches to the correct position			
3e. Set time clocks appropriately	ב		ø
3f. Ensured that settings fit the actual schedule of building use (including			•
night/weekend use)	1		
•			
ACTIVITY 11: CONTROL COMPONENTS			
3g. Ensured appropriate system pressure by testing line pressure at both the			
occupied (day) setting and the unoccupied (night) setting	Ъ		7
3h. Checked that the line dryer prevents moisture buildup			7
	-		
3i. Replaced control system filters at the compressor inlet based on the			•
compressor manufacturer's recommendation (for example, when you	-		r#
blow down the tank)	-		ø
3j. Set the line pressure at each thermostat and damper actuator at the proper	_	_	-1
level (no leakage or obstructions)	-		Ø
ACTIVITY 12: OUTDOOR AIR DAMPERS			
3k. Ensured that the outdoor air damper is visible for inspection	1		
31 Ensured that the recirculating relief and/or exhaust damners are visible			
for inspection	5		
3m. Ensured that air temperature in the indoor area(s) served by each			
outdoor air damper is within the normal operating range	1		
		-	
NOTE. It is necessary to ensure that the damper is anevating properly and within	the	nor	mal



NOTE: It is necessary to ensure that the damper is operating properly and within the normal range to continue.



3n.	Checked that the outdoor air damper fully closes within a few minutes of shutting off appropriate air handler	Yes G	No	N/A
30.	Checked that the outdoor air damper opens (at least partially with no delay) when the air handler is turned on	ø	D	
3р.	If in heating mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 85°F	, D		₽
3q.	If in cooling mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 60°F and mixed air thermostat is set to 45°F		D	, ,
3r.	If the outdoor air damper does not move, confirmed the following items:			6
	 The damper actuator links to the damper shaft, and any linkage set screws or bolts are tight 		Ĺ	ū
	• Moving parts are free of impediments (e.g., rust, corrosion)	2		ū
	• Electrical wire or pneumatic tubing connects to the damper actuator	9⁄	ίΩ.	
	• The outside air thermostat(s) is functioning properly (e.g., in the right location, calibrated correctly)	2		D

Proceed to Activities 13-16 if the damper seems to be operating properly.

ACTIVITY 13: FREEZE STATS

3s.	Disconnected power to controls (for automatic reset only) to test continuity across terminals		ø
OR			7
3t.	Confirmed (if applicable) that depressing the manual reset button (usually red) trips the freeze stat (clicking sound indicates freeze stat was		
	tripped)	Q	
3u.	Assessed the feasibility of replacing all manual reset freeze-stats with automatic reset freeze-stats	ø	D

NOTE: HVAC systems with water coils need protection from the cold. The freeze-stat may close the outdoor air damper and disconnect the supply air when tripped. The typical trip range is 35°F to 42°F.

ACTIVITY 14: MIXED AIR THERMOSTATS

3v. Ensured that the mixed air stat for heating mode is set no higher than 65°F	
3w. Ensured that the mixed air stat for cooling mode is set no lower than the room thermostat setting	ם כ
ACTIVITY 15: ECONOMIZERS	,
3x. Confirmed proper economizer settings based on design specifications or local practices	ם ב
NOTE The device the instantion and at 60 E and instant	

NOTE: The dry-bulb is typically set at 65°F or lower.

- 3y. Checked that sensor on the economizer is shielded from direct sunlight \Box \Box
- 3z. Ensured that dampers operate properly (for outside air, return air,
- exhaust/relief air, and recirculated air), per the design specifications

NOTE: Economizers use varying amounts of cool outdoor air to assist with the cooling load of the room or rooms. There are two types of economizers, dry-bulb and enthalpy. Dry-bulb economizers vary the amount of outdoor air based on outdoor temperature, and enthalpy economizers vary the amount of outdoor air based on outdoor temperature and humidity level.

ACTIVITY 16: FANS

NOTE: If fan shuts off when the thermostat is satisfied, adjust control cycle as necessary to ensure sufficient outdoor air supply.

4. AIR DISTRIBUTION

ACTIVITY 17: AIR DISTRIBUTION

4a. Ensured that supply and return air pathways in the existing ventilation system perform as required	D
4b. Ensured that passive gravity relief ventilation systems and transfer grilles between rooms and corridors are functioning	
NOTE: If ventilation system is closed or blocked to meet current fire codes, consult with a professional engineer for remedies.	
 4c. Made sure every occupied space has supply of outdoor air (mechanical system or operable windows)	
NOTE: If outlets have been blocked intentionally to correct drafts or discomfort, investigate and correct the cause of the discomfort and reopen the vents.	?
4e. Modified the HVAC system to supply outside air to areas without an outdoor	,

4e.	Modified the HVAC system to supply outside air to areas without an outdoor air supply	G	
4f.	Modified existing HVAC systems to incorporate any room or zone layout and population changes	D	
4g.	Moved all barriers (for example, room dividers, large free-standing blackboards or displays, bookshelves) that could block movement of air in the room, especially those blocking air vents	Q	⊿
4h.	Ensured that unit ventilators are quiet enough to accommodate classroom activities		
4i.	Ensured that classrooms are free of uncomfortable drafts produced by air from supply terminals	, a.	

ACTIVITY 18: PRESSURIZATION IN BUILDINGS

NOTE: To prevent infiltration of outdoor pollutants, the ventilation system is designed to maintain positive pressurization in the building. Therefore, ensure that the system, including any exhaust fans, is operating on the "occupied" cycle when doing this activity.

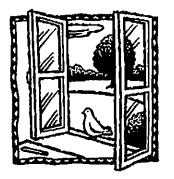
4j.	Ensured that air flows out of the building (using chemical smoke) through		,
	windows, doors, or other cracks and holes in exterior wall (for example,	/	
	floor joints, pipe openings)	ø	

5. EXHAUST SYSTEMS

ACTIVITY 19: EXHAUST FAN OPERATION

5a. Checked (using chemical smoke) that air flows into exhaust fan grille(s) 🛛

- If fans are running but air is not flowing toward the exhaust intake, check for the following:
 - Inoperable dampers
 - Obstructed, leaky, or disconnected ductwork
 - Undersized or improperly installed fan
 - Broken fan belt





5. EXHAUST SYSTEMS (continued)

ACTIVITY 20: EXHAUST AIRFLOW

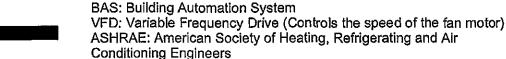
NOTE: Prevent migration of indoor contaminants from areas such as bathrooms, kitchens, and labs by keeping them under negative pressure (as compared to surrounding spaces).

	· · · · · · · · · · · · · · · · · · ·		/-	
5b.	Checked (using chemical smoke) that air is drawn into the room from Ye adjacent spaces			N/A
the	nd outside the room with the door slightly open while checking airflow high and door opening (see "How to Measure Airflow").		ow ii	1
5c.	Ensured that air is flowing toward the exhaust intake	{		D
٩Ċ	TIVITY 21: EXHAUST DUCTWORK			
5d.	Checked that the exhaust ductwork downstream of the exhaust fan (which is under positive pressure) is sealed and in good condition	{	Ó	
6.	QUANTITY OF OUTDOOR AIR			
AC	TIVITY 22: OUTDOOR AIR MEASUREMENTS AND CALCULATIONS	5		
NO	TE: Refer to "How to Measure Airflow" for techniques.			
ба.	Measured the quantity of outdoor air supplied (22a) to each ventilation unit)	ū	
5b.	Calculated the number of occupants served (22b) by the ventilation unit under consideration			
бс.	Divided outdoor air supply (22a) by the number of occupants (22b) to determine the existing quantity of outdoor air supply per person (22c)	נ		
AC	TIVITY 23: ACCEPTABLE LEVELS OF OUTDOOR AIR QUANTITIES	5		
	Compared the existing outdoor air per person (22c) to the recommended levels in Table 1			
5e.	Corrected problems with ventilation units that supplied inadequate quantities of outdoor air to ensure that outdoor air quantities (22c) meet			
	the recommended levels in Table 1	1		

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 - Check the "yes," "no," or "not applicable" box beside each item. (A "no" response requires further attention.)
 - Make comments in the "Notes" section as necessary.
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Ventilation Checklist

Name:	Stephen	Martoni			
School:	Amity	Middle	School	Olonge	
Unit Venti	ilator/AHU No:	4			
Room or A	Area: Ad (nin	Date	Completed:	1-25-24
Signature	: Ly f	45			

1. OUTDOOR AIR INTAKES

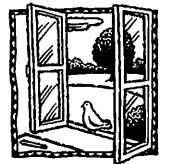
la.	Marked locations of all outdoor air intakes on a small floor plan (for Yes example, a fire escape floor plan)		N/A
1b.	Ensured that the ventilation system was on and operating in "occupied" mode		
AC	TIVITY 1: OBSTRUCTIONS		
1c.	Ensured that outdoor air intakes are clear of obstructions, debris, clogs,		
1.4	or covers	اسا	hund
10.	frequently block an intake)	ø	
AC	TIVITY 2: POLLUTANT SOURCES		
le.	Checked ground-level intakes for pollutant sources (dumpsters, loading		
	docks, and bus-idling areas)		
1 f.	Checked rooftop intakes for pollutant sources (plumbing vents; kitchen,		
	toilet, or laboratory exhaust fans; puddles; and mist from		
1.0	air-conditioning cooling towers)	4	L
ıg.	intakes (e.g., relocated dumpster or extended exhaust pipe)		
AC	TIVITY 3: AIRFLOW		/
1h.	Obtained chemical smoke (or a small piece of tissue paper or light plastic) \Box	a	
	Confirmed that outdoor air is entering the intake appropriately		
2.	SYSTEM CLEANLINESS		
	TIVITY 4: AIR FILTERS		
2a.	Replaced filters per maintenance schedule		
2b.	Shut off ventilation system fans while replacing filters (prevents dirt from		
2c.	blowing downstream)		
	Confirmed proper fit of filters to prevent air from bypassing (flowing		
	around) the air filter		

2e. Confirmed proper installation of filters (correct direction for airflow).......2 \Box \Box

2. SYSTEM CLEANLINESS (continued)

ACTIVITY 5: DRAIN PANS

ACTIVITY 5: DRAIN PANS			
2f. Ensured that drain pans slant toward the drain (to prevent water from	Yes.	No	N/A
accumulating)	.v.		
2h. Checked drain pans for mold and mildew	.µ	u	Ч
ACTIVITY 6: COILS	,		
2i. Ensured that heating and cooling coils are clean	.🗹	Q	Q
ACTIVITY 7: AIR-HANDLING UNITS, UNIT VENTILATORS	•		
2j. Ensured that the interior of air-handling unit(s) or unit ventilator			
(air-mixing chamber and fan blades) is clean			
(air-mixing chamber and fan blades) is clean	3		ō
	7	_	_
ACTIVITY 8: MECHANICAL ROOMS	,		
21. Checked mechanical room for unsanitary conditions, leaks, and spills	ø		
2m. Ensured that mechanical rooms and air-mixing chambers are free of trash,	-2	~	-
chemical products, and supplies	.,	U	
3. CONTROLS FOR OUTDOOR AIR SUPPLY			
	-	-	4
3a. Ensured that air dampers are at least partially open (minimum position)	.u	Ч	ų A
3b. Ensured that minimum position provides adequate outdoor air for occupants	m	n	
	. u		7
ACTIVITY 9: CONTROLS INFORMATION			
3c. Obtained and reviewed all design inside/outside temperature and humidity			
requirements, controls specifications, as-built mechanical drawings,	1		
and controls operations manuals (often uniquely designed)	Ø		
ACTIVITY 10: CLOCKS, TIMERS, SWITCHES			
3d. Turned summer-winter switches to the correct position	Z		
3e. Set time clocks appropriately			Ā
3f. Ensured that settings fit the actual schedule of building use (including		_	r
night/weekend use)	ø		
	•		
ACTIVITY 11: CONTROL COMPONENTS			
3g. Ensured appropriate system pressure by testing line pressure at both the	_	_	~
occupied (day) setting and the unoccupied (night) setting			2
3h. Checked that the line dryer prevents moisture buildup3i. Replaced control system filters at the compressor inlet based on the	. 🗆		
3i. Replaced control system filters at the compressor inlet based on the compressor manufacturer's recommendation (for example, when you			
blow down the tank)			Ø
3j. Set the line pressure at each thermostat and damper actuator at the proper	. —		
level (no leakage or obstructions)	D.		Ø
ACTIVITY 12: OUTDOOR AIR DAMPERS	~	m	— ·
3k. Ensured that the outdoor air damper is visible for inspection	κ.		
31. Ensured that the recirculating relief and/or exhaust dampers are visible for inspection	А		
3m. Ensured that air temperature in the indoor area(s) served by each	لے	-	4
outdoor air damper is within the normal operating range	ø	a	
NOTE: It is necessary to ensure that the damper is operating properly and with		nore	nal



NOTE: It is necessary to ensure that the damper is operating properly and within the normal range to continue.



3n.	Checked that the outdoor air damper fully closes within a few minutes Yes of shutting off appropriate air handler	₀¥ر □	N/A
30.	Checked that the outdoor air damper opens (at least partially with no delay) when the air handler is turned on	D	Q
3р.	If in heating mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 85°F	a	₽ ∕
3q.	If in cooling mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 60°F and mixed air thermostat is set to 45°F		, ,
3r.	If the outdoor air damper does not move, confirmed the following items:		1
	 The damper actuator links to the damper shaft, and any linkage set screws or bolts are tight 		
	• Moving parts are free of impediments (e.g., rust, corrosion)		
	• Electrical wire or pneumatic tubing connects to the damper actuator	í 🖬	
	• The outside air thermostat(s) is functioning properly (e.g., in the right location, calibrated correctly)		

Proceed to Activities 13-16 if the damper seems to be operating properly.

ACTIVITY 13: FREEZE STATS

3s.	Disconnected power to controls (for automatic reset only) to test continuity across terminals		ø
OR			1
3t.	Confirmed (if applicable) that depressing the manual reset button (usually red) trips the freeze stat (clicking sound indicates freeze stat was		
	tripped)	Q	
3u.	Assessed the feasibility of replacing all manual reset freeze-stats with automatic reset freeze-stats	_	

NOTE: HVAC systems with water coils need protection from the cold. The freeze-stat may close the outdoor air damper and disconnect the supply air when tripped. The typical trip range is 35°F to 42°F.

ACTIVITY 14: MIXED AIR THERMOSTATS

3v. Ensured that the mixed air stat for heating mode is set no higher than 65°F		
3w. Ensured that the mixed air stat for cooling mode is set no lower than the room thermostat setting	e [,] o	۵
ACTIVITY 15: ECONOMIZERS		

3x. Confirmed proper economizer settings based on design specifications or local practices

NOTE: The dry-bulb is typically set at 65°F or lower.

- 3y. Checked that sensor on the economizer is shielded from direct sunlight \square
- 3z. Ensured that dampers operate properly (for outside air, return air, exhaust/relief air, and recirculated air), per the design specifications

NOTE: Economizers use varying amounts of cool outdoor air to assist with the cooling load of the room or rooms. There are two types of economizers, dry-bulb and enthalpy. Dry-bulb economizers vary the amount of outdoor air based on outdoor temperature, and enthalpy economizers vary the amount of outdoor air based on outdoor temperature and humidity level.

ACTIVITY 16: FANS

3aa. Ensured that all fans (supply fans and associated return or relief fans) that move outside air indoors continuously operate during occupied Yes No N/A hours (even when room thermostat is satisfied)......

NOTE: If fan shuts off when the thermostat is satisfied, adjust control cycle as necessary to ensure sufficient outdoor air supply.

4. AIR DISTRIBUTION

ACTIVITY 17: AIR DISTRIBUTION

4a. Ensured that supply and return air pathways in the existing ventilation syste perform as required.		
4b. Ensured that passive gravity relief ventilation systems and transfer grilles between rooms and corridors are functioning		
NOTE: If ventilation system is closed or blocked to meet current fire codes, cons professional engineer for remedies.	sult with <mark>a</mark>	1
4c. Made sure every occupied space has supply of outdoor air (mechanical		_

704	Made sure every occupied space has supply of outdoor an (incentification	/	
	system or operable windows)	∕□	Q
4d.	Ensured that supply and return vents are open and unblocked		Q

NOTE: If outlets have been blocked intentionally to correct drafts or discomfort, investigate and correct the cause of the discomfort and reopen the vents.

4e.	Modified the HVAC system to supply outside air to areas without an outdoor air supply	G	
4f.	Modified existing HVAC systems to incorporate any room or zone layout and population changes	D	
4g.	Moved all barriers (for example, room dividers, large free-standing blackboards or displays, bookshelves) that could block movement of air in the room, especially those blocking air vents	Ū	⊿
4h.	Ensured that unit ventilators are quiet enough to accommodate classroom activities		
4i.	Ensured that classrooms are free of uncomfortable drafts produced by air from supply terminals	.	

ACTIVITY 18: PRESSURIZATION IN BUILDINGS

NOTE; To prevent infiltration of outdoor pollutants, the ventilation system is designed to maintain positive pressurization in the building. Therefore, ensure that the system, including any exhaust fans, is operating on the "occupied" cycle when doing this activity.

4j.	Ensured that air flows out of the building (using chemical smoke) through		,
	windows, doors, or other cracks and holes in exterior wall (for example,	/	/
	floor joints, pipe openings)	2	

5. EXHAUST SYSTEMS

ACTIVITY 19: EXHAUST FAN OPERATION

5a. Checked (using chemical smoke) that air flows into exhaust fan grille(s) D

- If fans are running but air is not flowing toward the exhaust intake, check for the following:
 - Inoperable dampers
 - · Obstructed, leaky, or disconnected ductwork
 - · Undersized or improperly installed fan
 - Broken fan belt





5. EXHAUST SYSTEMS (continued)

ACTIVITY 20: EXHAUST AIRFLOW

NOTE: Prevent migration of indoor contaminants from areas such as bathrooms, kitchens, and labs by keeping them under negative pressure (as compared to surrounding spaces).

 5b. Checked (using chemical smoke) that air is drawn into the room from adjacent spaces
 Yes. No N/A

 Image: Provide the state of the s

Stand outside the room with the door slightly open while checking airflow high and low in the door opening (see "How to Measure Airflow").

5c. Ensured that air is flowing toward the exhaust intake

ACTIVITY 21: EXHAUST DUCTWORK

5d. Checked that the exhaust ductwork downstream of the exhaust fan (which is under positive pressure) is sealed and in good condition......

6. QUANTITY OF OUTDOOR AIR

ACTIVITY 22: OUTDOOR AIR MEASUREMENTS AND CALCULATIONS

NOTE: Refer to "How to Measure Airflow" for techniques.

6a. Measured the quantity of outdoor air supplied (22a) to each ventilation unit 6b. Calculated the number of occupants served (22b) by the ventilation unit 6c. Divided outdoor air supply (22a) by the number of occupants (22b) to determine the existing quantity of outdoor air supply per person (22c)...... α ACTIVITY 23: ACCEPTABLE LEVELS OF OUTDOOR AIR QUANTITIES 6d. Compared the existing outdoor air per person (22c) to the recommended levels in Table 1 6e. Corrected problems with ventilation units that supplied inadequate quantities of outdoor air to ensure that outdoor air quantities (22c) meet the recommended levels in Table 1

NOTES All HVAC units through the BAS have advanced ventilation control logic deployed associated with the spaces they serve. The system will modulate the outdoor air damper and return dampers to provide the proper amount of air as needed to maintain space CO2 levels. This type of control is called CO2 based Demand-Controlled Ventilation (DCV). DCV provides proper ventilation air quantities as well as energy savings by reducing the amount of required ventilation air based on the CO2 levels measured by the sensor. The CO2 levels in parts per million (PPM) is used as an indicator of the number of occupants in a room. When the room has less than design occupancy, the required volume of ventilation is reduced. The CO2 sensor allows the VFD to reduce the fan speed to deliver a reduced volume of outside air for ventilation during these periods. An increase in the CO2 level is an indication that more people are in the room, so the fan speed is increased to maintain the required volume of ventilation air under all occupancy conditions.

Active DCV control is an acceptable alternate method to determine if ventilation requirements are met and could supersede rooms that may fail otherwise using traditional measured data collection procedures prescribed by established ASHRAE guidelines.

The ideal supply of outside air to interior occupied spaces should be based upon the 2018 Connecticut Building Code, which is based on the most currently adopted 2015 International Mechanical Code and coincides with ASHRAE-62.1, (2010) guidelines

BAS: Building Automation System VFD: Variable Frequency Drive (Controls the speed of the fan motor) ASHRAE: American Society of Heating, Refrigerating and Air Conditioning Engineers

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Instructions

- 1. Read the *IAQ Backgrounder* and the Background Information for this checklist.
- 2. Keep the Background Information and make a copy of this checklist for **each** ventilation unit in your school, as well as a copy for future reference.
- 3. Complete the Checklist.
 - Check the "yes," "no," or "not applicable" box beside each item. (A "no" response requires further attention.)
 - Make comments in the "Notes" section as necessary.
- Return the checklist portion of this document to the IAQ Coordinator.

Ventilation Checklist

Name:	Stephen Martoni
School:	Anity Middle School Orange
Unit Vent	tilator/AHU No:
Room or	Area: Band/Cholus Date Completed: 1-25.24
Signature	: Ly fits

1. OUTDOOR AIR INTAKES

1a.	Marked locations of all outdoor air intakes on a small floor plan (for Y example, a fire escape floor plan)			N/A
1b.	Ensured that the ventilation system was on and operating in "occupied" mode	,	D	۵
AC	TIVITY 1: OBSTRUCTIONS			
	Ensured that outdoor air intakes are clear of obstructions, debris, clogs, or covers	6		
1d.	Installed corrective devices as necessary (e.g., if snowdrifts or leaves frequently block an intake)	ב	ø	٦
AC	TIVITY 2: POLLUTANT SOURCES			
	Checked ground-level intakes for pollutant sources (dumpsters, loading docks, and bus-idling areas)	2	D	
1f.	Checked rooftop intakes for pollutant sources (plumbing vents; kitchen, toilet, or laboratory exhaust fans; puddles; and mist from air-conditioning cooling towers)	7		
1g.	Resolved any problems with pollutant sources located near outdoor air intakes (e.g., relocated dumpster or extended exhaust pipe)	-	D	
AC	TIVITY 3: AIRFLOW			
1h.	Obtained chemical smoke (or a small piece of tissue paper or light plastic) Confirmed that outdoor air is entering the intake appropriately			
2.	SYSTEM CLEANLINESS			
	TIVITY 4: AIR FILTERS			
	Replaced filters per maintenance schedule	2		
2b.	Shut off ventilation system fans while replacing filters (prevents dirt from blowing downstream)	1	D	m
2c.	Vacuumed filter areas before installing new filters			
	Confirmed proper fit of filters to prevent air from bypassing (flowing			

2e. Confirmed proper installation of filters (correct direction for airflow)..........

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2. SYSTEM CLEANLINESS (continued)

ACTIVITY 5: DRAIN PANS

ACTIVITY 5: DRAIN PANS			
accumulating)	Ø		N/A
2g. Cleaned drain pans	⊠		
2h. Checked drain pans for mold and mildew	ø	۵	
ACTIVITY 6: COILS	_/	_	_
2i. Ensured that heating and cooling coils are clean	Ø		
ACTIVITY 7: AIR-HANDLING UNITS, UNIT VENTILATORS			
2j. Ensured that the interior of air-handling unit(s) or unit ventilator	1		
(air-mixing chamber and fan blades) is clean	ø,		
(air-mixing chamber and fan blades) is clean	ø		
ACTIVITY 8: MECHANICAL ROOMS			
21. Checked mechanical room for unsanitary conditions, leaks, and spills	х́	D	
2m. Ensured that mechanical rooms and air-mixing chambers are free of trash,			
chemical products, and supplies	Ø		
3. CONTROLS FOR OUTDOOR AIR SUPPLY			
3a. Ensured that air dampers are at least partially open (minimum position)	a	D	ø
3b Ensured that minimum position provides adequate outdoor air			· /
for occupants			ø
ACTIVITY 9: CONTROLS INFORMATION			
3c. Obtained and reviewed all design inside/outside temperature and humidity			
requirements, controls specifications, as-built mechanical drawings,	/		
and controls operations manuals (often uniquely designed)	Ø		
ACTIVITY 10: CLOCKS, TIMERS, SWITCHES			
3d. Turned summer-winter switches to the correct position	ø		
3e. Set time clocks appropriately			ø
3f. Ensured that settings fit the actual schedule of building use (including			•
night/weekend use)	ø		
ACTIVITY 11: CONTROL COMPONENTS			
3g. Ensured appropriate system pressure by testing line pressure at both the			~
occupied (day) setting and the unoccupied (night) setting			Z,
3h. Checked that the line dryer prevents moisture buildup			A
3i. Replaced control system filters at the compressor inlet based on the			
compressor manufacturer's recommendation (for example, when you	_	_	- #
blow down the tank)	u		Þ
3j. Set the line pressure at each thermostat and damper actuator at the proper level (no leakage or obstructions)		Ē	Z
	-	-	-
ACTIVITY 12: OUTDOOR AIR DAMPERS	_	-	_ ·
3k. Ensured that the outdoor air damper is visible for inspection	Z	۵	
31. Ensured that the recirculating relief and/or exhaust dampers are visible	7	_	-
for inspection	Д		
3m. Ensured that air temperature in the indoor area(s) served by each outdoor air damper is within the normal operating range	d	П	
		Ч	

NOTE: It is necessary to ensure that the damper is operating properly and within the normal range to continue.





3n.	Checked that the outdoor air damper fully closes within a few minutes Yes of shutting off appropriate air handler	•אر □	N/A
30.	Checked that the outdoor air damper opens (at least partially with no delay) when the air handler is turned on	D	D
3p.	If in heating mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 85°F	D	⊊∕
•	If in cooling mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 60°F and mixed air thermostat is set to 45°F		7
51.	 The damper actuator links to the damper shaft, and any linkage set screws or bolts are tight		
	• The outside air thermostat(s) is functioning properly (e.g., in the right location, calibrated correctly)		

Proceed to Activities 13-16 if the damper seems to be operating properly.

ACTIVITY 13: FREEZE STATS

3s.	Disconnected power to controls (for automatic reset only) to test continuity across terminals	ü	ø
OR			,
3t.	Confirmed (if applicable) that depressing the manual reset button (usually red) trips the freeze stat (clicking sound indicates freeze stat was		
	tripped)		D
3u.	Assessed the feasibility of replacing all manual reset freeze-stats with automatic reset freeze-stats	ø	

NOTE: HVAC systems with water coils need protection from the cold. The freeze-stat may close the outdoor air damper and disconnect the supply air when tripped. The typical trip range is 35°F to 42°F.

ACTIVITY 14: MIXED AIR THERMOSTATS

3v.	Ensured that the mixed air stat for heating mode is set no higher than 65°F		
3w.	Ensured that the mixed air stat for cooling mode is set no lower than the room thermostat setting	· ,	

ACTIVITY 15: ECONOMIZERS

3x. Confirmed proper economizer settings based on design specifications or local practices

NOTE: The dry-bulb is typically set at 65°F or lower.

- 3y. Checked that sensor on the economizer is shielded from direct sunlight \square
- 3z. Ensured that dampers operate properly (for outside air, return air, exhaust/relief air, and recirculated air), per the design specifications

NOTE: Economizers use varying amounts of cool outdoor air to assist with the cooling load of the room or rooms. There are two types of economizers, dry-bulb and enthalpy. Dry-bulb economizers vary the amount of outdoor air based on outdoor temperature, and enthalpy economizers vary the amount of outdoor air based on outdoor temperature and humidity level.

ACTIVITY 16: FANS

NOTE: If fan shuts off when the thermostat is satisfied, adjust control cycle as necessary to ensure sufficient outdoor air supply.

4. AIR DISTRIBUTION

ACTIVITY 17: AIR DISTRIBUTION

 4a. Ensured that supply and return air pathways in the existing ventilation system perform as required. 4b. Ensured that passive gravity relief ventilation systems and transfer grilles between rooms and corridors are functioning.
NOTE: If ventilation system is closed or blocked to meet current fire codes, consult with a professional engineer for remedies.
 4c. Made sure every occupied space has supply of outdoor air (mechanical system or operable windows) 4d. Ensured that supply and return vents are open and unblocked
NOTE: If outlets have been blocked intentionally to correct drafts or discomfort, investigate and correct the cause of the discomfort and reopen the vents.
 4e. Modified the HVAC system to supply outside air to areas without an outdoor air supply
and population changes
4g. Moved all barriers (for example, room dividers, large free-standing blackboards or displays, bookshelves) that could block movement of air in the room, especially those blocking air vents
4h. Ensured that unit ventilators are quiet enough to accommodate classroom activities

ACTIVITY 18: PRESSURIZATION IN BUILDINGS

NOTE: To prevent infiltration of outdoor pollutants, the ventilation system is designed to maintain positive pressurization in the building. Therefore, ensure that the system, including any exhaust fans, is operating on the "occupied" cycle when doing this activity.

4i. Ensured that classrooms are free of uncomfortable drafts produced by air

4j.	Ensured that air flows out of the building (using chemical smoke) through		,
	windows, doors, or other cracks and holes in exterior wall (for example,	/	
	floor joints, pipe openings)	ত্র	

5. EXHAUST SYSTEMS

ACTIVITY 19: EXHAUST FAN OPERATION

5a. Checked (using chemical smoke) that air flows into exhaust fan grille(s) \Box

If fans are running but air is not flowing toward the exhaust intake, check for the following:

- Inoperable dampers
- Obstructed, leaky, or disconnected ductwork
- Undersized or improperly installed fan
- Broken fan belt





5. EXHAUST SYSTEMS (continued)

ACTIVITY 20: EXHAUST AIRFLOW

NOTE: Prevent migration of indoor contaminants from areas such as bathrooms, kitchens, and labs by keeping them under negative pressure (as compared to surrounding spaces).

 5b. Checked (using chemical smoke) that air is drawn into the room from Adjacent spaces
 Yes. No N/A

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 1

Stand outside the room with the door slightly open while checking airflow high and low in the door opening (see "How to Measure Airflow").

ACTIVITY 21: EXHAUST DUCTWORK

6. QUANTITY OF OUTDOOR AIR

ACTIVITY 22: OUTDOOR AIR MEASUREMENTS AND CALCULATIONS

NOTE: Refer to "How to Measure Airflow" for techniques.

- 6a. Measured the quantity of outdoor air supplied (22a) to each ventilation unit 6b. Calculated the number of occupants served (22b) by the ventilation unit under consideration 6c. Divided outdoor air supply (22a) by the number of occupants (22b) to determine the existing quantity of outdoor air supply per person (22c)...... **ACTIVITY 23: ACCEPTABLE LEVELS OF OUTDOOR AIR QUANTITIES** 6d. Compared the existing outdoor air per person (22c) to the recommended levels in Table 1 6e. Corrected problems with ventilation units that supplied inadequate
 - quantities of outdoor air to ensure that outdoor air quantities (22c) meet the recommended levels in Table 1

NOTES All HVAC units through the BAS have advanced ventilation control logic deployed associated with the spaces they serve. The system will modulate the outdoor air damper and return dampers to provide the proper amount of air as needed to maintain space CO2 levels. This type of control is called CO2 based Demand-Controlled Ventilation (DCV). DCV provides proper ventilation air quantities as well as energy savings by reducing the amount of required ventilation air based on the CO2 levels measured by the sensor. The CO2 levels in parts per million (PPM) is used as an indicator of the number of occupants in a room. When the room has less than design occupancy, the required volume of ventilation is reduced. The CO2 sensor allows the VFD to reduce the fan speed to deliver a reduced volume of outside air for ventilation during these periods. An increase in the CO2 level is an indication that more people are in the room, so the fan speed is increased to maintain the required volume of ventilation air under all occupancy conditions.

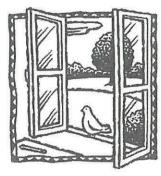
Active DCV control is an acceptable alternate method to determine if ventilation requirements are met and could supersede rooms that may fail otherwise using traditional measured data collection procedures prescribed by established ASHRAE guidelines.

The ideal supply of outside air to interior occupied spaces should be based upon the 2018 Connecticut Building Code, which is based on the most currently adopted 2015 International Mechanical Code and coincides with ASHRAE-62.1, (2010) guidelines

BAS: Building Automation System
 VFD: Variable Frequency Drive (Controls the speed of the fan motor)
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Conditioning Engineers

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Instructions

- 1. Read the *IAQ Backgrounder* and the Background Information for this checklist.
- 2. Keep the Background Information and make a copy of this checklist for **each** ventilation unit in your school, as well as a copy for future reference.
- 3. Complete the Checklist.
 - Check the "yes," "no," or "not applicable" box beside each item. (A "no" response requires further attention.)
 - Make comments in the "Notes" section as necessary.
- Return the checklist portion of this document to the IAQ Coordinator.

Ventilation Checklist

lame:	Stephen	Maytoni			
chool:	Amity	Middle	School	OTANGE	
nit Vent .oom or	ilator/AHUNO:	-eteria	Date	Completed:	1-26.24
ignature	11.0 1	16	Date	completed.	

1. OUTDOOR AIR INTAKES

la.	Marked locations of all outdoor air intakes on a small floor plan (for example, a fire escape floor plan)			N/A	
1b.	Ensured that the ventilation system was on and operating in "occupied" mode	¤	D	D	
AC	TIVITY 1: OBSTRUCTIONS				
1c.	Ensured that outdoor air intakes are clear of obstructions, debris, clogs, or covers	⊿			
1d.	Installed corrective devices as necessary (e.g., if snowdrifts or leaves frequently block an intake)	D	ø	D	
AC	TIVITY 2: POLLUTANT SOURCES				
	Checked ground-level intakes for pollutant sources (dumpsters, loading docks, and bus-idling areas)	Z		D	
1f.	Checked rooftop intakes for pollutant sources (plumbing vents; kitchen, toilet, or laboratory exhaust fans; puddles; and mist from air-conditioning cooling towers)	Z		a	
1g.	Resolved any problems with pollutant sources located near outdoor air intakes (e.g., relocated dumpster or extended exhaust pipe)	-	D		
AC	TIVITY 3: AIRFLOW				
1h.	Obtained chemical smoke (or a small piece of tissue paper or light plastic) Confirmed that outdoor air is entering the intake appropriately				
2.	SYSTEM CLEANLINESS				
AC	TIVITY 4: AIR FILTERS				
	Replaced filters per maintenance schedule	Z			
	Shut off ventilation system fans while replacing filters (prevents dirt from blowing downstream)	,Z,	D	۵	
2c.	Vacuumed filter areas before installing new filters	¤			
2d.	Confirmed proper fit of filters to prevent air from bypassing (flowing around) the air filter				

2. SYSTEM CLEANLINESS (continued)

ACTIVITY 5: DRAIN PANS

ACTIVITY 5: DRAIN PANS			
2f. Ensured that drain pans slant toward the drain (to prevent water from accumulating)	Ø		N/A
2g. Cleaned drain pans	🗹 🛛		Q
2h. Checked drain pans for mold and mildew	¤		۵
ACTIVITY 6: COILS	_	-	_
2i. Ensured that heating and cooling coils are clean	هر	ч	
ACTIVITY 7: AIR-HANDLING UNITS, UNIT VENTILATORS			
2j. Ensured that the interior of air-handling unit(s) or unit ventilator	1		
(air-mixing chamber and fan blades) is clean 2k. Ensured that ducts are clean	¤,		
2k. Ensured that ducts are clean	p	۵	
ACTIVITY 8: MECHANICAL ROOMS			
21. Checked mechanical room for unsanitary conditions, leaks, and spills	.,Z		
2m. Ensured that mechanical rooms and air-mixing chambers are free of trash.			
chemical products, and supplies	,¤		
3. CONTROLS FOR OUTDOOR AIR SUPPLY			
3a. Ensured that air dampers are at least partially open (minimum position)	D		ø
3b. Ensured that minimum position provides adequate outdoor air			• /
for occupants	🖸	۵	Ø
ACTIVITY 9: CONTROLS INFORMATION			
3c. Obtained and reviewed all design inside/outside temperature and humidity			
requirements, controls specifications, as-built mechanical drawings,			
and controls operations manuals (often uniquely designed)	ø		
ACTIVITY 10: CLOCKS, TIMERS, SWITCHES			
3d. Turned summer-winter switches to the correct position	Z		
3e. Set time clocks appropriately	ū		¥
3f. Ensured that settings fit the actual schedule of building use (including			•
night/weekend use)	¤ ī		
ACTIVITY 11: CONTROL COMPONENTS			
3g. Ensured appropriate system pressure by testing line pressure at both the			_
occupied (day) setting and the unoccupied (night) setting	🗆		р
3h. Checked that the line dryer prevents moisture buildup			A
3i. Replaced control system filters at the compressor inlet based on the			
compressor manufacturer's recommendation (for example, when you	_		
blow down the tank)			ø
3j. Set the line pressure at each thermostat and damper actuator at the proper	-	0	
level (no leakage or obstructions)	u		Ø
ACTIVITY 12: OUTDOOR AIR DAMPERS	,		
3k. Ensured that the outdoor air damper is visible for inspection	Ø		
31. Ensured that the recirculating relief and/or exhaust dampers are visible	,	_	_
for inspection			
3m. Ensured that air temperature in the indoor area(s) served by each		_	
outdoor air damper is within the normal operating range		Ч	
	A		t

NOTE: It is necessary to ensure that the damper is operating properly and within the normal range to continue.





	Checked that the outdoor air damper fully closes within a few minutes of shutting off appropriate air handler	es 3		N/A
	Checked that the outdoor air damper opens (at least partially with no delay) when the air handler is turned on	∡	D	D
•	If in heating mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 85°F	ב	D	₽ ∕
•	If in cooling mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 60°F and mixed air thermostat is set to 45°F If the outdoor air damper does not move, confirmed the following items:		D ,	7
	 The damper actuator links to the damper shaft, and any linkage set screws or bolts are tight Moving parts are free of impediments (e.g., rust, corrosion) Electrical wire or pneumatic tubing connects to the damper actuator The outside air thermostat(s) is functioning properly (e.g., in the right location, calibrated correctly) 			

Proceed to Activities 13-16 if the damper seems to be operating properly.

ACTIVITY 13: FREEZE STATS

3s.	Disconnected power to controls (for automatic reset only) to test continuity across terminals	۵	ø
OR			*
3t.	Confirmed (if applicable) that depressing the manual reset button (usually red) trips the freeze stat (clicking sound indicates freeze stat was		
	tripped)	Q	D
3u.	Assessed the feasibility of replacing all manual reset freeze-stats with	_	
	automatic reset freeze-stats	Ъ	U

NOTE: HVAC systems with water coils need protection from the cold. The freeze-stat may close the outdoor air damper and disconnect the supply air when tripped. The typical trip range is 35°F to 42°F.

ACTIVITY 14: MIXED AIR THERMOSTATS

3v.	Ensured that the mixed air stat for heating mode is set no higher than 65°F		
3w	Ensured that the mixed air stat for cooling mode is set no lower than the room thermostat setting	· ,	a

ACTIVITY 15: ECONOMIZERS

3x. Confirmed proper economizer settings based on design specifications or local practices

NOTE: The dry-bulb is typically set at 65°F or lower.

- 3y. Checked that sensor on the economizer is shielded from direct sunlight \square
- 32. Ensured that dampers operate properly (for outside air, return air, exhaust/relief air, and recirculated air), per the design specifications

NOTE: Economizers use varying amounts of cool outdoor air to assist with the cooling load of the room or rooms. There are two types of economizers, dry-bulb and enthalpy. Dry-bulb economizers vary the amount of outdoor air based on outdoor temperature, and enthalpy economizers vary the amount of outdoor air based on outdoor temperature and humidity level.

ACTIVITY 16: FANS

3aa. Ensured that all fans (supply fans and associated return or relief fans) that move outside air indoors continuously operate during occupied Yes No N/A hours (even when room thermostat is satisfied)......

NOTE: If fan shuts off when the thermostat is satisfied, adjust control cycle as necessary to ensure sufficient outdoor air supply.

4. AIR DISTRIBUTION

ACTIVITY 17: AIR DISTRIBUTION

4a. Ensured that supply and return air pathways in the existing ventilation system perform as required	ב
4b. Ensured that passive gravity relief ventilation systems and transfer grilles between rooms and corridors are functioning	ב
NOTE: If ventilation system is closed or blocked to meet current fire codes, consult with a professional engineer for remedies.	
 4c. Made sure every occupied space has supply of outdoor air (mechanical system or operable windows)	ב
NOTE: If outlets have been blocked intentionally to correct drafts or discomfort, investigate and correct the cause of the discomfort and reopen the vents.	
4e. Modified the HVAC system to supply outside air to areas without an outdoor air supply	ב
4f. Modified existing HVAC systems to incorporate any room or zone layout and population changes	ב
4g. Moved all barriers (for example, room dividers, large free-standing blackboards or displays, bookshelves) that could block movement of air in the room, especially those blocking air vents	⊿

4h. Ensured that unit ventilators are quiet enough to accommodate classroom activities 4i. Ensured that classrooms are free of uncomfortable drafts produced by air from supply terminals

ACTIVITY 18: PRESSURIZATION IN BUILDINGS

NOTE: To prevent infiltration of outdoor pollutants, the ventilation system is designed to maintain positive pressurization in the building. Therefore, ensure that the system, including any exhaust fans, is operating on the "occupied" cycle when doing this activity.

4j.	Ensured that air flows out of the building (using chemical smoke) through		,
	windows, doors, or other cracks and holes in exterior wall (for example,	/	
	floor joints, pipe openings)	ø	

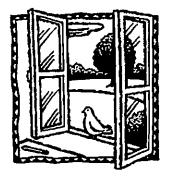
5. EXHAUST SYSTEMS

ACTIVITY 19: EXHAUST FAN OPERATION

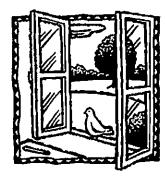
5a. Checked (using chemical smoke) that air flows into exhaust fan grille(s) D

- If fans are running but air is not flowing toward the exhaust intake, check for the following: • Inoperable dampers
 - · Obstructed, leaky, or disconnected ductwork
 - Undersized or improperly installed fan

 - Broken fan belt



- n



5. EXHAUST SYSTEMS (continued)

ACTIVITY 20: EXHAUST AIRFLOW

NOTE: Prevent migration of indoor contaminants from areas such as bathrooms, kitchens, and labs by keeping them under negative pressure (as compared to surrounding spaces).

5b. Checked (using chemical smoke) that air is drawn into the room from adjacent spaces	Yes No N/A
Stand outside the room with the door slightly open while checking airflow high the door opening (see "How to Measure Airflow").	
5c. Ensured that air is flowing toward the exhaust intake	

ACTIVITY 21: EXHAUST DUCTWORK

5d.	Checked that the exhaust ductwork downstream of the exhaust fan (which is	/	,	
	under positive pressure) is sealed and in good condition	2		

6. QUANTITY OF OUTDOOR AIR

ACTIVITY 22: OUTDOOR AIR MEASUREMENTS AND CALCULATIONS

NOTE: Refer to "How to Measure Airflow" for techniques.

6a. Measured the quantity of outdoor air supplied (22a) to each ventilation unit 6b. Calculated the number of occupants served (22b) by the ventilation unit under consideration 6c. Divided outdoor air supply (22a) by the number of occupants (22b) to determine the existing quantity of outdoor air supply per person (22c)...... **ACTIVITY 23: ACCEPTABLE LEVELS OF OUTDOOR AIR QUANTITIES** 6d. Compared the existing outdoor air per person (22c) to the recommended levels in Table 1 6e. Corrected problems with ventilation units that supplied inadequate quantities of outdoor air to ensure that outdoor air quantities (22c) meet the recommended levels in Table 1

NOTES All HVAC units through the BAS have advanced ventilation control logic deployed associated with the spaces they serve. The system will modulate the outdoor air damper and return dampers to provide the proper amount of air as needed to maintain space CO2 levels. This type of control is called CO2 based Demand-Controlled Ventilation (DCV). DCV provides proper ventilation air quantities as well as energy savings by reducing the amount of required ventilation air based on the CO2 levels measured by the sensor. The CO2 levels in parts per million (PPM) is used as an indicator of the number of occupants in a room. When the room has less than design occupancy, the required volume of ventilation is reduced. The CO2 sensor allows the VFD to reduce the fan speed to deliver a reduced volume of outside air for ventilation during these periods. An increase in the CO2 level is an indication that more people are in the room, so the fan speed is increased to maintain the required volume of ventilation air under all occupancy conditions.

Active DCV control is an acceptable alternate method to determine if ventilation requirements are met and could supersede rooms that may fail otherwise using traditional measured data collection procedures prescribed by established ASHRAE guidelines.

The ideal supply of outside air to interior occupied spaces should be based upon the 2018 Connecticut Building Code, which is based on the most currently adopted 2015 International Mechanical Code and coincides with ASHRAE-62.1, (2010) guidelines



BAS: Building Automation System VFD: Variable Frequency Drive (Controls the speed of the fan motor) ASHRAE: American Society of Heating, Refrigerating and Air Conditioning Engineers . .

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Instructions

- 1. Read the IAQ Backgrounder and the Background Information for this checklist.
- 2. Keep the Background Information and make a copy of this checklist for each ventilation unit in your school, as well as a copy for future reference.
- 3. Complete the Checklist.
 - · Check the "yes," "no," or "not applicable" box beside each item. (A "no" response requires further attention.)
 - Make comments in the "Notes" section as necessary.
- 4. Return the checklist portion of this document to the IAQ Coordinator.

1 of 5

Ventilation Checklist

Name:	Stephyn	Martoni	-			
School:	Amity	Middle	School	Olonge		
Unit Venti Room or 2	ilator/AHU No:	-olium	Data	Completed:	1.26-24	1
Signature	110 1	45	Jack Date	Completed.		

1. OUTDOOR AIR INTAKES

1a.	Marked locations of all outdoor air intakes on a small floor plan (for Yes example, a fire escape floor plan)		N/A
1b.	Ensured that the ventilation system was on and operating in "occupied" mode		
AC	TIVITY 1: OBSTRUCTIONS		
	Ensured that outdoor air intakes are clear of obstructions, debris, clogs, or covers		
1d.	Installed corrective devices as necessary (e.g., if snowdrifts or leaves frequently block an intake)	ø	
AC	TIVITY 2: POLLUTANT SOURCES		
le.	Checked ground-level intakes for pollutant sources (dumpsters, loading docks, and bus-idling areas)		٦
1f.	Checked rooftop intakes for pollutant sources (plumbing vents; kitchen, toilet, or laboratory exhaust fans; puddles; and mist from air-conditioning cooling towers)		
1g.	Resolved any problems with pollutant sources located near outdoor air intakes (e.g., relocated dumpster or extended exhaust pipe)	D	
AC	TIVITY 3: AIRFLOW		
1h.	Obtained chemical smoke (or a small piece of tissue paper or light plastic). \Box Confirmed that outdoor air is entering the intake appropriately		
2.	SYSTEM CLEANLINESS		
AC	TIVITY 4: AIR FILTERS		
	Replaced filters per maintenance schedule		
	Shut off ventilation system fans while replacing filters (prevents dirt from blowing downstream)	D	D
2c.	Vacuumed filter areas before installing new filters		
2d.	Confirmed proper fit of filters to prevent air from bypassing (flowing around) the air filter		

2e. Confirmed proper installation of filters (correct direction for airflow)..........

2. SYSTEM CLEANLINESS (continued)

ACTIVITY 5: DRAIN PANS 2f. Ensured that drain pans slant toward the drain (to prevent water from Yes No N/A accumulating) 2h. Checked drain pans for mold and mildew **ACTIVITY 6: COILS ACTIVITY 7: AIR-HANDLING UNITS, UNIT VENTILATORS** 2j. Ensured that the interior of air-handling unit(s) or unit ventilator **ACTIVITY 8: MECHANICAL ROOMS** 2m. Ensured that mechanical rooms and air-mixing chambers are free of trash, chemical products, and supplies D 3. CONTROLS FOR OUTDOOR AIR SUPPLY 3a. Ensured that air dampers are at least partially open (minimum position) \Box \Box \bigtriangledown 3b. Ensured that minimum position provides adequate outdoor air for occupants **ACTIVITY 9: CONTROLS INFORMATION** 3c. Obtained and reviewed all design inside/outside temperature and humidity requirements, controls specifications, as-built mechanical drawings, **ACTIVITY 10: CLOCKS, TIMERS, SWITCHES** 3d. Turned summer-winter switches to the correct position 3e. Set time clocks appropriately Ø 3f. Ensured that settings fit the actual schedule of building use (including night/weekend use) ACTIVITY 11: CONTROL COMPONENTS 3g. Ensured appropriate system pressure by testing line pressure at both the occupied (day) setting and the unoccupied (night) setting Ø 3h. Checked that the line dryer prevents moisture buildup 3i. Replaced control system filters at the compressor inlet based on the compressor manufacturer's recommendation (for example, when you blow down the tank)..... ZĨ 3j. Set the line pressure at each thermostat and damper actuator at the proper level (no leakage or obstructions) Z **ACTIVITY 12: OUTDOOR AIR DAMPERS** 31. Ensured that the recirculating relief and/or exhaust dampers are visible for inspection 3m. Ensured that air temperature in the indoor area(s) served by each outdoor air damper is within the normal operating range

NOTE: It is necessary to ensure that the damper is operating properly and within the normal range to continue.





3n.	Checked that the outdoor air damper fully closes within a few minutes Yes No of shutting off appropriate air handler	0	N/A
	Checked that the outdoor air damper opens (at least partially with no delay) when the air handler is turned on	1	D
Зр.	If in heating mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 85°F.	1	۶ź
3q.	If in cooling mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 60°F and mixed air thermostat is set to 45°F	1	9⁄
3r.	If the outdoor air damper does not move, confirmed the following items:		4
	• The damper actuator links to the damper shaft, and any linkage set screws or bolts are tight	1	Q
	• Moving parts are free of impediments (e.g., rust, corrosion)	ł	D
	• Electrical wire or pneumatic tubing connects to the damper actuator		D
	• The outside air thermostat(s) is functioning properly (e.g., in the right location, calibrated correctly)	1	۵

Proceed to Activities 13-16 if the damper seems to be operating properly.

ACTIVITY 13: FREEZE STATS

Disconnected power to controls (for automatic reset only) to test continuity across terminals	۵	ø
		1
Confirmed (if applicable) that depressing the manual reset button (usually red) trips the freeze stat (clicking sound indicates freeze stat was		
tripped)	Q	
Assessed the feasibility of replacing all manual reset freeze-stats with automatic reset freeze-stats \Box	ø	D
	across terminals Confirmed (if applicable) that depressing the manual reset button (usually red) trips the freeze stat (clicking sound indicates freeze stat was tripped) Assessed the feasibility of replacing all manual reset freeze-stats with	across terminals Confirmed (if applicable) that depressing the manual reset button (usually red) trips the freeze stat (clicking sound indicates freeze stat was tripped)

NOTE: HVAC systems with water coils need protection from the cold. The freeze-stat may close the outdoor air damper and disconnect the supply air when tripped. The typical trip range is 35°F to 42°F.

ACTIVITY 14: MIXED AIR THERMOSTATS

	sured that the mixed air stat for heating mode is set no higher $n 65^{\circ}F$	D
3w. Ens tha	sured that the mixed air stat for cooling mode is set no lower n the room thermostat setting	
	17-17- FONIOMIZEDE	

ACTIVITY 15: ECONOMIZERS

3x. Confirmed proper economizer settings based on design specifications or local practices

NOTE: The dry-bulb is typically set at 65°F or lower.

- 3y. Checked that sensor on the economizer is shielded from direct sunlight \square

NOTE: Economizers use varying amounts of cool outdoor air to assist with the cooling load of the room or rooms. There are two types of economizers, dry-bulb and enthalpy. Dry-bulb economizers vary the amount of outdoor air based on outdoor temperature, and enthalpy economizers vary the amount of outdoor air based on outdoor temperature and humidity level.

ACTIVITY 16: FANS

NOTE: If fan shuts off when the thermostat is satisfied, adjust control cycle as necessary to ensure sufficient outdoor air supply.

4. AIR DISTRIBUTION

ACTIVITY 17: AIR DISTRIBUTION

4a.	Ensured that supply and return air pathways in the existing ventilation system				
	perform as required				
4Ъ.	Ensured that passive gravity relief ventilation systems and transfer grilles				
	between rooms and corridors are functioning				
NOTE: If vanishing more in along or blocked to wast anywart five codes, consult with a					

NOTE: If ventilation system is closed or blocked to meet current fire codes, consult with a professional engineer for remedies.

4c.	Made sure every occupied space has supply of outdoor air (mechanical		
	system or operable windows)	/ u	Q
	Ensured that supply and return vents are open and unblocked		

NOTE: If outlets have been blocked intentionally to correct drafts or discomfort, investigate and correct the cause of the discomfort and reopen the vents.

4 e .	Modified the HVAC system to supply outside air to areas without an outdoor air supply	G	
4f.	Modified existing HVAC systems to incorporate any room or zone layout and population changes	Q	
4g.	Moved all barriers (for example, room dividers, large free-standing blackboards or displays, bookshelves) that could block movement of air in the room, especially those blocking air vents	D	⊿
4h.	Ensured that unit ventilators are quiet enough to accommodate classroom activities		a
4i.	Ensured that classrooms are free of uncomfortable drafts produced by air from supply terminals	, D.	

ACTIVITY 18: PRESSURIZATION IN BUILDINGS

NOTE: To prevent infiltration of outdoor pollutants, the ventilation system is designed to maintain positive pressurization in the building. Therefore, ensure that the system, including any exhaust fans, is operating on the "occupied" cycle when doing this activity.

4j.	Ensured that air flows out of the building (using chemical smoke) through		,
	windows, doors, or other cracks and holes in exterior wall (for example,	/	
	floor joints, pipe openings)	ত্র	Ū

5. EXHAUST SYSTEMS

ACTIVITY 19: EXHAUST FAN OPERATION

5a. Checked (using chemical smoke) that air flows into exhaust fan grille(s) \Box

If fans are running but air is not flowing toward the exhaust intake, check for the following:

- Inoperable dampers
- · Obstructed, leaky, or disconnected ductwork
- Undersized or improperly installed fan
- Broken fan belt



√No N/A



5. EXHAUST SYSTEMS (continued)

ACTIVITY 20: EXHAUST AIRFLOW

NOTE: Prevent migration of indoor contaminants from areas such as bathrooms, kitchens, and labs by keeping them under negative pressure (as compared to surrounding spaces).

5b. Checked (using chemical smoke) that air is drawn into the room from Yes. No N/A adjacent spaces

Stand outside the room with the door slightly open while checking airflow high and low in the door opening (see "How to Measure Airflow").

ACTIVITY 21: EXHAUST DUCTWORK

6. QUANTITY OF OUTDOOR AIR

ACTIVITY 22: OUTDOOR AIR MEASUREMENTS AND CALCULATIONS

NOTE: Refer to "How to Measure Airflow" for techniques.

6a. Measured the quantity of outdoor air supplied (22a) to each ventilation 6b. Calculated the number of occupants served (22b) by the ventilation unit under consideration 6c. Divided outdoor air supply (22a) by the number of occupants (22b) to determine the existing quantity of outdoor air supply per person (22c)....... **ACTIVITY 23: ACCEPTABLE LEVELS OF OUTDOOR AIR QUANTITIES** 6d. Compared the existing outdoor air per person (22c) to the recommended levels in Table 1 6e. Corrected problems with ventilation units that supplied inadequate quantities of outdoor air to ensure that outdoor air quantities (22c) meet

NOTES All HVAC units through the BAS have advanced ventilation control logic deployed associated with the spaces they serve. The system will modulate the outdoor air damper and return dampers to provide the proper amount of air as needed to maintain space CO2 levels. This type of control is called CO2 based Demand-Controlled Ventilation (DCV). DCV provides proper ventilation air quantities as well as energy

savings by reducing the amount of required ventilation air based on the CO2 levels measured by the sensor. The CO2 levels in parts per million (PPM) is used as an indicator of the number of occupants in a room. When the room has less than design occupancy, the required volume of ventilation is reduced. The CO2 sensor allows the VFD to reduce the fan speed to deliver a reduced volume of outside air for ventilation during these periods. An increase in the CO2 level is an indication that more people are in the room, so the fan speed is increased to maintain the required volume of ventilation air under all occupancy conditions.

Active DCV control is an acceptable alternate method to determine if ventilation requirements are met and could supersede rooms that may fail otherwise using traditional measured data collection procedures prescribed by established ASHRAE guidelines.

The ideal supply of outside air to interior occupied spaces should be based upon the 2018 Connecticut Building Code, which is based on the most currently adopted 2015 International Mechanical Code and coincides with ASHRAE-62.1, (2010) guidelines

BAS: Building Automation System

VFD: Variable Frequency Drive (Controls the speed of the fan motor) ASHRAE: American Society of Heating, Refrigerating and Air Conditioning Engineers

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Instructions

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- 2. Keep the Background Information and make a copy of this checklist for each ventilation unit in your school, as well as a copy for future reference.
- 3. Complete the Checklist.
 - Check the "yes," "no," or "not applicable" box beside each item. (A "no" response requires further attention.)
 - Make comments in the "Notes" section as necessary.
- Return the checklist portion of this document to the IAQ Coordinator.

Ventilation Checklist

Name:	Stephen	Martoni				
School:	Amity	Middle	School	Orunge		
	tilator/AHU No:	8			1 2/ 24	1
Room or	110/	hed.	Date	Completed:	1-26-2-	1
Signature	: A f					

1. OUTDOOR AIR INTAKES

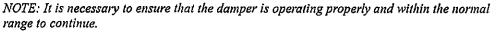
1a.	Marked locations of all outdoor air intakes on a small floor plan (for example, a fire escape floor plan)			N/A
1b.	Ensured that the ventilation system was on and operating in "occupied" mode	,	D	
AC	TIVITY 1: OBSTRUCTIONS			
1c.	Ensured that outdoor air intakes are clear of obstructions, debris, clogs, or covers	Z		D
1d.	Installed corrective devices as necessary (e.g., if snowdrifts or leaves frequently block an intake)		ø	
AC	TIVITY 2: POLLUTANT SOURCES			
	Checked ground-level intakes for pollutant sources (dumpsters, loading docks, and bus-idling areas)	Z		
1 f.	Checked rooftop intakes for pollutant sources (plumbing vents; kitchen, toilet, or laboratory exhaust fans; puddles; and mist from air-conditioning cooling towers)	7		
lg.	Resolved any problems with pollutant sources located near outdoor air intakes (e.g., relocated dumpster or extended exhaust pipe)	/		
AC	TIVITY 3: AIRFLOW			
1h.	Obtained chemical smoke (or a small piece of tissue paper or light plastic) Confirmed that outdoor air is entering the intake appropriately			
2.	SYSTEM CLEANLINESS			
AC	TIVITY 4: AIR FILTERS			
	Replaced filters per maintenance schedule	Z		
2b.	Shut off ventilation system fans while replacing filters (prevents dirt from blowing downstream)	N		
2c.	Vacuumed filter areas before installing new filters	Z		
2d.	Confirmed proper fit of filters to prevent air from bypassing (flowing			

2. SYSTEM CLEANLINESS (continued)

ACTIVITY 5: DRAIN PANS

.

ACTIVITY 5: DRAIN PAINS			
accumulating)	. 🗹		N/A Ci
2g. Cleaned drain pans	. 🗹		D
2h. Checked drain pans for mold and mildew	Ø		
ACTIVITY 6: COILS	_/	_	_
2i. Ensured that heating and cooling coils are clean	.⊿	Q	
ACTIVITY 7: AIR-HANDLING UNITS, UNIT VENTILATORS			
2i. Ensured that the interior of air-handling unit(s) or unit ventilator	ر ا		
(air-mixing chamber and fan blades) is clean	.ø,		
(air-mixing chamber and fan blades) is clean	p		
ACTIVITY 8: MECHANICAL ROOMS	,		
21. Checked mechanical room for unsanitary conditions, leaks, and spills			
2m. Ensured that mechanical rooms and air-mixing chambers are free of trash, chemical products, and supplies	ø	۵	
3. CONTROLS FOR OUTDOOR AIR SUPPLY			
3. CONTROLS FOR OUTDOOR AIR SUPPLY			
3a. Ensured that air dampers are at least partially open (minimum position)3b. Ensured that minimum position provides adequate outdoor air	<u> </u>		ø
for occupants	n	П	
······································		—	$\boldsymbol{\mathcal{L}}$
ACTIVITY 9: CONTROLS INFORMATION			
3c. Obtained and reviewed all design inside/outside temperature and humidity			
requirements, controls specifications, as-built mechanical drawings.			
and controls operations manuals (often uniquely designed)	Ø		
ACTIVITY 10: CLOCKS, TIMERS, SWITCHES			
3d. Turned summer-winter switches to the correct position			
3e. Set time clocks appropriately			
3f. Ensured that settings fit the actual schedule of building use (including		_	<i>•</i>
night/weekend use)	Ø		
· ·	•		
ACTIVITY 11: CONTROL COMPONENTS			
3g. Ensured appropriate system pressure by testing line pressure at both the			•
occupied (day) setting and the unoccupied (night) setting			Д,
3h. Checked that the line dryer prevents moisture buildup			Ď
3i. Replaced control system filters at the compressor inlet based on the			
compressor manufacturer's recommendation (for example, when you	_	_	
blow down the tank)			Ø
3j. Set the line pressure at each thermostat and damper actuator at the proper	-	a	
level (no leakage or obstructions)	. Ц	ų	4
ACTIVITY 12: OUTDOOR AIR DAMPERS			
3k. Ensured that the outdoor air damper is visible for inspection	⊿		<u>с</u> .
31. Ensured that the recirculating relief and/or exhaust dampers are visible		-	-
for inspection	<u>⊿</u>		
3m. Ensured that air temperature in the indoor area(s) served by each			
outdoor air damper is within the normal operating range	ø	Q	
NOTE: It is necessary to ensure that the downey is exercised more when and within			







3n.	Checked that the outdoor air damper fully closes within a few minutes of shutting off appropriate air handler	Yes ⊡∕	№ 0	N/A
	Checked that the outdoor air damper opens (at least partially with no delay) when the air handler is turned on) ¤	þ	D
Зр.	If in heating mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to $85^{\circ}F$	ם		Ŕ
	If in cooling mode, checked that the outdoor air damper goes to its minimu position (without completely closing) when the room thermostat is set to 60°F and mixed air thermostat is set to 45°F			7
эг.	 If the outdoor air damper does not move, confirmed the following items: The damper actuator links to the damper shaft, and any linkage set screws or bolts are tight	. 2		
	 The outside air inerniostat(s) is functioning property (e.g., in the right location, calibrated correctly) 			D

Proceed to Activities 13-16 if the damper seems to be operating properly.

ACTIVITY 13: FREEZE STATS

3s.	Disconnected power to controls (for automatic reset only) to test continuity across terminals	ü	ø
OR			1
3t.	Confirmed (if applicable) that depressing the manual reset button (usually red) trips the freeze stat (clicking sound indicates freeze stat was		
	tripped)	Q	
3u.	Assessed the feasibility of replacing all manual reset freeze-stats with automatic reset freeze-stats	_	

NOTE: HVAC systems with water coils need protection from the cold. The freeze-stat may close the outdoor air damper and disconnect the supply air when tripped. The typical trip range is 35°F to 42°F.

ACTIVITY 14: MIXED AIR THERMOSTATS

3v.	Ensured that the mixed air stat for heating mode is set no higher than 65°F		
3w.	Ensured that the mixed air stat for cooling mode is set no lower than the room thermostat setting	·/_	٦

ACTIVITY 15: ECONOMIZERS

3x. Confirmed proper economizer settings based on design specifications or local practices

NOTE: The dry-bulb is typically set at 65°F or lower.

- 3y. Checked that sensor on the economizer is shielded from direct sunlight \square
- 3z. Ensured that dampers operate properly (for outside air, return air,
- exhaust/relief air, and recirculated air), per the design specifications

NOTE: Economizers use varying amounts of cool outdoor air to assist with the cooling load of the room or rooms. There are two types of economizers, dry-bulb and enthalpy. Dry-bulb economizers vary the amount of outdoor air based on outdoor temperature, and enthalpy economizers vary the amount of outdoor air based on outdoor temperature and humidity level.

ACTIVITY 16: FANS

3aa. Ensured that all fans (supply fans and associated return or relief fans) that move outside air indoors continuously operate during occupied Yes No N/A hours (even when room thermostat is satisfied)......

NOTE: If fan shuts off when the thermostat is satisfied, adjust control cycle as necessary to ensure sufficient outdoor air supply.

4. AIR DISTRIBUTION

ACTIVITY 17: AIR DISTRIBUTION

4a.	Ensured that supply and return air pathways in the existing ventilation system perform as required		D
4Ъ.	Ensured that passive gravity relief ventilation systems and transfer grilles between rooms and corridors are functioning		
	TE: If ventilation system is closed or blocked to meet current fire codes, consult v fessional engineer for remedies.	vith a	
	Made sure every occupied space has supply of outdoor air (mechanical system or operable windows)		a a
	TE: If outlets have been blocked intentionally to correct drafts or discomfort, invo I correct the cause of the discomfort and reopen the vents.	estiga	te
	Modified the HVAC system to supply outside air to areas without an outdoor air supply	ď	
4f.	Modified existing HVAC systems to incorporate any room or zone layout and population changes	D	
4g.	Moved all barriers (for example, room dividers, large free-standing blackboards or displays, bookshelves) that could block movement of air in the room, especially those blocking air vents	þ	⊿

4h.	Ensured that unit ventilators are quiet enough to accommodate classroom activities	ר	
4:		-	9
41,	Ensured that classrooms are free of uncomfortable drafts produced by air from supply terminals].	

ACTIVITY 18: PRESSURIZATION IN BUILDINGS

NOTE: To prevent infiltration of outdoor pollutants, the ventilation system is designed to maintain positive pressurization in the building. Therefore, ensure that the system, including any exhaust fans, is operating on the "occupied" cycle when doing this activity.

4j.	Ensured that air flows out of the building (using chemical smoke) through		,
	windows, doors, or other cracks and holes in exterior wall (for example,	1	
	floor joints, pipe openings)	ত্র	Ū

5. EXHAUST SYSTEMS

ACTIVITY 19: EXHAUST FAN OPERATION

5a. Checked (using chemical smoke) that air flows into exhaust fan grille(s) D 💋

- If fans are running but air is not flowing toward the exhaust intake, check for the following:
 - Inoperable dampers
 - Obstructed, leaky, or disconnected ductwork
 - Undersized or improperly installed fan
 - Broken fan belt





5. EXHAUST SYSTEMS (continued)

ACTIVITY 20: EXHAUST AIRFLOW

NOTE: Prevent migration of indoor contaminants from areas such as bathrooms, kitchens, and labs by keeping them under negative pressure (as compared to surrounding spaces).

5b. Checked (using chemical smoke) that air is drawn into the room from Yes. No N/A adjacent spaces

Stand outside the room with the door slightly open while checking airflow high and low in the door opening (see "How to Measure Airflow").

ACTIVITY 21: EXHAUST DUCTWORK

6. QUANTITY OF OUTDOOR AIR

ACTIVITY 22: OUTDOOR AIR MEASUREMENTS AND CALCULATIONS

NOTE: Refer to "How to Measure Airflow" for techniques.

6a. Measured the quantity of outdoor air supplied (22a) to each ventilation 6b. Calculated the number of occupants served (22b) by the ventilation unit 6c. Divided outdoor air supply (22a) by the number of occupants (22b) to determine the existing quantity of outdoor air supply per person (22c) **ACTIVITY 23: ACCEPTABLE LEVELS OF OUTDOOR AIR OUANTITIES** 6d. Compared the existing outdoor air per person (22c) to the recommended levels in Table 1 6e. Corrected problems with ventilation units that supplied inadequate quantities of outdoor air to ensure that outdoor air quantities (22c) meet the recommended levels in Table 1.....

NOTES All HVAC units through the BAS have advanced ventilation control logic deployed associated with the spaces they serve. The system will modulate the outdoor air damper and return dampers to provide the proper amount of air as needed to maintain space CO2 levels. This type of control is called CO2 based Demand-Controlled Ventilation (DCV). DCV provides proper ventilation air quantities as well as energy savings by reducing the amount of required ventilation air based on the CO2 levels measured by the sensor. The CO2 levels in parts per million (PPM) is used as an indicator of the number of occupants in a room. When the room has less than design occupancy, the required volume of ventilation is reduced. The CO2 sensor allows the VFD to reduce the fan speed to deliver a reduced volume of outside air for ventilation during these periods. An increase in the CO2 level is an indication that more people are in the room, so the fan speed is increased to maintain the required volume of ventilation air under all occupancy conditions.

Active DCV control is an acceptable alternate method to determine if ventilation requirements are met and could supersede rooms that may fail otherwise using traditional measured data collection procedures prescribed by established ASHRAE guidelines.

The ideal supply of outside air to interior occupied spaces should be based upon the 2018 Connecticut Building Code, which is based on the most currently adopted 2015 International Mechanical Code and coincides with ASHRAE-62.1, (2010) guidelines

BAS: Building Automation System VFD: Variable Frequency Drive (Controls the speed of the fan motor) ASHRAE: American Society of Heating, Refrigerating and Air Conditioning Engineers . . . (

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Instructions

- 1. Read the *IAQ Backgrounder* and the Background Information for this checklist.
- 2. Keep the Background Information and make a copy of this checklist for **each** ventilation unit in your school, as well as a copy for future reference.
- 3. Complete the Checklist.
 - Check the "yes," "no," or "not applicable" box beside each item. (A "no" response requires further attention.)
 - Make comments in the "Notes" section as necessary.
- Return the checklist portion of this document to the IAQ Coordinator.

Ventilation Checklist

Name:	Stephen	Martoni	*		
School:	Amity	Middle	School	0 Tunge	2
Unit Vent	ilator/AHU N	o:4			1 2/ 2/
Room or .	111	HI+ NAS	Date	Completed:	1- 76-29
Signature	: soff				

1. OUTDOOR AIR INTAKES

la.	Marked locations of all outdoor air intakes on a small floor plan (for vest example, a fire escape floor plan)		N/A
1b.	Ensured that the ventilation system was on and operating in "occupied" mode		D
AC	TIVITY 1: OBSTRUCTIONS		
1c.	Ensured that outdoor air intakes are clear of obstructions, debris, clogs, or covers	D	D
1d.	Installed corrective devices as necessary (e.g., if snowdrifts or leaves frequently block an intake) \Box		D
AC	TIVITY 2: POLLUTANT SOURCES		
le.	Checked ground-level intakes for pollutant sources (dumpsters, loading docks, and bus-idling areas)		D
1f.	Checked rooftop intakes for pollutant sources (plumbing vents; kitchen, toilet, or laboratory exhaust fans; puddles; and mist from air-conditioning cooling towers)		D
1g.	Resolved any problems with pollutant sources located near outdoor air intakes (e.g., relocated dumpster or extended exhaust pipe)		
AC	TIVITY 3: AIRFLOW		
1h.	Obtained chemical smoke (or a small piece of tissue paper or light plastic) Confirmed that outdoor air is entering the intake appropriately		
2.	SYSTEM CLEANLINESS		
AC	TIVITY 4: AIR FILTERS		
	Replaced filters per maintenance schedule		
	Shut off ventilation system fans while replacing filters (prevents dirt from blowing downstream)	, 0	D
2c.	Vacuumed filter areas before installing new filters		
2d.	Confirmed proper fit of filters to prevent air from bypassing (flowing around) the air filter	D	

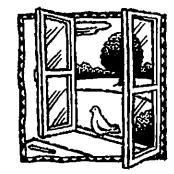
2e. Confirmed proper installation of filters (correct direction for airflow)........ \square

2. SYSTEM CLEANLINESS (continued)

ACTIVITY 5: DRAIN PANS 2f. Ensured that drain pans slant toward the drain (to prevent water from Yes No N/A accumulating) 2h. Checked drain pans for mold and mildew **ACTIVITY 6: COILS** ACTIVITY 7: AIR-HANDLING UNITS, UNIT VENTILATORS 2j. Ensured that the interior of air-handling unit(s) or unit ventilator 2k. Ensured that ducts are clean **ACTIVITY 8: MECHANICAL ROOMS** 2m. Ensured that mechanical rooms and air-mixing chambers are free of trash, chemical products, and supplies 3. CONTROLS FOR OUTDOOR AIR SUPPLY 3a. Ensured that air dampers are at least partially open (minimum position) 🗆 🛛 3b. Ensured that minimum position provides adequate outdoor air **ACTIVITY 9: CONTROLS INFORMATION** 3c. Obtained and reviewed all design inside/outside temperature and humidity requirements, controls specifications, as-built mechanical drawings, **ACTIVITY 10: CLOCKS, TIMERS, SWITCHES** 3d. Turned summer-winter switches to the correct position 3e. Set time clocks appropriately Ø 3f. Ensured that settings fit the actual schedule of building use (including ACTIVITY 11: CONTROL COMPONENTS 3g. Ensured appropriate system pressure by testing line pressure at both the occupied (day) setting and the unoccupied (night) setting Ъ 3h. Checked that the line dryer prevents moisture buildup 3i. Replaced control system filters at the compressor inlet based on the compressor manufacturer's recommendation (for example, when you blow down the tank)..... Ø Set the line pressure at each thermostat and damper actuator at the proper 3j. Z level (no leakage or obstructions) **ACTIVITY 12: OUTDOOR AIR DAMPERS** 31. Ensured that the recirculating relief and/or exhaust dampers are visible for inspection 3m. Ensured that air temperature in the indoor area(s) served by each

NOTE: It is necessary to ensure that the damper is operating properly and within the normal range to continue.

2 of 5



3n.	Checked that the outdoor air damper fully closes within a few minutes of shutting off appropriate air handler	Yes	010 □	N/A □	
30.	Checked that the outdoor air damper opens (at least partially with no delay) when the air handler is turned on	Z		a	
3р.	If in heating mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 85°F	. ם	۵	۶,	
•	If in cooling mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 60°F and mixed air thermostat is set to 45°F		Q	7	
3r.	 If the outdoor air damper does not move, confirmed the following items: The damper actuator links to the damper shaft, and any linkage set screws or bolts are tight 				
	• Moving parts are free of impediments (e.g., rust, corrosion)	2		D	
	• Electrical wire or pneumatic tubing connects to the damper actuator			D	
	• The outside air thermostat(s) is functioning properly (e.g., in the right location, calibrated correctly)		, 		

Proceed to Activities 13-16 if the damper seems to be operating properly.

ACTIVITY 13: FREEZE STATS

3s.	Disconnected power to controls (for automatic reset only) to test continuity across terminals	۵	ø
OR			4
3t.	Confirmed (if applicable) that depressing the manual reset button (usually red) trips the freeze stat (clicking sound indicates freeze stat was		
	tripped)	Q	
3u.	Assessed the feasibility of replacing all manual reset freeze-stats with automatic reset freeze-stats	_	

NOTE: HVAC systems with water coils need protection from the cold. The freeze-stat may close the outdoor air damper and disconnect the supply air when tripped. The typical trip range is 35°F to 42°F.

ACTIVITY 14: MIXED AIR THERMOSTATS

3v. Ensured that the mixed air stat for heating mode is set no higher than 65°F		
3w. Ensured that the mixed air stat for cooling mode is set no lower than the room thermostat setting	, D	
ACTIVITY 15: ECONOMIZERS		
3x. Confirmed proper economizer settings based on design specifications or local practices		Q
NOTE: The dry-bulb is typically set at 65°F or lower.		
3y. Checked that sensor on the economizer is shielded from direct sunlight	7	Q

NOTE: Economizers use varying amounts of cool outdoor air to assist with the cooling load of the room or rooms. There are two types of economizers, dry-bulb and enthalpy. Dry-bulb economizers vary the amount of outdoor air based on outdoor temperature, and enthalpy economizers vary the amount of outdoor air based on outdoor temperature and humidity level.

ACTIVITY 16: FANS

3aa. Ensured that all fans (supply fans and associated return or relief fans) that move outside air indoors continuously operate during occupied Yes No N/A hours (even when room thermostat is satisfied)......

NOTE: If fan shuts off when the thermostat is satisfied, adjust control cycle as necessary to ensure sufficient outdoor air supply.

4. AIR DISTRIBUTION

ACTIVITY 17: AIR DISTRIBUTION

 4a. Ensured that supply and return air pathways in the existing ventilation system perform as required. 4b. Ensured that passive gravity relief ventilation systems and transfer grilles between rooms and corridors are functioning.
NOTE: If ventilation system is closed or blocked to meet current fire codes, consult with a professional engineer for remedies.
 4c. Made sure every occupied space has supply of outdoor air (mechanical system or operable windows) 4d. Ensured that supply and return vents are open and unblocked
NOTE: If outlets have been blocked intentionally to correct drafts or discomfort, investigate and correct the cause of the discomfort and reopen the vents.
4e. Modified the HVAC system to supply outside air to areas without an outdoor air supply
4f. Modified existing HVAC systems to incorporate any room or zone layout and population changes
4g. Moved all barriers (for example, room dividers, large free-standing blackboards or displays, bookshelves) that could block movement of air in the room, especially those blocking air vents
4h. Ensured that unit ventilators are quiet enough to accommodate classroom activities
4i. Ensured that classrooms are free of uncomfortable drafts produced by air

ACTIVITY 18: PRESSURIZATION IN BUILDINGS

NOTE: To prevent infiltration of outdoor pollutants, the ventilation system is designed to maintain positive pressurization in the building. Therefore, ensure that the system, including any exhaust fans, is operating on the "occupied" cycle when doing this activity.

4j.	Ensured that air flows out of the building (using chemical smoke) through		,
	windows, doors, or other cracks and holes in exterior wall (for example,	/	
	floor joints, pipe openings)	ত্র	Ø

5. EXHAUST SYSTEMS

ACTIVITY 19: EXHAUST FAN OPERATION

5a. Checked (using chemical smoke) that air flows into exhaust fan grille(s) D

- If fans are running but air is not flowing toward the exhaust intake, check for the following: • Inoperable dampers

 - Obstructed, leaky, or disconnected ductwork
 - · Undersized or improperly installed fan
 - Broken fan belt





5. EXHAUST SYSTEMS (continued)

ACTIVITY 20: EXHAUST AIRFLOW

NOTE: Prevent migration of indoor contaminants from areas such as bathrooms, kitchens, and labs by keeping them under negative pressure (as compared to surrounding spaces).

5b.	Checked (using chemical smoke) that air is drawn into the room from	Yeş.	No	N/A
	adjacent spaces	. ø		

Stand outside the room with the door slightly open while checking airflow high and low in the door opening (see "How to Measure Airflow").

ACTIVITY 21: EXHAUST DUCTWORK

5d. Checked that the exhaust ductwork downstream of the exhaust fan (which is under positive pressure) is sealed and in good condition......

6. QUANTITY OF OUTDOOR AIR

ACTIVITY 22: OUTDOOR AIR MEASUREMENTS AND CALCULATIONS

NOTE: Refer to "How to Measure Airflow" for techniques.

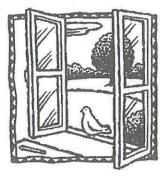
6a. Measured the quantity of outdoor air supplied (22a) to each ventilation n 6b. Calculated the number of occupants served (22b) by the ventilation unit under consideration 6c. Divided outdoor air supply (22a) by the number of occupants (22b) to determine the existing quantity of outdoor air supply per person (22c) **ACTIVITY 23: ACCEPTABLE LEVELS OF OUTDOOR AIR OUANTITIES** 6d. Compared the existing outdoor air per person (22c) to the recommended levels in Table 1 6e. Corrected problems with ventilation units that supplied inadequate quantities of outdoor air to ensure that outdoor air quantities (22c) meet the recommended levels in Table 1

NOTES All HVAC units through the BAS have advanced ventilation control logic deployed associated with the spaces they serve. The system will modulate the outdoor air damper and return dampers to provide the proper amount of air as needed to maintain space CO2 levels. This type of control is called CO2 based Demand-Controlled Ventilation (DCV). DCV provides proper ventilation air quantities as well as energy savings by reducing the amount of required ventilation air based on the CO2 levels measured by the sensor. The CO2 levels in parts per million (PPM) is used as an indicator of the number of occupants in a room. When the room has less than design occupancy, the required volume of ventilation is reduced. The CO2 sensor allows the VFD to reduce the fan speed to deliver a reduced volume of outside air for ventilation during these periods. An increase in the CO2 level is an indication that more people are in the room, so the fan speed is increased to maintain the required volume of ventilation air under all occupancy conditions.

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 - Make comments in the "Notes" section as necessary.
- Return the checklist portion of this document to the IAQ Coordinator.

Ventilation Checklist

				And and a second se		
Name:	Stephan	Mortoni	<u>.</u>			
School:	Amity	Middle S	ic hool	Orange		
Jnit Venti	ilator/AHU No:	10		· · · · · · · · · · · · · · · · · · ·		
Room or A	Area: <u>M</u>	JSIC	Date	Completed:	1-26-1	O
Signature:	: Ly f	45				
	1					

1. OUTDOOR AIR INTAKES

1a.	Marked locations of all outdoor air intakes on a small floor plan (for example, a fire escape floor plan)			N/A
1b.	Ensured that the ventilation system was on and operating in "occupied" mode	,	D	D
AC	TIVITY 1: OBSTRUCTIONS			
1c.	Ensured that outdoor air intakes are clear of obstructions, debris, clogs, or covers	Z		
1d.	Installed corrective devices as necessary (e.g., if snowdrifts or leaves frequently block an intake)			۵
AC	TIVITY 2: POLLUTANT SOURCES			
	Checked ground-level intakes for pollutant sources (dumpsters, loading docks, and bus-idling areas)	.A		
1f.	Checked rooftop intakes for pollutant sources (plumbing vents; kitchen, toilet, or laboratory exhaust fans; puddles; and mist from air-conditioning cooling towers)	.Z	D	
1g.	Resolved any problems with pollutant sources located near outdoor air intakes (e.g., relocated dumpster or extended exhaust pipe)	1		
AC	TIVITY 3: AIRFLOW			7
1h.	Obtained chemical smoke (or a small piece of tissue paper or light plastic). Confirmed that outdoor air is entering the intake appropriately			
2.	SYSTEM CLEANLINESS			
	TIVITY 4: AIR FILTERS			
	Replaced filters per maintenance schedule	Z.		
2b.	Shut off ventilation system fans while replacing filters (prevents dirt from blowing downstream)	, Z,	D	
	Vacuumed filter areas before installing new filters	.Z		
2d.	Confirmed proper fit of filters to prevent air from bypassing (flowing			

2. SYSTEM CLEANLINESS (continued)

ACTIVITY 5: DRAIN PANS

ACTIVITY 5: DRAIN PANS			
accumulating)	Z,		N/A
2g. Cleaned drain pans	4	Q	
2h. Checked drain pans for mold and mildew	₫		Q
ACTIVITY 6: COILS	_/	_	-
2i. Ensured that heating and cooling coils are clean	Δ	D	ū
ACTIVITY 7: AIR-HANDLING UNITS, UNIT VENTILATORS			
2j. Ensured that the interior of air-handling unit(s) or unit ventilator	1		
(air-mixing chamber and fan blades) is clean	۵,	Q	
(air-mixing chamber and fan blades) is clean	Z	Q	
ACTIVITY 8: MECHANICAL ROOMS			
21. Checked mechanical room for unsanitary conditions, leaks, and spills	Z		
2m. Ensured that mechanical rooms and air-mixing chambers are free of trash,	,		
chemical products, and supplies	Z		
3. CONTROLS FOR OUTDOOR AIR SUPPLY			
3a. Ensured that air dampers are at least partially open (minimum position)	ב		\not
3b. Ensured that minimum position provides adequate outdoor air		_	1
for occupants	_ _		μ
ACTIVITY 9: CONTROLS INFORMATION			
3c. Obtained and reviewed all design inside/outside temperature and humidity			
requirements, controls specifications, as-built mechanical drawings,	1		
and controls operations manuals (often uniquely designed)	4		
ACTIVITY 10: CLOCKS, TIMERS, SWITCHES	•		
3d. Turned summer-winter switches to the correct position			
3e. Set time clocks appropriately	ב		Ā
3f. Ensured that settings fit the actual schedule of building use (including	~	_	_
night/weekend use)	<u>-</u>		
ACTIVITY 11: CONTROL COMPONENTS			
3g. Ensured appropriate system pressure by testing line pressure at both the	_		~
occupied (day) setting and the unoccupied (night) setting			
3h. Checked that the line dryer prevents moisture buildup	_		
3i. Replaced control system filters at the compressor inlet based on the compressor manufacturer's recommendation (for example, when you			•
blow down the tank)	Ъ		Z
3j. Set the line pressure at each thermostat and damper actuator at the proper	-	-	~
level (no leakage or obstructions)	ב		Ø
ACTIVITY 12: OUTDOOR AIR DAMPERS			
3k. Ensured that the outdoor air damper is visible for inspection	∕		o.
31. Ensured that the recirculating relief and/or exhaust dampers are visible	,	-	_
for inspection	6		D
3m. Ensured that air temperature in the indoor area(s) served by each			
outdoor air damper is within the normal operating range		۵	
NOTE: It is an and the second that the domain of the second is a second se			

NOTE: It is necessary to ensure that the damper is operating properly and within the normal range to continue.





3n.	Checked that the outdoor air damper fully closes within a few minutes Yes of shutting off appropriate air handler		N/A
30.	Checked that the outdoor air damper opens (at least partially with no delay) when the air handler is turned on	´ ם	
3р.	If in heating mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 85°F	a	ø
3q.	If in cooling mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 60° F and mixed air thermostat is set to 45° F	a	\$
3r.	If the outdoor air damper does not move, confirmed the following items:		4
	 The damper actuator links to the damper shaft, and any linkage set screws or bolts are tight		٩
	• Moving parts are free of impediments (e.g., rust, corrosion)	्रव	ū
	• Electrical wire or pneumatic tubing connects to the damper actuator		
	• The outside air thermostat(s) is functioning properly (e.g., in the right location, calibrated correctly)		D

Proceed to Activities 13–16 if the damper seems to be operating properly.

ACTIVITY 13: FREEZE STATS

3s.	Disconnected power to controls (for automatic reset only) to test continuity across terminals	۵	ø
OR			4
3t.	Confirmed (if applicable) that depressing the manual reset button (usually red) trips the freeze stat (clicking sound indicates freeze stat was tripped)		
3u.	Assessed the feasibility of replacing all manual reset freeze-stats with automatic reset freeze-stats.	_	

NOTE: HVAC systems with water coils need protection from the cold. The freeze-stat may close the outdoor air damper and disconnect the supply air when tripped. The typical trip range is $35^{\circ}F$ to $42^{\circ}F$.

ACTIVITY 14: MIXED AIR THERMOSTATS

3v.	Ensured that the mixed air stat for heating mode is set no higher than 65°F	
3w.	Ensured that the mixed air stat for cooling mode is set no lower than the room thermostat setting	D
AC	TIVITY 15: ECONOMIZERS	
3x.	Confirmed proper economizer settings based on design specifications or local practices	Q
NO	TE: The dry-bulb is typically set at 65°F or lower.	
Зу.	Checked that sensor on the economizer is shielded from direct sunlight	a
3z.	Ensured that dampers operate properly (for outside air, return air, exhaust/relief air, and recirculated air), per the design specifications	
NO	TE. Economican upo permise amounts of cool outdoor air to again with the cooling	

NOTE: Economizers use varying amounts of cool outdoor air to assist with the cooling load of the room or rooms. There are two types of economizers, dry-bulb and enthalpy. Dry-bulb economizers vary the amount of outdoor air based on outdoor temperature, and enthalpy economizers vary the amount of outdoor air based on outdoor temperature and humidity level.

ACTIVITY 16: FANS

3aa. Ensured that all fans (supply fans and associated return or relief fans) that move outside air indoors continuously operate during occupied Yes No N/A

NOTE: If fan shuts off when the thermostat is satisfied, adjust control cycle as necessary to ensure sufficient outdoor air supply.

4. AIR DISTRIBUTION

ACTIVITY 17: AIR DISTRIBUTION

4a.	Ensured that supply and return air pathways in the existing ventilation system perform as required			
4b.	Ensured that passive gravity relief ventilation systems and transfer grilles between rooms and corridors are functioning			
NOTE: If ventilation system is closed or blocked to meet current fire codes, consult with a professional engineer for remedies.				
	Made sure every occupied space has supply of outdoor air (mechanical system or operable windows)			
NOTE: If outlets have been blocked intentionally to correct drafts or discomfort, investigate and correct the cause of the discomfort and reopen the vents.				
	Modified the HVAC system to supply outside air to areas without an outdoor air supply			
4f.	Modified existing HVAC systems to incorporate any room or zone layout and population changes	Q		
4g.	Moved all barriers (for example, room dividers, large free-standing blackboards or displays, bookshelves) that could block movement of air in the room, especially those blocking air vents	ū	ø	

activities 4i. Ensured that classrooms are free of uncomfortable drafts produced by air from supply terminals **D**. **D**

4h. Ensured that unit ventilators are quiet enough to accommodate classroom

ACTIVITY 18: PRESSURIZATION IN BUILDINGS

NOTE: To prevent infiltration of outdoor pollutants, the ventilation system is designed to maintain positive pressurization in the building. Therefore, ensure that the system, including any exhaust fans, is operating on the "occupied" cycle when doing this activity.

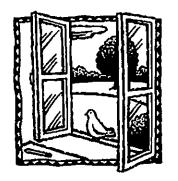
4j.	Ensured that air flows out of the building (using chemical smoke) through		,
	windows, doors, or other cracks and holes in exterior wall (for example,	/	
	floor joints, pipe openings)	ত্র	

5. EXHAUST SYSTEMS

ACTIVITY 19: EXHAUST FAN OPERATION

5a. Checked (using chemical smoke) that air flows into exhaust fan grille(s)

- If fans are running but air is not flowing toward the exhaust intake, check for the following:
 - Inoperable dampers
 - · Obstructed, leaky, or disconnected ductwork
 - Undersized or improperly installed fan
 - Broken fan belt





5. EXHAUST SYSTEMS (continued)

ACTIVITY 20: EXHAUST AIRFLOW

NOTE: Prevent migration of indoor contaminants from areas such as bathrooms, kitchens, and labs by keeping them under negative pressure (as compared to surrounding spaces).

5b.			N/A
	adjacent spaces	¤	

Stand outside the room with the door slightly open while checking airflow high and low in the door opening (see "How to Measure Airflow").

ACTIVITY 21: EXHAUST DUCTWORK

5d. Checked that the exhaust ductwork downstream of the exhaust fan (which is under positive pressure) is sealed and in good condition......

6. QUANTITY OF OUTDOOR AIR

ACTIVITY 22: OUTDOOR AIR MEASUREMENTS AND CALCULATIONS

NOTE: Refer to "How to Measure Airflow" for techniques.

6a. Measured the quantity of outdoor air supplied (22a) to each ventilation unit 6b. Calculated the number of occupants served (22b) by the ventilation unit under consideration 6c. Divided outdoor air supply (22a) by the number of occupants (22b) to determine the existing quantity of outdoor air supply per person (22c) **ACTIVITY 23: ACCEPTABLE LEVELS OF OUTDOOR AIR QUANTITIES** 6d. Compared the existing outdoor air per person (22c) to the recommended levels in Table 1 6e. Corrected problems with ventilation units that supplied inadequate quantities of outdoor air to ensure that outdoor air quantities (22c) meet the recommended levels in Table 1

NOTES All HVAC units through the BAS have advanced ventilation control logic deployed associated with the spaces they serve. The system will modulate the outdoor air damper and return dampers to provide the proper amount of air as needed to maintain space CO2 levels. This type of control is called CO2 based Demand-Controlled Ventilation (DCV). DCV provides proper ventilation air quantities as well as energy savings by reducing the amount of required ventilation air based on the CO2 levels measured by the sensor. The CO2 levels in parts per million (PPM) is used as an indicator of the number of occupants in a room. When the room has less than design occupancy, the required volume of ventilation is reduced. The CO2 sensor allows the VFD to reduce the fan speed to deliver a reduced volume of outside air for ventilation during these periods. An increase in the CO2 level is an indication that more people are in the room, so the fan speed is increased to maintain the required volume of ventilation air under all occupancy conditions.

Active DCV control is an acceptable alternate method to determine if ventilation requirements are met and could supersede rooms that may fail otherwise using traditional measured data collection procedures prescribed by established ASHRAE guidelines.

The ideal supply of outside air to interior occupied spaces should be based upon the 2018 Connecticut Building Code, which is based on the most currently adopted 2015 International Mechanical Code and coincides with ASHRAE-62.1, (2010) guidelines



BAS: Building Automation System VFD: Variable Frequency Drive (Controls the speed of the fan motor) ASHRAE: American Society of Heating, Refrigerating and Air Conditioning Engineers



Instructions

- 1. Read the *IAQ Backgrounder* and the Background Information for this checklist.
- 2. Keep the Background Information and make a copy of this checklist for each ventilation unit in your school, as well as a copy for future reference.
- 3. Complete the Checklist.
 - Check the "yes," "no," or "not applicable" box beside each item. (A "no" response requires further attention.)
 - Make comments in the "Notes" section as necessary.
- 4. Return the checklist portion of this document to the IAQ Coordinator.

Ventilation Checklist

Name:	Stephen	Martoni				
School:	Amity	Middle	School	Olonge		
Unit Ven	tilator/AHU No	•				
Room or	Area: /	<u> </u>	Date	Completed:	1-29-24	
Sionatur	e: Ly	45	and the second second second	•		
Signature						

1. OUTDOOR AIR INTAKES

la.	Marked locations of all outdoor air intakes on a small floor plan (for example, a fire escape floor plan)			N/A
1b.	Ensured that the ventilation system was on and operating in "occupied" mode	,	۵	D
AC	TIVITY 1: OBSTRUCTIONS			
1c.	Ensured that outdoor air intakes are clear of obstructions, debris, clogs, or covers	Z	a	D
ld.	Installed corrective devices as necessary (e.g., if snowdrifts or leaves frequently block an intake)		ø	D
AC	TIVITY 2: POLLUTANT SOURCES			
	· · · · · · · · · · · · · · · · · · ·	ø	۵	D
lf.	Checked rooftop intakes for pollutant sources (plumbing vents; kitchen, toilet, or laboratory exhaust fans; puddles; and mist from air-conditioning cooling towers)	. A		
lg.	Resolved any problems with pollutant sources located near outdoor air intakes (e.g., relocated dumpster or extended exhaust pipe)			
AC	TIVITY 3: AIRFLOW			,
lh.	Obtained chemical smoke (or a small piece of tissue paper or light plastic) Confirmed that outdoor air is entering the intake appropriately	ם Q⁄	0 1 0	
2.	SYSTEM CLEANLINESS			
AC	TIVITY 4: AIR FILTERS			
2a.	Replaced filters per maintenance schedule	. Z		
2b.	Shut off ventilation system fans while replacing filters (prevents dirt from blowing downstream)	Þ,	D	D
2c.	blowing downstream) Vacuumed filter areas before installing new filters	p		
2d.	Confirmed proper fit of filters to prevent air from bypassing (flowing around) the air filter			

2. SYSTEM CLEANLINESS (continued)

ACTIVITY 5: DRAIN PANS

.

ACTIVITY 5: DRAIN PANS			
2f. Ensured that drain pans slant toward the drain (to prevent water from accumulating)			N/A C
2g. Cleaned drain pans	. 🗹		Q
2h. Checked drain pans for mold and mildew	¤	a	Q
ACTIVITY 6: COILS	_/	Q	
2i. Ensured that heating and cooling coils are clean	هر	Ч	u
ACTIVITY 7: AIR-HANDLING UNITS, UNIT VENTILATORS			
2j. Ensured that the interior of air-handling unit(s) or unit ventilator	1	_	_
(air-mixing chamber and fan blades) is clean	д		
2k. Ensured that ducts are clean	p		
ACTIVITY 8: MECHANICAL ROOMS			
21. Checked mechanical room for unsanitary conditions, leaks, and spills	.Z	D	
2m. Ensured that mechanical rooms and air-mixing chambers are free of trash,			
chemical products, and supplies	,മ	ũ	
3. CONTROLS FOR OUTDOOR AIR SUPPLY			
3a. Ensured that air dampers are at least partially open (minimum position)	D	Д	ø
3b. Ensured that minimum position provides adequate outdoor air			• /
for occupants		۵	ø
ACTIVITY 9: CONTROLS INFORMATION			
3c. Obtained and reviewed all design inside/outside temperature and humidity			
requirements, controls specifications, as-built mechanical drawings,	1		
and controls operations manuals (often uniquely designed)	,21		
ACTIVITY 10: CLOCKS, TIMERS, SWITCHES			
3d. Turned summer-winter switches to the correct position	Z		
3e. Set time clocks appropriately	🗖		ø
3f. Ensured that settings fit the actual schedule of building use (including			•
night/weekend use)	p î		D
ACTIVITY 11: CONTROL COMPONENTS			
3g. Ensured appropriate system pressure by testing line pressure at both the			~
occupied (day) setting and the unoccupied (night) setting			A
3h. Checked that the line dryer prevents moisture buildup	🗆		þ
3i. Replaced control system filters at the compressor inlet based on the			
compressor manufacturer's recommendation (for example, when you			Ø
blow down the tank)	., La		γ.
3j. Set the line pressure at each thermostat and damper actuator at the proper level (no leakage or obstructions)	🗆	۵	Ø
ACTIVITY 12: OUTDOOR AIR DAMPERS	4	m	m .
3k. Ensured that the outdoor air damper is visible for inspection)41		
31. Ensured that the recirculating relief and/or exhaust dampers are visible for inspection	А		
3m. Ensured that air temperature in the indoor area(s) served by each			_
outdoor air damper is within the normal operating range	¤	Q	
NOTE: It is used and the second that the demonstrate even where we doubt			t

NOTE: It is necessary to ensure that the damper is operating properly and within the normal range to continue.





3n.	Checked that the outdoor air damper fully closes within a few minutes Yes X of shutting off appropriate air handler	0	N/A
	Checked that the outdoor air damper opens (at least partially with no delay) when the air handler is turned on	ב	Q
3р.	If in heating mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 85°F	ב	ø
3q.	If in cooling mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 60°F and mixed air thermostat is set to 45°F	3	, ,
3r.	If the outdoor air damper does not move, confirmed the following items:		1
	• The damper actuator links to the damper shaft, and any linkage set screws or bolts are tight	3	D
	• Moving parts are free of impediments (e.g., rust, corrosion)	3	D
	• Electrical wire or pneumatic tubing connects to the damper actuator	ב	
	• The outside air thermostat(s) is functioning properly (e.g., in the right location, calibrated correctly)	נ	D

Proceed to Activities 13-16 if the damper seems to be operating properly.

ACTIVITY 13: FREEZE STATS

3s.	Disconnected power to controls (for automatic reset only) to test continuity across terminals	۵	ø
OR			'
3t.	Confirmed (if applicable) that depressing the manual reset button (usually red) trips the freeze stat (clicking sound indicates freeze stat was		
	tripped)	Q	
3u.	Assessed the feasibility of replacing all manual reset freeze-stats with automatic reset freeze-stats	ø	D

NOTE: HVAC systems with water coils need protection from the cold. The freeze-stat may close the outdoor air damper and disconnect the supply air when tripped. The typical trip range is $35^{\circ}F$ to $42^{\circ}F$.

ACTIVITY 14: MIXED AIR THERMOSTATS

3v. Ensured that the mixed air stat for heating mode is set no higher than 65°F	ב
3w. Ensured that the mixed air stat for cooling mode is set no lower than the room thermostat setting	ב
ACTIVITY 15: ECONOMIZERS	
3x. Confirmed proper economizer settings based on design specifications or local practices	ב
NOTE: The dry-bulb is typically set at 65°F or lower.	
3y. Checked that sensor on the economizer is shielded from direct sunlight 🗹 📮 🕻	ב
 3y. Checked that sensor on the economizer is shielded from direct sunlight	ב
NOTE: Economizers use varying amounts of good outdoor gir to assist with the cooling	

NOTE: Economizers use varying amounts of cool outdoor air to assist with the cooling load of the room or rooms. There are two types of economizers, dry-bulb and enthalpy. Dry-bulb economizers vary the amount of outdoor air based on outdoor temperature, and enthalpy economizers vary the amount of outdoor air based on outdoor temperature and humidity level.

ACTIVITY 16: FANS

3aa. Ensured that all fans (supply fans and associated return or relief fans) that move outside air indoors continuously operate during occupied hours (even when room thermostat is satisfied)......

NOTE: If fan shuts off when the thermostat is satisfied, adjust control cycle as necessary to ensure sufficient outdoor air supply.

4. AIR DISTRIBUTION

ACTIVITY 17: AIR DISTRIBUTION

 4a. Ensured that supply and return air pathways in the existing ventilation system perform as required. 4b. Ensured that passive gravity relief ventilation systems and transfer grilles between rooms and corridors are functioning.
NOTE: If ventilation system is closed or blocked to meet current fire codes, consult with a professional engineer for remedies.
 4c. Made sure every occupied space has supply of outdoor air (mechanical system or operable windows) 4d. Ensured that supply and return vents are open and unblocked
NOTE: If outlets have been blocked intentionally to correct drafts or discomfort, investigate and correct the cause of the discomfort and reopen the vents.
4e. Modified the HVAC system to supply outside air to areas without an outdoor air supply
4f. Modified existing HVAC systems to incorporate any room or zone layout and population changes
4g. Moved all barriers (for example, room dividers, large free-standing blackboards or displays, bookshelves) that could block movement of air in the room, especially those blocking air vents
4h. Ensured that unit ventilators are quiet enough to accommodate classroom activities
4i. Ensured that classrooms are free of uncomfortable drafts produced by air from supply terminals

ACTIVITY 18: PRESSURIZATION IN BUILDINGS

NOTE: To prevent infiltration of outdoor pollutants, the ventilation system is designed to maintain positive pressurization in the building. Therefore, ensure that the system, including any exhaust fans, is operating on the "occupied" cycle when doing this activity.

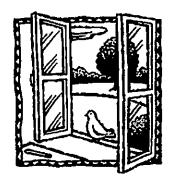
4j.	Ensured that air flows out of the building (using chemical smoke) through		,
	windows, doors, or other cracks and holes in exterior wall (for example,	/	
	floor joints, pipe openings)	đ	

5. EXHAUST SYSTEMS

ACTIVITY 19: EXHAUST FAN OPERATION

5a. Checked (using chemical smoke) that air flows into exhaust fan grille(s) D

- If fans are running but air is not flowing toward the exhaust intake, check for the following:
 - Inoperable dampers
 - Obstructed, leaky, or disconnected ductwork
 - · Undersized or improperly installed fan
 - Broken fan belt



Yes No N/A

n



5. EXHAUST SYSTEMS (continued)

ACTIVITY 20: EXHAUST AIRFLOW

NOTE: Prevent migration of indoor contaminants from areas such as bathrooms, kitchens, and labs by keeping them under negative pressure (as compared to surrounding spaces).

ACTIVITY 21: EXHAUST DUCTWORK

5d. Checked that the exhaust ductwork downstream of the exhaust fan (which is under positive pressure) is sealed and in good condition......

6. QUANTITY OF OUTDOOR AIR

ACTIVITY 22: OUTDOOR AIR MEASUREMENTS AND CALCULATIONS

NOTE: Refer to "How to Measure Airflow" for techniques.

6a. Measured the quantity of outdoor air supplied (22a) to each ventilation unit 🔲 6b. Calculated the number of occupants served (22b) by the ventilation unit under consideration 6c. Divided outdoor air supply (22a) by the number of occupants (22b) to determine the existing quantity of outdoor air supply per person (22c) **ACTIVITY 23; ACCEPTABLE LEVELS OF OUTDOOR AIR OUANTITIES** 6d. Compared the existing outdoor air per person (22c) to the recommended levels in Table 1 6e. Corrected problems with ventilation units that supplied inadequate quantities of outdoor air to ensure that outdoor air quantities (22c) meet the recommended levels in Table 1

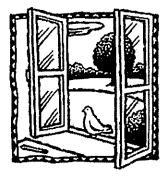
NOTES All HVAC units through the BAS have advanced ventilation control logic deployed associated with the spaces they serve. The system will modulate the outdoor air damper and return dampers to provide the proper amount of air as needed to maintain space CO2 levels. This type of control is called CO2 based Demand-Controlled Ventilation (DCV). DCV provides proper ventilation air quantities as well as energy savings by reducing the amount of required ventilation air based on the CO2 levels measured by the sensor. The CO2 levels in parts per million (PPM) is used as an indicator of the number of occupants in a room. When the room has less than design occupancy, the required volume of ventilation is reduced. The CO2 sensor allows the VFD to reduce the fan speed to deliver a reduced volume of outside air for ventilation during these periods. An increase in the CO2 level is an indication that more people are in the room, so the fan speed is increased to maintain the required volume of ventilation air under all occupancy conditions.

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· ·



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 - Check the "yes," "no," or "not applicable" box beside each item. (A "no" response requires further attention.)
 - Make comments in the "Notes" section as necessary.
- 4. Return the checklist portion of this document to the IAQ Coordinator.

Ventilation Checklist

Name:		Martoni				
School:	Amity	Middle	School	Oronge		
Unit Vent	ilator/AHU No:	2				_
Room or .		2	Date	Completed:	1-29.24	
Signature	: Ly l	65				
5	- / +					

1. OUTDOOR AIR INTAKES

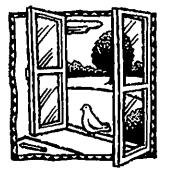
la.	Marked locations of all outdoor air intakes on a small floor plan (for example, a fire escape floor plan)			N/A
1b.	Ensured that the ventilation system was on and operating in "occupied" mode	,		۵
AC	TIVITY 1: OBSTRUCTIONS			
	Ensured that outdoor air intakes are clear of obstructions, debris, clogs, or covers	<i>j</i> 2	Q	
1d.	Installed corrective devices as necessary (e.g., if snowdrifts or leaves frequently block an intake)	D	ø	
AC	TIVITY 2: POLLUTANT SOURCES			
	Checked ground-level intakes for pollutant sources (dumpsters, loading docks, and bus-idling areas)	z i	a	
۱f,	Checked rooftop intakes for pollutant sources (plumbing vents; kitchen, toilet, or laboratory exhaust fans; puddles; and mist from air-conditioning cooling towers)	র		
1g.	Resolved any problems with pollutant sources located near outdoor air intakes (e.g., relocated dumpster or extended exhaust pipe)	, 2		0
	TIVITY 3: AIRFLOW			
lh.	Obtained chemical smoke (or a small piece of tissue paper or light plastic) Confirmed that outdoor air is entering the intake appropriately	ם ם⁄	2 2 2	
2.	SYSTEM CLEANLINESS			
	TIVITY 4: AIR FILTERS			
	Replaced filters per maintenance schedule			
2b.	Shut off ventilation system fans while replacing filters (prevents dirt from blowing downstream).	Z .	D	
2c.	blowing downstream) Vacuumed filter areas before installing new filters	Z	ū	
2d.	Confirmed proper fit of filters to prevent air from bypassing (flowing	•		

2e. Confirmed proper installation of filters (correct direction for airflow)........

2. SYSTEM CLEANLINESS (continued)

ACTIVITY 5: DRAIN PANS

ACTIVITY 5: DRAIN PANS			
			N/A
accumulating)			
2g. Cleaned drain pans			
2h. Checked drain pans for mold and mildew	P	Q	
ACTIVITY 6: COILS	,		
2i. Ensured that heating and cooling coils are clean		a	
ACTIVITY 7: AIR-HANDLING UNITS, UNIT VENTILATORS			
2j. Ensured that the interior of air-handling unit(s) or unit ventilator			
(air-mixing chamber and fan blades) is clean	. Z	D	
(air-mixing chamber and fan blades) is clean			
	/		
ACTIVITY 8: MECHANICAL ROOMS	_		_
21. Checked mechanical room for unsanitary conditions, leaks, and spills	,Z		
2m. Ensured that mechanical rooms and air-mixing chambers are free of trash,	~	-	_
chemical products, and supplies	, ک	U	
3. CONTROLS FOR OUTDOOR AIR SUPPLY			
3a. Ensured that air dampers are at least partially open (minimum position)	. 0		ø
3b. Ensured that minimum position provides adequate outdoor air	. —	—	ſ,
for occupants	. 🗆		ø
-			1
ACTIVITY 9: CONTROLS INFORMATION			
3c. Obtained and reviewed all design inside/outside temperature and humidity			
requirements, controls specifications, as-built mechanical drawings,	1	_	_
and controls operations manuals (often uniquely designed)	.д		
ACTIVITY 10: CLOCKS, TIMERS, SWITCHES			
3d. Turned summer-winter switches to the correct position	X .		
3e. Set time clocks appropriately	.a		Ø
3f. Ensured that settings fit the actual schedule of building use (including			•
night/weekend use)	۲Ľ.	ü	
ACTIVITY 11: CONTROL COMPONENTS			
3g. Ensured appropriate system pressure by testing line pressure at both the occupied (day) setting and the unoccupied (night) setting	П	п	
3h. Checked that the line dryer prevents moisture buildup			2
3i. Replaced control system filters at the compressor inlet based on the	. 🗆	9	~
compressor manufacturer's recommendation (for example, when you			•
blow down the tank)	. 🗆		Ø
3j. Set the line pressure at each thermostat and damper actuator at the proper			•
level (no leakage or obstructions)	.D		ø
ACTIVITY 12: OUTDOOR AIR DAMPERS			
3k. Ensured that the outdoor air damper is visible for inspection	1		
31. Ensured that the recirculating relief and/or exhaust dampers are visible	, jini		4
for inspection	.		
3m. Ensured that air temperature in the indoor area(s) served by each			-
outdoor air damper is within the normal operating range	.⊉	a	
NOTE. It is necessary to ansure that the downer is onerating property and with		101	n a l



NOTE: It is necessary to ensure that the damper is operating properly and within the normal range to continue.



3n.	Checked that the outdoor air damper fully closes within a few minutes of shutting off appropriate air handler	≥s ≩∕	No 0	N/A
30.	Checked that the outdoor air damper opens (at least partially with no delay) when the air handler is turned on	1	۵	Q
Зр.	If in heating mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 85°F	נ	D	۶,
3q.	If in cooling mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 60°F and mixed air thermostat is set to 45°F	נ	D	, ,
3r.	If the outdoor air damper does not move, confirmed the following items:			1
	 The damper actuator links to the damper shaft, and any linkage set screws or bolts are tight 	1		D
	• Moving parts are free of impediments (e.g., rust, corrosion)	Y		Q
	• Electrical wire or pneumatic tubing connects to the damper actuator	Y		ū
	• The outside air thermostat(s) is functioning properly (e.g., in the right location, calibrated correctly)	x		D

Proceed to Activities 13-16 if the damper seems to be operating properly.

ACTIVITY 13: FREEZE STATS

3s.	Disconnected power to controls (for automatic reset only) to test continuity across terminals	ü	ø
OR			1
3t.	Confirmed (if applicable) that depressing the manual reset button (usually red) trips the freeze stat (clicking sound indicates freeze stat was		
	tripped)	Q	
3u.	Assessed the feasibility of replacing all manual reset freeze-stats with automatic reset freeze-stats	_	

NOTE: HVAC systems with water coils need protection from the cold. The freeze-stat may close the outdoor air damper and disconnect the supply air when tripped. The typical trip range is $35^{\circ}F$ to $42^{\circ}F$.

ACTIVITY 14: MIXED AIR THERMOSTATS

3v.	Ensured that the mixed air stat for heating mode is set no higher than 65°F	D
3w.	Ensured that the mixed air stat for cooling mode is set no lower than the room thermostat setting	
AC	TIVITY 15: ECONOMIZERS	
3x.	Confirmed proper economizer settings based on design specifications or local practices	D
NO	TE: The dry-bulb is typically set at 65°F or lower.	
	Checked that sensor on the economizer is shielded from direct sunlight	a
3z.	Ensured that dampers operate properly (for outside air, return air, exhaust/relief air, and recirculated air), per the design specifications	

NOTE: Economizers use varying amounts of cool outdoor air to assist with the cooling load of the room or rooms. There are two types of economizers, dry-bulb and enthalpy. Dry-bulb economizers vary the amount of outdoor air based on outdoor temperature, and enthalpy economizers vary the amount of outdoor air based on outdoor temperature and humidity level.

ACTIVITY 16: FANS

3aa. Ensured that all fans (supply fans and associated return or relief fans) Yes No N/A that move outside air indoors continuously operate during occupied

NOTE: If fan shuts off when the thermostat is satisfied, adjust control cycle as necessary to ensure sufficient outdoor air supply.

4. AIR DISTRIBUTION

ACTIVITY 17: AIR DISTRIBUTION

4a. Ensured that supply and return air pathways in the existing ventilation system perform as required.	
4b. Ensured that passive gravity relief ventilation systems and transfer grilles between rooms and corridors are functioning	
NOTE: If ventilation system is closed or blocked to meet current fire codes, consult with a professional engineer for remedies.	
 4c. Made sure every occupied space has supply of outdoor air (mechanical system or operable windows)	
NOTE: If outlets have been blocked intentionally to correct drafts or discomfort, investigat and correct the cause of the discomfort and reopen the vents.	e
4e. Modified the HVAC system to supply outside air to areas without an outdoor air supply	,
4f. Modified existing HVAC systems to incorporate any room or zone layout and population changes	Q
4g. Moved all barriers (for example, room dividers, large free-standing blackboards or displays, bookshelves) that could block movement of	1

	air in the room, especially those blocking air vents		Ø
4h.	Ensured that unit ventilators are quiet enough to accommodate classroom	/	_
	activities	u –	
4i.	Ensured that classrooms are free of uncomfortable drafts produced by air		
	from supply terminals	α.	

ACTIVITY 18: PRESSURIZATION IN BUILDINGS

NOTE: To prevent infiltration of outdoor pollutants, the ventilation system is designed to maintain positive pressurization in the building. Therefore, ensure that the system, including any exhaust fans, is operating on the "occupied" cycle when doing this activity.

4j.	Ensured that air flows out of the building (using chemical smoke) through		,
	windows, doors, or other cracks and holes in exterior wall (for example,	/	
	floor joints, pipe openings)	Ø	Ū

5. EXHAUST SYSTEMS

ACTIVITY 19: EXHAUST FAN OPERATION

5a. Checked (using chemical smoke) that air flows into exhaust fan grille(s) D

- If fans are running but air is not flowing toward the exhaust intake, check for the following:
 - Inoperable dampers
 - Obstructed, leaky, or disconnected ductwork
 - · Undersized or improperly installed fan
 - Broken fan belt





5. EXHAUST SYSTEMS (continued)

ACTIVITY 20: EXHAUST AIRFLOW

NOTE: Prevent migration of indoor contaminants from areas such as bathrooms, kitchens, and labs by keeping them under negative pressure (as compared to surrounding spaces).

10/16	i and by heeping mem anaer negative pressure (as compared to surrounding sp		<i>.</i>	
5b.	Checked (using chemical smoke) that air is drawn into the room from Ye adjacent spaces	s. P	ol/ D	N. (
	nd outside the room with the door slightly open while checking airflow high and door opening (see "How to Measure Airflow").	i lo	w in	!
5c.	Ensured that air is flowing toward the exhaust intake			C
AC	TIVITY 21: EXHAUST DUCTWORK			
5d.	Checked that the exhaust ductwork downstream of the exhaust fan (which is under positive pressure) is sealed and in good condition	/		Ç
6.	QUANTITY OF OUTDOOR AIR			
AC	TIVITY 22: OUTDOOR AIR MEASUREMENTS AND CALCULATIONS	\$		
NO	TE: Refer to "How to Measure Airflow" for techniques.			
ба.	Measured the quantity of outdoor air supplied (22a) to each ventilation unit		D	C
6b.	Calculated the number of occupants served (22b) by the ventilation unit under consideration			Ç
бс.	Divided outdoor air supply (22a) by the number of occupants (22b) to determine the existing quantity of outdoor air supply per person (22c)			(
AC	TIVITY 23: ACCEPTABLE LEVELS OF OUTDOOR AIR QUANTITIES			
	Compared the existing outdoor air per person (22c) to the recommended levels in Table 1			1

6e. Corrected problems with ventilation units that supplied inadequate quantities of outdoor air to ensure that outdoor air quantities (22c) meet the recommended levels in Table 1

NOTES All HVAC units through the BAS have advanced ventilation control logic deployed associated with the spaces they serve. The system will modulate the outdoor air damper and return dampers to provide the proper amount of air as needed to maintain space CO2 levels. This type of control is called CO2 based Demand-Controlled Ventilation (DCV). DCV provides proper ventilation air quantities as well as energy savings by reducing the amount of required ventilation air based on the CO2 levels measured by the sensor. The CO2 levels in parts per million (PPM) is used as an indicator of the number of occupants in a room. When the room has less than design occupancy, the required volume of ventilation is reduced. The CO2 sensor allows the VFD to reduce the fan speed to deliver a reduced volume of outside air for ventilation during these periods. An increase in the CO2 level is an indication that more people are in the room, so the fan speed is increased to maintain the required volume of ventilation air under all occupancy conditions.

Active DCV control is an acceptable alternate method to determine if ventilation requirements are met and could supersede rooms that may fail otherwise using traditional measured data collection procedures prescribed by established ASHRAE guidelines.

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 - Check the "yes," "no," or "not applicable" box beside each item. (A "no" response requires further attention.)
 - Make comments in the "Notes" section as necessary.
- 4. Return the checklist portion of this document to the IAQ Coordinator.

Ventilation Checklist

Name:	Stephyn	Martoni				
School:	Amity	Middle	School	OTUNGE	7	
Jnit Vent	ilator/AHU No:	3	•			. 1
Room or .	Area: 5 1	24 3	Date	Completed:	1-29-2	4
Signature	: LY 4	40				

1. OUTDOOR AIR INTAKES

la.	Marked locations of all outdoor air intakes on a small floor plan (for Ya example, a fire escape floor plan)			N/A
1b.	Ensured that the ventilation system was on and operating in "occupied" mode	,	D	٦
AC	TIVITY 1: OBSTRUCTIONS			
1c.	Ensured that outdoor air intakes are clear of obstructions, debris, clogs, or covers	5		D
1d.	Installed corrective devices as necessary (e.g., if snowdrifts or leaves frequently block an intake)		ø	
AC	TIVITY 2: POLLUTANT SOURCES			
	Checked ground-level intakes for pollutant sources (dumpsters, loading docks, and bus-idling areas)	1	D	۵
1f.	Checked rooftop intakes for pollutant sources (plumbing vents; kitchen, toilet, or laboratory exhaust fans; puddles; and mist from air-conditioning cooling towers)	Z		D
1g.	Resolved any problems with pollutant sources located near outdoor air intakes (e.g., relocated dumpster or extended exhaust pipe)			D
AC	TIVITY 3: AIRFLOW			1
	Obtained chemical smoke (or a small piece of tissue paper or light plastic) Confirmed that outdoor air is entering the intake appropriately			
2.	SYSTEM CLEANLINESS			
	TIVITY 4: AIR FILTERS	ω.		
	Replaced filters per maintenance schedule	3		
	Shut off ventilation system fans while replacing filters (prevents dirt from blowing downstream)	1.	D	
2c.	blowing downstream) Vacuumed filter areas before installing new filters	1		
	Confirmed proper fit of filters to prevent air from bypassing (flowing around) the air filter			

2e. Confirmed proper installation of filters (correct direction for airflow)....... \mathbf{Z}

2. SYSTEM CLEANLINESS (continued)

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ACTIVITY 5: DRAIN PANS		N I -	
2f. Ensured that drain pans slant toward the drain (to prevent water from accumulating)			N/A
2g. Cleaned drain pans	2		ū
2h. Checked drain pans for mold and mildew	.¤		Q
ACTIVITY 6: COILS 2i. Ensured that heating and cooling coils are clean	. 🗹	п	
	/	-	-
ACTIVITY 7: AIR-HANDLING UNITS, UNIT VENTILATORS			
2j. Ensured that the interior of air-handling unit(s) or unit ventilator	~	_	_
(air-mixing chamber and fan blades) is clean	.д. Т		
	7	-	
ACTIVITY 8: MECHANICAL ROOMS			
21. Checked mechanical room for unsanitary conditions, leaks, and spills	X		
2m. Ensured that mechanical rooms and air-mixing chambers are free of trash,	7	۵	D
chemical products, and supplies	.,2		
3. CONTROLS FOR OUTDOOR AIR SUPPLY			
3a. Ensured that air dampers are at least partially open (minimum position)	П		ø
3b Ensured that minimum position provides adequate outdoor air			<i>"</i>
for occupants	0		ø
	•		<i>(</i>
ACTIVITY 9: CONTROLS INFORMATION 3c. Obtained and reviewed all design inside/outside temperature and humidity			
requirements, controls specifications, as-built mechanical drawings.			
and controls operations manuals (often uniquely designed)	.ø		
ACTIVITY 10: CLOCKS, TIMERS, SWITCHES 3d. Turned summer-winter switches to the correct position	Г		п
3e. Set time clocks appropriately			Z
3f. Ensured that settings fit the actual schedule of building use (including			'
night/weekend use)	<u>م</u> .		
ACTIVITY 11: CONTROL COMPONENTS			
3g. Ensured appropriate system pressure by testing line pressure at both the			
occupied (day) setting and the unoccupied (night) setting			Ъ,
3h. Checked that the line dryer prevents moisture buildup	. 🗆		A
3i. Replaced control system filters at the compressor inlet based on the compressor manufacturer's recommendation (for example, when you			•
blow down the tank)	. 🗆		ø
3j. Set the line pressure at each thermostat and damper actuator at the proper	_	_	_
level (no leakage or obstructions)	.4		Ø
ACTIVITY 12: OUTDOOR AIR DAMPERS	-		
3k. Ensured that the outdoor air damper is visible for inspection	.⊉		
31 Ensured that the recirculating relief and/or exhaust damners are visible		_	_
for inspection	. Z		
3m. Ensured that air temperature in the indoor area(s) served by each outdoor air damper is within the normal operating range	.⊿	a	
	<i>.</i> .		-

NOTE: It is necessary to ensure that the damper is operating properly and within the normal range to continue.



.



3n.	Checked that the outdoor air damper fully closes within a few minutes of shutting off appropriate air handler	'es	No D	N/A
30.	Checked that the outdoor air damper opens (at least partially with no delay) when the air handler is turned on	∡	۵	a
3р.	If in heating mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 85°F	ב	Q	¢⁄
3q.	If in cooling mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 60°F and mixed air thermostat is set to 45°F		D	, ,
3r.	If the outdoor air damper does not move, confirmed the following items:			1
	 The damper actuator links to the damper shaft, and any linkage set screws or bolts are tight 	3		۵
	• Moving parts are free of impediments (e.g., rust, corrosion)	2		Q
	• Electrical wire or pneumatic tubing connects to the damper actuator	∍∕	í 🗖	ū
	• The outside air thermostat(s) is functioning properly (e.g., in the right location, calibrated correctly)	<u>a</u>		

Proceed to Activities 13-16 if the damper seems to be operating properly.

ACTIVITY 13: FREEZE STATS

3s.	Disconnected power to controls (for automatic reset only) to test continuity across terminals		ø
OR			4
3t.	Confirmed (if applicable) that depressing the manual reset button (usually red) trips the freeze stat (clicking sound indicates freeze stat was		
	tripped)	Q	D
3u.	Assessed the feasibility of replacing all manual reset freeze-stats with automatic reset freeze-stats	ø	

NOTE: HVAC systems with water coils need protection from the cold. The freeze-stat may close the outdoor air damper and disconnect the supply air when tripped. The typical trip range is 35°F to 42°F.

ACTIVITY 14: MIXED AIR THERMOSTATS

3v.	Ensured that the mixed air stat for heating mode is set no higher than 65°F	
3w.	than the room thermostat setting	
AC	TIVITY 15: ECONOMIZERS	
3x.	Confirmed proper economizer settings based on design specifications or local practices	
NO	TE: The dry-bulb is typically set at 65°F or lower.	
3y.	Checked that sensor on the economizer is shielded from direct sunlight	a

- 3y. Checked that sensor on the economizer is shielded from direct sunlight
- 3z. Ensured that dampers operate properly (for outside air, return air, exhaust/relief air, and recirculated air), per the design specifications

NOTE: Economizers use varying amounts of cool outdoor air to assist with the cooling load of the room or rooms. There are two types of economizers, dry-bulb and enthalpy. Dry-bulb economizers vary the amount of outdoor air based on outdoor temperature, and enthalpy economizers vary the amount of outdoor air based on outdoor temperature and humidity level.

ACTIVITY 16: FANS

3aa. Ensured that all fans (supply fans and associated return or relief fans) Yes No N/A that move outside air indoors continuously operate during occupied hours (even when room thermostat is satisfied)......

NOTE: If fan shuts off when the thermostat is satisfied, adjust control cycle as necessary to ensure sufficient outdoor air supply.

4. AIR DISTRIBUTION

ACTIVITY 17: AIR DISTRIBUTION

4a. Ensured that supply and return air pathways in the existing ventilation system perform as required	
4b. Ensured that passive gravity relief ventilation systems and transfer grilles between rooms and corridors are functioning	
NOTE: If ventilation system is closed or blocked to meet current fire codes, consult with a professional engineer for remedies.	
4c. Made sure every occupied space has supply of outdoor air (mechanical system or operable windows)	Q
4d. Ensured that supply and return vents are open and unblocked	

NOTE: If outlets have been blocked intentionally to correct drafts or discomfort, investigate and correct the cause of the discomfort and reopen the vents.

4e.	Modified the HVAC system to supply outside air to areas without an outdoor air supply		
4f.	Modified existing HVAC systems to incorporate any room or zone layout and population changes	۵	
4g.	Moved all barriers (for example, room dividers, large free-standing blackboards or displays, bookshelves) that could block movement of air in the room, especially those blocking air vents		ø
4h.	Ensured that unit ventilators are quiet enough to accommodate classroom activities		
4i.	Ensured that classrooms are free of uncomfortable drafts produced by air from supply terminals	۵.	

ACTIVITY 18: PRESSURIZATION IN BUILDINGS

NOTE: To prevent infiltration of outdoor pollutants, the ventilation system is designed to maintain positive pressurization in the building. Therefore, ensure that the system, including any exhaust fans, is operating on the "occupied" cycle when doing this activity.

4j.	Ensured that air flows out of the building (using chemical smoke) through		,
	windows, doors, or other cracks and holes in exterior wall (for example,	/	
	floor joints, pipe openings)	ত্র	Ø

5. EXHAUST SYSTEMS

ACTIVITY 19: EXHAUST FAN OPERATION

5a. Checked (using chemical smoke) that air flows into exhaust fan grille(s) D

- If fans are running but air is not flowing toward the exhaust intake, check for the following: • Inoperable dampers

 - Obstructed, leaky, or disconnected ductwork
 - Undersized or improperly installed fan
 - Broken fan belt





5. EXHAUST SYSTEMS (continued)

ACTIVITY 20: EXHAUST AIRFLOW

NOTE: Prevent migration of indoor contaminants from areas such as bathrooms, kitchens, and labs by keeping them under negative pressure (as compared to surrounding spaces).

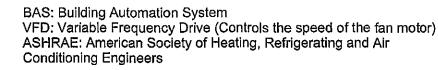
	tabs by neeping mem ander negative pressure (as compared to surrounding	•	,	
5b.	Checked (using chemical smoke) that air is drawn into the room from adjacent spaces	Yes. .⊠	No D	
the	nd outside the room with the door slightly open while checking airflow high d door opening (see "How to Measure Airflow").		'ow ir	1
5c. :	Ensured that air is flowing toward the exhaust intake	.ø		
	TIVITY 21: EXHAUST DUCTWORK			
5d.	Checked that the exhaust ductwork downstream of the exhaust fan (which is under positive pressure) is sealed and in good condition	s.,⊿	_	
6.	QUANTITY OF OUTDOOR AIR			
AC'	TIVITY 22: OUTDOOR AIR MEASUREMENTS AND CALCULATIO	NS		
NO	TE: Refer to "How to Measure Airflow" for techniques.			
ба.	Measured the quantity of outdoor air supplied (22a) to each ventilation unit	. 🖸		D
	Calculated the number of occupants served (22b) by the ventilation unit under consideration	. D		
бс.	Divided outdoor air supply (22a) by the number of occupants (22b) to determine the existing quantity of outdoor air supply per person (22c)	.0		
AC'	TIVITY 23: ACCEPTABLE LEVELS OF OUTDOOR AIR QUANTITI	ES		
6 d .	Compared the existing outdoor air per person (22c) to the recommended	п	П	

levels in Table 1
6e. Corrected problems with ventilation units that supplied inadequate quantities of outdoor air to ensure that outdoor air quantities (22c) meet the recommended levels in Table 1

NOTES All HVAC units through the BAS have advanced ventilation control logic deployed associated with the spaces they serve. The system will modulate the outdoor air damper and return dampers to provide the proper amount of air as needed to maintain space CO2 levels. This type of control is called CO2 based Demand-Controlled Ventilation (DCV). DCV provides proper ventilation air quantities as well as energy savings by reducing the amount of required ventilation air based on the CO2 levels measured by the sensor. The CO2 levels in parts per million (PPM) is used as an indicator of the number of occupants in a room. When the room has less than design occupancy, the required volume of ventilation is reduced. The CO2 sensor allows the VFD to reduce the fan speed to deliver a reduced volume of outside air for ventilation during these periods. An increase in the CO2 level is an indication that more people are in the room, so the fan speed is increased to maintain the required volume of ventilation air under all occupancy conditions.

Active DCV control is an acceptable alternate method to determine if ventilation requirements are met and could supersede rooms that may fail otherwise using traditional measured data collection procedures prescribed by established ASHRAE guidelines.

The ideal supply of outside air to interior occupied spaces should be based upon the 2018 Connecticut Building Code, which is based on the most currently adopted 2015 International Mechanical Code and coincides with ASHRAE-62.1, (2010) guidelines





Instructions

- 1. Read the *IAQ Backgrounder* and the Background Information for this checklist.
- 2. Keep the Background Information and make a copy of this checklist for each ventilation unit in your school, as well as a copy for future reference.
- 3. Complete the Checklist.
 - Check the "yes," "no," or "not applicable" box beside each item. (A "no" response requires further attention.)
 - Make comments in the "Notes" section as necessary.
- Return the checklist portion of this document to the IAQ Coordinator.

Ventilation Checklist

Name:	Stephen	Martoni			
School:	Amity	Middle	School	Orange	
Unit Vent	ilator/AHU No:	6			
Room or J	Area: A	6	Date	Completed:	1-29-24
Signature	: Ly f	40			

1. OUTDOOR AIR INTAKES

la.	Marked locations of all outdoor air intakes on a small floor plan (for Yes example, a fire escape floor plan)		N/A
1b.	Ensured that the ventilation system was on and operating in "occupied" mode		
AC	TIVITY 1: OBSTRUCTIONS		
1c.	Ensured that outdoor air intakes are clear of obstructions, debris, clogs, or covers		
1d.	Installed corrective devices as necessary (e.g., if snowdrifts or leaves frequently block an intake)	ø	۵
AC	TIVITY 2: POLLUTANT SOURCES		
1e.	Checked ground-level intakes for pollutant sources (dumpsters, loading docks, and bus-idling areas)		
1f.	Checked rooftop intakes for pollutant sources (plumbing vents; kitchen, toilet, or laboratory exhaust fans; puddles; and mist from air-conditioning cooling towers)	D	
1g.	Resolved any problems with pollutant sources located near outdoor air intakes (e.g., relocated dumpster or extended exhaust pipe)	۵	
AC	TIVITY 3: AIRFLOW		
	Obtained chemical smoke (or a small piece of tissue paper or light plastic) Confirmed that outdoor air is entering the intake appropriately		
2.	SYSTEM CLEANLINESS		
100 (100 (100)	TIVITY 4: AIR FILTERS		
	Replaced filters per maintenance schedule		
	Shut off ventilation system fans while replacing filters (prevents dirt from blowing downstream)		
2c.	Vacuumed filter areas before installing new filters		

2. SYSTEM CLEANLINESS (continued)

ACTIVITY 5: DRAIN PANS

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ACTIVITY 5: DRAIN PANS			
accumulating)			N/A
2g. Cleaned drain pans	. 🗹		Q
2h. Checked drain pans for mold and mildew	.p		Q
ACTIVITY 6: COILS	_	_	_
2i. Ensured that heating and cooling coils are clean	.⊿		
ACTIVITY 7: AIR-HANDLING UNITS, UNIT VENTILATORS			
2j. Ensured that the interior of air-handling unit(s) or unit ventilator	1		
(air-mixing chamber and fan blades) is clean	.Ø,		
(air-mixing chamber and fan blades) is clean	.ø		
ACTIVITY 8: MECHANICAL ROOMS			
21. Checked mechanical room for unsanitary conditions, leaks, and spills	ø		
2m. Ensured that mechanical rooms and air-mixing chambers are free of trash,			
chemical products, and supplies	۲.	ū	
3. CONTROLS FOR OUTDOOR AIR SUPPLY			
3a. Ensured that air dampers are at least partially open (minimum position)	.0	D	Ø
3b. Ensured that minimum position provides adequate outdoor air			* /
for occupants	.0		ø
ACTIVITY 9: CONTROLS INFORMATION	•		·
3c. Obtained and reviewed all design inside/outside temperature and humidity			
requirements controls specifications as built mechanical drawings			
and controls operations manuals (often uniquely designed)	. Z		
ACTIVITY 10: CLOCKS, TIMERS, SWITCHES			
3d. Turned summer-winter switches to the correct position	.Z		
3e. Set time clocks appropriately			
3f. Ensured that settings fit the actual schedule of building use (including			'
night/weekend use)	.Д	۵	
ACTIVITY 11: CONTROL COMPONENTS			
3g. Ensured appropriate system pressure by testing line pressure at both the			
occupied (day) setting and the unoccupied (night) setting	, 🗆		Z.
3h. Checked that the line dryer prevents moisture buildup	, Ο		ß
3i. Replaced control system filters at the compressor inlet based on the			
compressor manufacturer's recommendation (for example, when you			
blow down the tank)	. 🗆		ø
3j. Set the line pressure at each thermostat and damper actuator at the proper	_	_	-
level (no leakage or obstructions)	.4		Ø
ACTIVITY 12: OUTDOOR AIR DAMPERS			
3k. Ensured that the outdoor air damper is visible for inspection	. 🗹		
3]. Ensured that the recirculating relief and/or exhaust dampers are visible		_	_
for inspection	Д.		
3m. Ensured that air temperature in the indoor area(s) served by each outdoor air damper is within the normal operating range	. 🗹		
NOTE: It is necessary to answe that the downer is one wing respective and with		-	_

NOTE: It is necessary to ensure that the damper is operating properly and within the normal range to continue.



3n.	Checked that the outdoor air damper fully closes within a few minutes of shutting off appropriate air handler	/es @	01 0	N/A
30.	Checked that the outdoor air damper opens (at least partially with no delay) when the air handler is turned on	ø		
3р.	If in heating mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 85°F	D		ø
3q.	If in cooling mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 60°F and mixed air thermostat is set to 45°F		D	, ,
3r.	If the outdoor air damper does not move, confirmed the following items:			1
	 The damper actuator links to the damper shaft, and any linkage set screws or bolts are tight 	<u>ح</u>		
	• Moving parts are free of impediments (e.g., rust, corrosion)	2		
	· Electrical wire or pneumatic tubing connects to the damper actuator	Q⁄	í a	D)
	• The outside air thermostat(s) is functioning properly (e.g., in the right location, calibrated correctly)	ø		

Proceed to Activities 13-16 if the damper seems to be operating properly.

ACTIVITY 13: FREEZE STATS

3s.	Disconnected power to controls (for automatic reset only) to test continuity across terminals	ü	A
OR			7
3t.	Confirmed (if applicable) that depressing the manual reset button (usually red) trips the freeze stat (clicking sound indicates freeze stat was		
	tripped)	Q	D
3u.	Assessed the feasibility of replacing all manual reset freeze-stats with automatic reset freeze-stats	-	a

NOTE: HVAC systems with water coils need protection from the cold. The freeze-stat may close the outdoor air damper and disconnect the supply air when tripped. The typical trip range is $35^{\circ}F$ to $42^{\circ}F$.

ACTIVITY 14: MIXED AIR THERMOSTATS

3v. Ensured that the mixed air stat for heating mode is set no higher than 65°F	, D	
3w. Ensured that the mixed air stat for cooling mode is set no lower than the room thermostat setting		
ACTIVITY 15: ECONOMIZERS		
3x. Confirmed proper economizer settings based on design specifications or local practices		Q
NOTE: The dry-bulb is typically set at 65°F or lower.		
3y. Checked that sensor on the economizer is shielded from direct sunlight	7	D
3z. Ensured that dampers operate properly (for outside air, return air, exhaust/relief air, and recirculated air), per the design specifications		۵

NOTE: Economizers use varying amounts of cool outdoor air to assist with the cooling load of the room or rooms. There are two types of economizers, dry-bulb and enthalpy. Dry-bulb economizers vary the amount of outdoor air based on outdoor temperature, and enthalpy economizers vary the amount of outdoor air based on outdoor temperature and humidity level.

ACTIVITY 16: FANS

3aa. Ensured that all fans (supply fans and associated return or relief fans) that move outside air indoors continuously operate during occupied Yes No N/A hours (even when room thermostat is satisfied)......

NOTE: If fan shuts off when the thermostat is satisfied, adjust control cycle as necessary to ensure sufficient outdoor air supply.

4. AIR DISTRIBUTION

ACTIVITY 17: AIR DISTRIBUTION

 4a. Ensured that supply and return air pathways in the existing ventilation system perform as required. 4b. Ensured that passive gravity relief ventilation systems and transfer grilles 	
between rooms and corridors are functioning	
NOTE: If ventilation system is closed or blocked to meet current fire codes, consult with a professional engineer for remedies.	
4c. Made sure every occupied space has supply of outdoor air (mechanical system or operable windows)	a
4d. Ensured that supply and return vents are open and unblocked \square	
NOTE: If outlets have been blocked intentionally to correct drafts or discomfort, investigate and correct the cause of the discomfort and reopen the vents.	е
4e. Modified the HVAC system to supply outside air to areas without an outdoor air supply	, _
4f. Modified existing HVAC systems to incorporate any room or zone layout and population changes	
4g. Moved all barriers (for example, room dividers, large free-standing blackboards or displays, bookshelves) that could block movement of	,
air in the room, especially those blocking air vents	Ŋ
4h. Ensured that unit ventilators are quiet enough to accommodate classroom activities	

ACTIVITY 18: PRESSURIZATION IN BUILDINGS

4i. Ensured that classrooms are free of uncomfortable drafts produced by air

NOTE: To prevent infiltration of outdoor pollutants, the ventilation system is designed to maintain positive pressurization in the building. Therefore, ensure that the system, including any exhaust fans, is operating on the "occupied" cycle when doing this activity.

from supply terminals

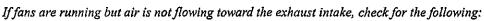
4j.	Ensured that air flows out of the building (using chemical smoke) through		,
	windows, doors, or other cracks and holes in exterior wall (for example,	/	
	floor joints, pipe openings)	ন্থ	Θ

5. EXHAUST SYSTEMS

ACTIVITY 19: EXHAUST FAN OPERATION

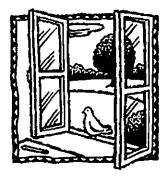
5a. Checked (using chemical smoke) that air flows into exhaust fan grille(s)

Ο. Ο



- Inoperable dampers
- Obstructed, leaky, or disconnected ductwork
- · Undersized or improperly installed fan
- Broken fan belt





5. EXHAUST SYSTEMS (continued)

ACTIVITY 20: EXHAUST AIRFLOW

NOTE: Prevent migration of indoor contaminants from areas such as bathrooms, kitchens, and labs by keeping them under negative pressure (as compared to surrounding spaces).

5b. Checked (using chemical smoke) that air is drawn into the room from adjacent spaces	Yes ,⊉	No	N/A
Stand outside the room with the door slightly open while checking airflow high the door opening (see "How to Measure Airflow").			
5c. Ensured that air is flowing toward the exhaust intake	<i>p</i>		
ACTIVITY 21: EXHAUST DUCTWORK			
5d. Checked that the exhaust ductwork downstream of the exhaust fan (which under positive pressure) is sealed and in good condition	is 	_	۵
6. QUANTITY OF OUTDOOR AIR			
ACTIVITY 22: OUTDOOR AIR MEASUREMENTS AND CALCULATION	ONS		

NOTE: Refer to "How to Measure Airflow" for techniques.

Measured the quantity of outdoor air supplied (22a) to each ventilation unit	D	
Calculated the number of occupants served (22b) by the ventilation unit under consideration	a	
Divided outdoor air supply (22a) by the number of occupants (22b) to determine the existing quantity of outdoor air supply per person (22c)		۵
TIVITY 23: ACCEPTABLE LEVELS OF OUTDOOR AIR QUANTITIES		
TIVITY 23: ACCEPTABLE LEVELS OF OUTDOOR AIR QUANTITIES Compared the existing outdoor air per person (22c) to the recommended levels in Table 1		
	unit Calculated the number of occupants served (22b) by the ventilation unit under consideration Divided outdoor air supply (22a) by the number of occupants (22b) to	unit Calculated the number of occupants served (22b) by the ventilation unit under consideration

NOTES All HVAC units through the BAS have advanced ventilation control logic deployed associated with the spaces they serve. The system will modulate the outdoor air damper and return dampers to provide the proper amount of air as needed to maintain space CO2 levels. This type of control is called CO2 based Demand-Controlled Ventilation (DCV). DCV provides proper ventilation air quantities as well as energy savings by reducing the amount of required ventilation air based on the CO2 levels measured by the sensor. The CO2 levels in parts per million (PPM) is used as an indicator of the number of occupants in a room. When the room has less than design occupancy, the required volume of ventilation is reduced. The CO2 sensor allows the VFD to reduce the fan speed to deliver a reduced volume of outside air for ventilation during these periods. An increase in the CO2 level is an indication that more people are in the room, so the fan speed is increased to maintain the required volume of ventilation air under all occupancy conditions.

Active DCV control is an acceptable alternate method to determine if ventilation requirements are met and could supersede rooms that may fail otherwise using traditional measured data collection procedures prescribed by established ASHRAE guidelines.

The ideal supply of outside air to interior occupied spaces should be based upon the 2018 Connecticut Building Code, which is based on the most currently adopted 2015 International Mechanical Code and coincides with ASHRAE-62.1, (2010) guidelines

BAS: Building Automation System VFD: Variable Frequency Drive (Controls the speed of the fan motor) ASHRAE: American Society of Heating, Refrigerating and Air Conditioning Engineers

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Instructions

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- Complete the Checklist.
 - Check the "yes," "no," or "not applicable" box beside each item. (A "no" response requires further attention.)
 - Make comments in the "Notes" section as necessary.
- Return the checklist portion of this document to the IAQ Coordinator.

1 of 5

Ventilation Checklist

Name:	Stephen	Martoni	-			
School:	Amity	Middle	School	Osonge	5	
Unit Vent	ilator/AHU No:	A7			~ ~ ~ ~	1
Room or	Area: 7	21	Date	Completed:	1.29.7	/
Signature	: Ly f	45				

1. OUTDOOR AIR INTAKES

la.	Marked locations of all outdoor air intakes on a small floor plan (for example, a fire escape floor plan)			N/A
1b.	Ensured that the ventilation system was on and operating in "occupied" mode	,		
AC	TIVITY 1: OBSTRUCTIONS			
	Ensured that outdoor air intakes are clear of obstructions, debris, clogs, or covers	⊿		
1d.	Installed corrective devices as necessary (e.g., if snowdrifts or leaves frequently block an intake)			
AC	TIVITY 2: POLLUTANT SOURCES			
	Checked ground-level intakes for pollutant sources (dumpsters, loading docks, and bus-idling areas)	Z		
1f.	Checked rooftop intakes for pollutant sources (plumbing vents; kitchen, toilet, or laboratory exhaust fans; puddles; and mist from air-conditioning cooling towers)	Z		
1g.	Resolved any problems with pollutant sources located near outdoor air intakes (e.g., relocated dumpster or extended exhaust pipe)			
AC	TIVITY 3: AIRFLOW			
1h.	Obtained chemical smoke (or a small piece of tissue paper or light plastic) Confirmed that outdoor air is entering the intake appropriately			
2.	SYSTEM CLEANLINESS			
	TIVITY 4: AIR FILTERS	220		
	Replaced filters per maintenance schedule			
	Shut off ventilation system fans while replacing filters (prevents dirt from blowing downstream)		D	
	Vacuumed filter areas before installing new filters	¤		
2d.	Confirmed proper fit of filters to prevent air from bypassing (flowing	-0		

2e. Confirmed proper installation of filters (correct direction for airflow).......

2. SYSTEM CLEANLINESS (continued)

ACTIVITY 5: DRAIN PANS

ACTIVITY 5: DRAIN PANS			
2f. Ensured that drain pans slant toward the drain (to prevent water from Ye	s I	No	
accumulating)	-	U O	
2g. Cleaned drain pans	/	u n	u m
2h. Checked drain pans for mold and mildew	I		G
ACTIVITY 6: COILS	,		
2i. Ensured that heating and cooling coils are clean	Í	۵	
ACTIVITY 7: AIR-HANDLING UNITS, UNIT VENTILATORS			
2i. Ensured that the interior of air-handling unit(s) or unit ventilator	,		
(air-mixing chamber and fan blades) is clean	ĺ,		
(air-mixing chamber and fan blades) is clean	l	۵	
ACTIVITY 8: MECHANICAL ROOMS			
21. Checked mechanical room for unsanitary conditions, leaks, and spills	1		
2m. Ensured that mechanical rooms and air-mixing chambers are free of trash.		-	
2m. Ensured that mechanical rooms and air-mixing chambers are free of trash, chemical products, and supplies	7		
3. CONTROLS FOR OUTDOOR AIR SUPPLY			
		-	-
3a. Ensured that air dampers are at least partially open (minimum position)	•	u	μ,
3b. Ensured that minimum position provides adequate outdoor air for occupants		п	
	:	4	7
ACTIVITY 9: CONTROLS INFORMATION			
3c. Obtained and reviewed all design inside/outside temperature and humidity			
requirements, controls specifications, as-built mechanical drawings,			D
and controls operations manuals (often uniquely designed)		Ч	ч
ACTIVITY 10: CLOCKS, TIMERS, SWITCHES	_		
3d. Turned summer-winter switches to the correct position			
3e. Set time clocks appropriately	i		7
3f. Ensured that settings fit the actual schedule of building use (including		_	_
night/weekend use)	ļ	U	
ACTIVITY 11: CONTROL COMPONENTS			
3g. Ensured appropriate system pressure by testing line pressure at both the		-	_^
occupied (day) setting and the unoccupied (night) setting			P,
3h. Checked that the line dryer prevents moisture buildup	I		þ
3i. Replaced control system filters at the compressor inlet based on the			
compressor manufacturer's recommendation (for example, when you		-	-A
blow down the tank)	1		Ъ
3j. Set the line pressure at each thermostat and damper actuator at the proper level (no leakage or obstructions)		۵	
	I	9	γı
ACTIVITY 12: OUTDOOR AIR DAMPERS	/		
3k. Ensured that the outdoor air damper is visible for inspection	ł		
31. Ensured that the recirculating relief and/or exhaust dampers are visible	'	_	-
for inspection	l		
3m. Ensured that air temperature in the indoor area(s) served by each outdoor air damper is within the normal operating range	í		
NOTE: It is passages to answe that the damper is operating property and within t		u	_

NOTE: It is necessary to ensure that the damper is operating properly and within the normal range to continue.



3n.	Checked that the outdoor air damper fully closes within a few minutes Yes No of shutting off appropriate air handler	N/A
	Checked that the outdoor air damper opens (at least partially with no delay) when the air handler is turned on	Q
3р.	If in heating mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 85°F	ø
-	If in cooling mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 60°F and mixed air thermostat is set to 45°F	7
<i>3</i> r.	 If the outdoor air damper does not move, confirmed the following items: The damper actuator links to the damper shaft, and any linkage set screws or bolts are tight	
	 Moving parts are free of impediments (e.g., rust, corrosion)	
	 The outside air thermostat(s) is functioning properly (e.g., in the right location, calibrated correctly) 	۵

Proceed to Activities 13-16 if the damper seems to be operating properly.

ACTIVITY 13: FREEZE STATS

3s.	Disconnected power to controls (for automatic reset only) to test continuity across terminals	۵	ø
OR			1
3t.	Confirmed (if applicable) that depressing the manual reset button (usually red) trips the freeze stat (clicking sound indicates freeze stat was		
	tripped)	Q	
3u.	Assessed the feasibility of replacing all manual reset freeze-stats with automatic reset freeze-stats \Box	-	

NOTE: HVAC systems with water coils need protection from the cold. The freeze-stat may close the outdoor air damper and disconnect the supply air when tripped. The typical trip range is 35°F to 42°F.

ACTIVITY 14: MIXED AIR THERMOSTATS

3v. Ensured that the mixed air stat for heating mode is set no higher than 65°F		
3w. Ensured that the mixed air stat for cooling mode is set no lower than the room thermostat setting		۵
ACTIVITY 15: ECONOMIZERS		
3x. Confirmed proper economizer settings based on design specifications or local practices		D
NOTE: The dry-bulb is typically set at 65°F or lower.		
3y. Checked that sensor on the economizer is shielded from direct sunlight	e 🖵	a
3z. Ensured that dampers operate properly (for outside air, return air, exhaust/relief air, and recirculated air), per the design specifications		
NOTE: Economizers use varying amounts of cool outdoor air to assist with the	cooling	

NOTE: Economizers use varying amounts of cool outdoor air to assist with the cooling load of the room or rooms. There are two types of economizers, dry-bulb and enthalpy. Dry-bulb economizers vary the amount of outdoor air based on outdoor temperature, and enthalpy economizers vary the amount of outdoor air based on outdoor temperature and humidity level.

ACTIVITY 16: FANS

3aa. Ensured that all fans (supply fans and associated return or relief fans) Yes No N/A that move outside air indoors continuously operate during occupied hours (even when room thermostat is satisfied)......

NOTE: If fan shuts off when the thermostat is satisfied, adjust control cycle as necessary to ensure sufficient outdoor air supply.

4. AIR DISTRIBUTION

ACTIVITY 17: AIR DISTRIBUTION

4a.	Ensured that supply and return air pathways in the existing ventilation system perform as required		
4Ъ.	Ensured that passive gravity relief ventilation systems and transfer grilles between rooms and corridors are functioning		
	TE: If ventilation system is closed or blocked to meet current fire codes, consult v fessional engineer for remedies.	vith a	
	Made sure every occupied space has supply of outdoor air (mechanical system or operable windows)		
	TE: If outlets have been blocked intentionally to correct drafts or discomfort, inve l correct the cause of the discomfort and reopen the vents.	estiga	te
	Modified the HVAC system to supply outside air to areas without an outdoor air supply	G	
4f.	Modified existing HVAC systems to incorporate any room or zone layout and population changes	۵	
4g.	Moved all barriers (for example, room dividers, large free-standing blackboards or displays, bookshelves) that could block movement of air in the room, especially those blocking air vents	0	⊿

activities n 4i. Ensured that classrooms are free of uncomfortable drafts produced by air from supply terminals **D**. **D**

4h. Ensured that unit ventilators are quiet enough to accommodate classroom

ACTIVITY 18: PRESSURIZATION IN BUILDINGS

NOTE: To prevent infiltration of outdoor pollutants, the ventilation system is designed to maintain positive pressurization in the building. Therefore, ensure that the system, including any exhaust fans, is operating on the "occupied" cycle when doing this activity.

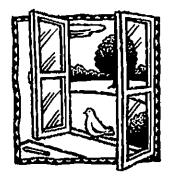
4j.	Ensured that air flows out of the building (using chemical smoke) through		,
	windows, doors, or other cracks and holes in exterior wall (for example,	/	
	floor joints, pipe openings)	Ø	Ū

5. EXHAUST SYSTEMS

ACTIVITY 19: EXHAUST FAN OPERATION

5a. Checked (using chemical smoke) that air flows into exhaust fan grille(s) D

- If fans are running but air is not flowing toward the exhaust intake, check for the following:
 - Inoperable dampers
 - Obstructed, leaky, or disconnected ductwork
 - · Undersized or improperly installed fan
 - Broken fan belt





5. EXHAUST SYSTEMS (continued)

ACTIVITY 20: EXHAUST AIRFLOW

NOTE: Prevent migration of indoor contaminants from areas such as bathrooms, kitchens, and labs by keeping them under negative pressure (as compared to surrounding spaces).

5b.	Checked (using chemical smoke) that air is drawn into the room from Yes adjacent spaces	. No	N//
the	nd outside the room with the door slightly open while checking airflow high and door opening (see "How to Measure Airflow").		
5c.	Ensured that air is flowing toward the exhaust intake		
AC	TIVITY 21: EXHAUST DUCTWORK		
5d.	Checked that the exhaust ductwork downstream of the exhaust fan (which is under positive pressure) is sealed and in good condition		
6.	QUANTITY OF OUTDOOR AIR		
	TIVITY 22: OUTDOOR AIR MEASUREMENTS AND CALCULATIONS		
AC	TIVITY 22: OUTDOOR AIR MEASUREMENTS AND CALCULATIONS TE: Refer to "How to Measure Airflow" for techniques.		
АС <i>NО</i> 6а.	TE: Refer to "How to Measure Airflow" for techniques. Measured the quantity of outdoor air supplied (22a) to each ventilation unit		
АС <i>NО</i> 6а.	TE: Refer to "How to Measure Airflow" for techniques. Measured the quantity of outdoor air supplied (22a) to each ventilation		

6d. Compared the existing outdoor air per person (22c) to the recommended levels in Table 1
6e. Corrected problems with ventilation units that supplied inadequate quantities of outdoor air to ensure that outdoor air quantities (22c) meet the recommended levels in Table 1

NOTES All HVAC units through the BAS have advanced ventilation control logic deployed associated with the spaces they serve. The system will modulate the outdoor air damper and return dampers to provide the proper amount of air as needed to maintain space CO2 levels. This type of control is called CO2 based Demand-Controlled Ventilation (DCV). DCV provides proper ventilation air quantities as well as energy savings by reducing the amount of required ventilation air based on the CO2 levels measured by the sensor. The CO2 levels in parts per million (PPM) is used as an indicator of the number of occupants in a room. When the room has less than design occupancy, the required volume of ventilation is reduced. The CO2 sensor allows the VFD to reduce the fan speed to deliver a reduced volume of outside air for ventilation during these periods. An increase in the CO2 level is an indication that more people are in the room, so the fan speed is increased to maintain the required volume of ventilation air under all occupancy conditions.

Active DCV control is an acceptable alternate method to determine if ventilation requirements are met and could supersede rooms that may fail otherwise using traditional measured data collection procedures prescribed by established ASHRAE guidelines.

The ideal supply of outside air to interior occupied spaces should be based upon the 2018 Connecticut Building Code, which is based on the most currently adopted 2015 International Mechanical Code and coincides with ASHRAE-62.1, (2010) guidelines



BAS: Building Automation System VFD: Variable Frequency Drive (Controls the speed of the fan motor) ASHRAE: American Society of Heating, Refrigerating and Air Conditioning Engineers

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Instructions

- 1. Read the *IAQ Backgrounder* and the Background Information for this checklist.
- 2. Keep the Background Information and make a copy of this checklist for **each** ventilation unit in your school, as well as a copy for future reference.
- 3. Complete the Checklist.
 - Check the "yes," "no," or "not applicable" box beside each item. (A "no" response requires further attention.)
 - Make comments in the "Notes" section as necessary.
- Return the checklist portion of this document to the IAQ Coordinator.

Ventilation Checklist

Name:	Stephen	Mortoni			
School:	Amity	Middle	School	Orange	
Unit Vent	ilator/AHU No:	8		-	*****
Room or .	Area:	A8	Date	Completed:	1-29-24
Signature	LA C	45			
Signature	· · · · · · · · · · · · · · · · · · ·				

1. OUTDOOR AIR INTAKES

la.	Marked locations of all outdoor air intakes on a small floor plan (for Yes example, a fire escape floor plan)		N/A
1b.	Ensured that the ventilation system was on and operating in "occupied" mode		
AC	TIVITY 1: OBSTRUCTIONS		
1c.	Ensured that outdoor air intakes are clear of obstructions, debris, clogs,	(m))
1.4	or covers		
10.	frequently block an intake)	ø	
AC	TIVITY 2: POLLUTANT SOURCES		
1e.	Checked ground-level intakes for pollutant sources (dumpsters, loading		-
1.0	docks, and bus-idling areas)	U.	
If.	Checked rooftop intakes for pollutant sources (plumbing vents; kitchen, toilet, or laboratory exhaust fans; puddles; and mist from		
	air-conditioning cooling towers)		D
1g.	Resolved any problems with pollutant sources located near outdoor air		
	intakes (e.g., relocated dumpster or extended exhaust pipe)		
	TIVITY 3: AIRFLOW		/
1h.	Obtained chemical smoke (or a small piece of tissue paper or light plastic). \Box	a	
1i.	Confirmed that outdoor air is entering the intake appropriately	10	
2.	SYSTEM CLEANLINESS		
AC	TIVITY 4: AIR FILTERS		
2a.	Replaced filters per maintenance schedule		
	Shut off ventilation system fans while replacing filters (prevents dirt from		
20	blowing downstream)		
20.	Vacuumed filter areas before installing new filters	9	5

2. SYSTEM CLEANLINESS (continued)

ACTIVITY 5: DRAIN PANS 2f. Ensured that drain pans slant toward the drain (to prevent water from Yes No N/A accumulating) 2g. Cleaned drain pans 2h. Checked drain pans for mold and mildew **ACTIVITY 6: COILS ACTIVITY 7: AIR-HANDLING UNITS, UNIT VENTILATORS** 2j. Ensured that the interior of air-handling unit(s) or unit ventilator 2k. Ensured that ducts are clean П ACTIVITY 8: MECHANICAL ROOMS 2m. Ensured that mechanical rooms and air-mixing chambers are free of trash, chemical products, and supplies 3. CONTROLS FOR OUTDOOR AIR SUPPLY 3a. Ensured that air dampers are at least partially open (minimum position) \Box \Box \swarrow 3b. Ensured that minimum position provides adequate outdoor air **ACTIVITY 9: CONTROLS INFORMATION** 3c. Obtained and reviewed all design inside/outside temperature and humidity requirements, controls specifications, as-built mechanical drawings, and controls operations manuals (often uniquely designed) **ACTIVITY 10: CLOCKS, TIMERS, SWITCHES** 3d. Turned summer-winter switches to the correct position 3e. Set time clocks appropriately Ø 3f. Ensured that settings fit the actual schedule of building use (including **ACTIVITY 11: CONTROL COMPONENTS** 3g. Ensured appropriate system pressure by testing line pressure at both the occupied (day) setting and the unoccupied (night) setting Ъ 3h. Checked that the line dryer prevents moisture buildup 3i. Replaced control system filters at the compressor inlet based on the compressor manufacturer's recommendation (for example, when you blow down the tank)..... ZĨ 3j. Set the line pressure at each thermostat and damper actuator at the proper level (no leakage or obstructions) Z **ACTIVITY 12: OUTDOOR AIR DAMPERS** 3k. Ensured that the outdoor air damper is visible for inspection 31. Ensured that the recirculating relief and/or exhaust dampers are visible for inspection 3m. Ensured that air temperature in the indoor area(s) served by each

NOTE: It is necessary to ensure that the damper is operating properly and within the normal range to continue.





3n.	Checked that the outdoor air damper fully closes within a few minutes of shutting off appropriate air handler	Yes , 🖬 🖌	0 0	N/A
30.	Checked that the outdoor air damper opens (at least partially with no delay) when the air handler is turned on	.⊿	a	Q
3p.	If in heating mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 85°F	.0	D	⊊∕
3q.	If in cooling mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 60°F and mixed air thermostat is set to 45°F			, ,
3r.	If the outdoor air damper does not move, confirmed the following items:			1
	• The damper actuator links to the damper shaft, and any linkage set screws or bolts are tight		<u>_</u>	0
	Moving parts are free of impediments (e.g., rust, corrosion)		المر	Q
	Electrical wire or pneumatic tubing connects to the damper actuator			
	• The outside air thermostat(s) is functioning properly (e.g., in the right		1	

location, calibrated correctly)

Proceed to Activities 13-16 if the damper seems to be operating properly.

ACTIVITY 13: FREEZE STATS

3s.	Disconnected power to controls (for automatic reset only) to test continuity across terminals	۵	ø
OR			1
3t.	Confirmed (if applicable) that depressing the manual reset button (usually red) trips the freeze stat (clicking sound indicates freeze stat was tripped)		D
311.	Assessed the feasibility of replacing all manual reset freeze-stats with		
Jui	automatic reset freeze-stats	ø	

NOTE: HVAC systems with water coils need protection from the cold. The freeze-stat may close the outdoor air damper and disconnect the supply air when tripped. The typical trip range is 35°F to 42°F.

ACTIVITY 14: MIXED AIR THERMOSTATS

3v. Ensured that the mixed air stat for heating mode is set no higher than 65°F	
3w. Ensured that the mixed air stat for cooling mode is set no lower than the room thermostat setting	
ACTIVITY 15: ECONOMIZERS	
3x. Confirmed proper economizer settings based on design specifications or local practices	a
NOTE: The dry-bulb is typically set at 65°F or lower.	
3y. Checked that sensor on the economizer is shielded from direct sunlight	
3z. Ensured that dampers operate properly (for outside air, return air, exhaust/relief air, and recirculated air), per the design specifications	

NOTE: Economizers use varying amounts of cool outdoor air to assist with the cooling load of the room or rooms. There are two types of economizers, dry-bulb and enthalpy. Dry-bulb economizers vary the amount of outdoor air based on outdoor temperature, and enthalpy economizers vary the amount of outdoor air based on outdoor temperature and humidity level.

ACTIVITY 16: FANS

3aa. Ensured that all fans (supply fans and associated return or relief fans) that move outside air indoors continuously operate during occupied Yes No N/A hours (even when room thermostat is satisfied)......

NOTE: If fan shuts off when the thermostat is satisfied, adjust control cycle as necessary to ensure sufficient outdoor air supply.

4. AIR DISTRIBUTION

ACTIVITY 17: AIR DISTRIBUTION

 4a. Ensured that supply and return air pathways in the existing ventilation system perform as required. 4b. Ensured that passive gravity relief ventilation systems and transfer grilles
between rooms and corridors are functioning
NOTE: If ventilation system is closed or blocked to meet current fire codes, consult with a professional engineer for remedies.
4c. Made sure every occupied space has supply of outdoor air (mechanical system or operable windows)
4d. Ensured that supply and return vents are open and unblocked
NOTE: If outlets have been blocked intentionally to correct drafts or discomfort, investigate and correct the cause of the discomfort and reopen the vents.
4e. Modified the HVAC system to supply outside air to areas without an outdoor air supply
4f. Modified existing HVAC systems to incorporate any room or zone layout and population changes
4g. Moved all barriers (for example, room dividers, large free-standing blackboards or displays, bookshelves) that could block movement of air in the room, especially those blocking air vents
4h. Ensured that unit ventilators are quiet enough to accommodate classroom activities
4i. Ensured that classrooms are free of uncomfortable drafts produced by air from supply terminals

ACTIVITY 18: PRESSURIZATION IN BUILDINGS

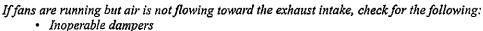
NOTE: To prevent infiltration of outdoor pollutants, the ventilation system is designed to maintain positive pressurization in the building. Therefore, ensure that the system, including any exhaust fans, is operating on the "occupied" cycle when doing this activity.

4j.	Ensured that air flows out of the building (using chemical smoke) through		,
	windows, doors, or other cracks and holes in exterior wall (for example,	/	
	floor joints, pipe openings)	Ø	

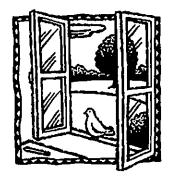
5. EXHAUST SYSTEMS

ACTIVITY 19: EXHAUST FAN OPERATION

5a. Checked (using chemical smoke) that air flows into exhaust fan grille(s) \Box



- Obstructed, leaky, or disconnected ductwork
- · Undersized or improperly installed fan
- Broken fan belt





5. EXHAUST SYSTEMS (continued)

ACTIVITY 20: EXHAUST AIRFLOW

NOTE: Prevent migration of indoor contaminants from areas such as bathrooms, kitchens, and labs by keeping them under negative pressure (as compared to surrounding spaces).

5b.	Checked (using chemical smoke) that air is drawn into the room from adjacent spaces	Yes. ⊠	No D	N/A D
Sta	nd outside the room with the door slightly open while checking girflow high	and l	ow in	1

Stand outside the room with the door slightly open while checking airflow high and low in the door opening (see "How to Measure Airflow").

ACTIVITY 21: EXHAUST DUCTWORK

5d. Checked that the exhaust ductwork downstream of the exhaust fan (which is under positive pressure) is sealed and in good condition......

6. QUANTITY OF OUTDOOR AIR

ACTIVITY 22: OUTDOOR AIR MEASUREMENTS AND CALCULATIONS

NOTE: Refer to "How to Measure Airflow" for techniques.

- 6a. Measured the quantity of outdoor air supplied (22a) to each ventilation unit 🖸 6b. Calculated the number of occupants served (22b) by the ventilation unit under consideration 🗅 6c. Divided outdoor air supply (22a) by the number of occupants (22b) to determine the existing quantity of outdoor air supply per person (22c) **ACTIVITY 23: ACCEPTABLE LEVELS OF OUTDOOR AIR QUANTITIES** 6d. Compared the existing outdoor air per person (22c) to the recommended levels in Table 1 6e. Corrected problems with ventilation units that supplied inadequate
 - quantities of outdoor air to ensure that outdoor air quantities (22c) meet the recommended levels in Table 1

NOTES All HVAC units through the BAS have advanced ventilation control logic deployed associated with the spaces they serve. The system will modulate the outdoor air damper and return dampers to provide the proper amount of air as needed to maintain space CO2 levels. This type of control is called CO2 based Demand-Controlled Ventilation (DCV). DCV provides proper ventilation air quantities as well as energy savings by reducing the amount of required ventilation air based on the CO2 levels measured by the sensor. The CO2 levels in parts per million (PPM) is used as an indicator of the number of occupants in a room. When the room has less than design occupancy, the required volume of ventilation is reduced. The CO2 sensor allows the VFD to reduce the fan speed to deliver a reduced volume of outside air for ventilation during these periods. An increase in the CO2 level is an indication that more people are in the room, so the fan speed is increased to maintain the required volume of ventilation air under all occupancy conditions.

Active DCV control is an acceptable alternate method to determine if ventilation requirements are met and could supersede rooms that may fail otherwise using traditional measured data collection procedures prescribed by established ASHRAE guidelines.

The ideal supply of outside air to interior occupied spaces should be based upon the 2018 Connecticut Building Code, which is based on the most currently adopted 2015 International Mechanical Code and coincides with ASHRAE-62.1, (2010) guidelines

BAS: Building Automation System VFD: Variable Frequency Drive (Controls the speed of the fan motor)

ASHRAE: American Society of Heating, Refrigerating and Air Conditioning Engineers



Instructions

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 - Check the "yes," "no," or "not applicable" box beside each item. (A "no" response requires further attention.)
 - Make comments in the "Notes" section as necessary.
- Return the checklist portion of this document to the IAQ Coordinator.

Ventilation Checklist

Name:	Stephen	Martoni				
School:	Amity	Middle	School	Olonge		
Unit Vent	tilator/AHU No:	10				
Room or	Area: 1	AIO	Date	Completed:	1-29.2	Ч
Signature	SA /	45				
-	1 4					

1. OUTDOOR AIR INTAKES

1a.	Marked locations of all outdoor air intakes on a small floor plan (for example, a fire escape floor plan)			
1b.	Ensured that the ventilation system was on and operating in "occupied" mode	1		
AC	TIVITY 1: OBSTRUCTIONS			
1c.	Ensured that outdoor air intakes are clear of obstructions, debris, clogs, or covers	ſ		
1d.	Installed corrective devices as necessary (e.g., if snowdrifts or leaves frequently block an intake)		ø	
AC	TIVITY 2: POLLUTANT SOURCES			
	Checked ground-level intakes for pollutant sources (dumpsters, loading docks, and bus-idling areas)	1	D	۵
1f.	Checked rooftop intakes for pollutant sources (plumbing vents; kitchen, toilet, or laboratory exhaust fans; puddles; and mist from air-conditioning cooling towers)	1		
1g.	Resolved any problems with pollutant sources located near outdoor air intakes (e.g., relocated dumpster or extended exhaust pipe)	-		D
AC	TIVITY 3: AIRFLOW			7
1h.	Obtained chemical smoke (or a small piece of tissue paper or light plastic)	ו ר		
2.	SYSTEM CLEANLINESS			
AC	TIVITY 4: AIR FILTERS			
	Replaced filters per maintenance schedule	1		
	Shut off ventilation system fans while replacing filters (prevents dirt from blowing downstream)	1	D	D
		1		
2d.	Confirmed proper fit of filters to prevent air from bypassing (flowing around) the air filter	1		

2. SYSTEM CLEANLINESS (continued)

ACTIVITY 5: DRAIN PANS	Vac	No	N/A
2f. Ensured that drain pans slant toward the drain (to prevent water from accumulating)			
2g. Cleaned drain pans		Q	
2h. Checked drain pans for mold and mildew	¤		
ACTIVITY 6: COILS			
		0	
	7		_
ACTIVITY 7: AIR-HANDLING UNITS, UNIT VENTILATORS			
2j. Ensured that the interior of air-handling unit(s) or unit ventilator	7	п	
(air-mixing chamber and fan blades) is clean 2k. Ensured that ducts are clean	Z		
	7		
ACTIVITY 8: MECHANICAL ROOMS	_		
21. Checked mechanical room for unsanitary conditions, leaks, and spills		D	
2m. Ensured that mechanical rooms and air-mixing chambers are free of trash, chemical products, and supplies		۵	
	-		
3. CONTROLS FOR OUTDOOR AIR SUPPLY			
3a. Ensured that air dampers are at least partially open (minimum position)		D	ø
2h Engurad that minimum position provides adequate outdoor air			•
for occupants			P
ACTIVITY 9: CONTROLS INFORMATION	•		
3c. Obtained and reviewed all design inside/outside temperature and humidity			
requirements, controls specifications, as-built mechanical drawings,	~	_	-
and controls operations manuals (often uniquely designed)	., אם	u	
ACTIVITY 10: CLOCKS, TIMERS, SWITCHES			
3d. Turned summer-winter switches to the correct position			
3e. Set time clocks appropriately			ø
3f. Ensured that settings fit the actual schedule of building use (including night/weekend use)	ØĨ	۵	
	. <u></u>	-	-
ACTIVITY 11: CONTROL COMPONENTS			
3g. Ensured appropriate system pressure by testing line pressure at both the	n		5
occupied (day) setting and the unoccupied (night) setting			6
3i. Replaced control system filters at the compressor inlet based on the	. –	-	~
compressor manufacturer's recommendation (for example, when you	_	_	
blow down the tank)			ø
level (no leakage or obstructions)	ם		Ø
ACTIVITY 12: OUTDOOR AIR DAMPERS	4	-	<u> </u>
3k. Ensured that the outdoor air damper is visible for inspection		۵	
for inspection	£		
3m. Ensured that air temperature in the indoor area(s) served by each		_	_
outdoor air damper is within the normal operating range			
NOTE It is according to current that the downey is executing property and with			

NOTE: It is necessary to ensure that the damper is operating properly and within the normal range to continue.

2 of 5



3n.	Checked that the outdoor air damper fully closes within a few minutes Yes No of shutting off appropriate air handler	N/A
	Checked that the outdoor air damper opens (at least partially with no delay) when the air handler is turned on	Q
3p.	If in heating mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 85°F	₽∕
	If in cooling mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 60° F and mixed air thermostat is set to 45° F	2
3r.	 If the outdoor air damper does not move, confirmed the following items: The damper actuator links to the damper shaft, and any linkage set screws or bolts are tight	
	• Electrical wire or pneumatic tubing connects to the damper actuator	
	• The outside air thermostat(s) is functioning properly (e.g., in the right location, calibrated correctly)	۵

Proceed to Activities 13-16 if the damper seems to be operating properly.

ACTIVITY 13: FREEZE STATS

3s.	Disconnected power to controls (for automatic reset only) to test continuity across terminals		ø
OR			'
3t.	Confirmed (if applicable) that depressing the manual reset button (usually red) trips the freeze stat (clicking sound indicates freeze stat was		
	tripped)	Q	D
3u.	Assessed the feasibility of replacing all manual reset freeze-stats with automatic reset freeze-stats		

NOTE: HVAC systems with water coils need protection from the cold. The freeze-stat may close the outdoor air damper and disconnect the supply air when tripped. The typical trip range is 35°F to 42°F.

ACTIVITY 14: MIXED AIR THERMOSTATS

3v.	Ensured that the mixed air stat for heating mode is set no higher than 65°F		
3w.	Ensured that the mixed air stat for cooling mode is set no lower than the room thermostat setting	_ _	

ACTIVITY 15: ECONOMIZERS

Confirmed proper economizer settings based on design specifications or		
local practices	D	a

NOTE: The dry-bulb is typically set at 65°F or lower.

- 3y. Checked that sensor on the economizer is shielded from direct sunlight \Box
- 3z. Ensured that dampers operate properly (for outside air, return air, exhaust/relief air, and recirculated air), per the design specifications

NOTE: Economizers use varying amounts of cool outdoor air to assist with the cooling load of the room or rooms. There are two types of economizers, dry-bulb and enthalpy. Dry-bulb economizers vary the amount of outdoor air based on outdoor temperature, and enthalpy economizers vary the amount of outdoor air based on outdoor temperature and humidity level.

ACTIVITY 16: FANS

3aa. Ensured that all fans (supply fans and associated return or relief fans) that move outside air indoors continuously operate during occupied Yes No N/A hours (even when room thermostat is satisfied)......

NOTE: If fan shuts off when the thermostat is satisfied, adjust control cycle as necessary to ensure sufficient outdoor air supply.

4. AIR DISTRIBUTION

ACTIVITY 17: AIR DISTRIBUTION

4a. Ensured that supply and return air pathways in the existing ventilation system perform as required.	D
4b. Ensured that passive gravity relief ventilation systems and transfer grilles between rooms and corridors are functioning	
NOTE: If ventilation system is closed or blocked to meet current fire codes, consult with a professional engineer for remedies.	
 4c. Made sure every occupied space has supply of outdoor air (mechanical system or operable windows) 4d. Ensured that supply and active supply and upply along a supply along a supply	Q
4d. Ensured that supply and return vents are open and unblocked	ч
NOTE: If outlets have been blocked intentionally to correct drafts or discomfort, investigat and correct the cause of the discomfort and reopen the vents.	е
	,

4e.	Modified the HVAC system to supply outside air to areas without an outdoor air supply	œ	
4f.	Modified existing HVAC systems to incorporate any room or zone layout and population changes	D	
4g.	Moved all barriers (for example, room dividers, large free-standing blackboards or displays, bookshelves) that could block movement of air in the room, especially those blocking air vents	Q	⊿
4h.	Ensured that unit ventilators are quiet enough to accommodate classroom activities		
4i.	Ensured that classrooms are free of uncomfortable drafts produced by air from supply terminals	.	

ACTIVITY 18: PRESSURIZATION IN BUILDINGS

NOTE: To prevent infiltration of outdoor pollutants, the ventilation system is designed to maintain positive pressurization in the building. Therefore, ensure that the system, including any exhaust fans, is operating on the "occupied" cycle when doing this activity.

4j.	Ensured that air flows out of the building (using chemical smoke) through		,
	windows, doors, or other cracks and holes in exterior wall (for example,	/	
	floor joints, pipe openings)	ত্র	$\overline{\mathbf{O}}$

5. EXHAUST SYSTEMS

ACTIVITY 19: EXHAUST FAN OPERATION

5a. Checked (using chemical smoke) that air flows into exhaust fan grille(s) D

If fans are running but air is not flowing toward the exhaust intake, check for the following:

- Inoperable dampers
- Obstructed, leaky, or disconnected ductwork
- · Undersized or improperly installed fan
- Broken fan belt





5. EXHAUST SYSTEMS (continued)

ACTIVITY 20: EXHAUST AIRFLOW

NOTE: Prevent migration of indoor contaminants from areas such as bathrooms, kitchens, and labs by keeping them under negative pressure (as compared to surrounding spaces).

5b. Checked (using chemical smoke) that air is drawn into the room from Yes. No N/A adjacent spaces

Stand outside the room with the door slightly open while checking airflow high and low in the door opening (see "How to Measure Airflow").

ACTIVITY 21: EXHAUST DUCTWORK

5d. Checked that the exhaust ductwork downstream of the exhaust fan (which is under positive pressure) is sealed and in good condition......

6. QUANTITY OF OUTDOOR AIR

ACTIVITY 22: OUTDOOR AIR MEASUREMENTS AND CALCULATIONS

NOTE: Refer to "How to Measure Airflow" for techniques.

6a. Measured the quantity of outdoor air supplied (22a) to each ventilation unit 6b. Calculated the number of occupants served (22b) by the ventilation unit under consideration 6c. Divided outdoor air supply (22a) by the number of occupants (22b) to determine the existing quantity of outdoor air supply per person (22c) **ACTIVITY 23: ACCEPTABLE LEVELS OF OUTDOOR AIR QUANTITIES** 6d. Compared the existing outdoor air per person (22c) to the recommended levels in Table 1 6e. Corrected problems with ventilation units that supplied inadequate quantities of outdoor air to ensure that outdoor air quantities (22c) meet the recommended levels in Table 1

NOTES All HVAC units through the BAS have advanced ventilation control logic deployed associated with the spaces they serve. The system will modulate the outdoor air damper and return dampers to provide the proper amount of air as needed to maintain space CO2 levels. This type of control is called CO2 based Demand-Controlled Ventilation (DCV). DCV provides proper ventilation air quantities as well as energy savings by reducing the amount of required ventilation air based on the CO2 levels measured by the sensor. The CO2 levels in parts per million (PPM) is used as an indicator of the number of occupants in a room. When the room has less than design occupancy, the required volume of ventilation is reduced. The CO2 sensor allows the VFD to reduce the fan speed to deliver a reduced volume of outside air for ventilation during these periods. An increase in the CO2 level is an indication that more people are in the room, so the fan speed is increased to maintain the required volume of ventilation air under all occupancy conditions.

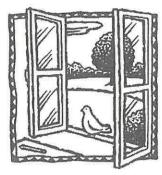
Active DCV control is an acceptable alternate method to determine if ventilation requirements are met and could supersede rooms that may fail otherwise using traditional measured data collection procedures prescribed by established ASHRAE guidelines.

The ideal supply of outside air to interior occupied spaces should be based upon the 2018 Connecticut Building Code, which is based on the most currently adopted 2015 International Mechanical Code and coincides with ASHRAE-62.1, (2010) guidelines

BAS: Building Automation System VFD: Variable Frequency Drive (Controls the speed of the fan motor) ASHRAE: American Society of Heating, Refrigerating and Air Conditioning Engineers

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Instructions

- 1. Read the *IAQ Backgrounder* and the Background Information for this checklist.
- 2. Keep the Background Information and make a copy of this checklist for **each** ventilation unit in your school, as well as a copy for future reference.
- 3. Complete the Checklist.
 - Check the "yes," "no," or "not applicable" box beside each item. (A "no" response requires further attention.)
 - Make comments in the "Notes" section as necessary.
- Return the checklist portion of this document to the IAQ Coordinator.

Ventilation Checklist

Name:	Stephen	Martoni				
School:	Amity	Middle	School	Olonge	~	
Unit Vent	ilator/AHU No:	<u>l/</u>			/	
Room or	Area:	All	Date	Completed:	1-29-24	
Signature	: Ly f	45				

1. OUTDOOR AIR INTAKES

la.	Marked locations of all outdoor air intakes on a small floor plan (for Ye example, a fire escape floor plan)			N/A	
1b.	Ensured that the ventilation system was on and operating in "occupied" mode	,		٦	
AC	TIVITY 1: OBSTRUCTIONS				
1c.	Ensured that outdoor air intakes are clear of obstructions, debris, clogs, or covers	ĩ		D	
1d.	Installed corrective devices as necessary (e.g., if snowdrifts or leaves frequently block an intake)		ø		
AC	TIVITY 2: POLLUTANT SOURCES				
	Checked ground-level intakes for pollutant sources (dumpsters, loading docks, and bus-idling areas)	រ	D		
1f.	Checked rooftop intakes for pollutant sources (plumbing vents; kitchen, toilet, or laboratory exhaust fans; puddles; and mist from air-conditioning cooling towers)	í			
1g.	Resolved any problems with pollutant sources located near outdoor air intakes (e.g., relocated dumpster or extended exhaust pipe)	1724			
AC	TIVITY 3: AIRFLOW				
1h.	Obtained chemical smoke (or a small piece of tissue paper or light plastic) Confirmed that outdoor air is entering the intake appropriately				
2.	SYSTEM CLEANLINESS				
AC	TIVITY 4: AIR FILTERS				
	Replaced filters per maintenance schedule	ſ			
2b.	Shut off ventilation system fans while replacing filters (prevents dirt from	1		m	
2c.	blowing downstream)	1			
2d.	Confirmed proper fit of filters to prevent air from bypassing (flowing around) the air filter				

2. SYSTEM CLEANLINESS (continued)

ACTIVITY 5: DRAIN PANS 2f. Ensured that drain pans slant toward the drain (to prevent water from accumulating) 2g. Cleaned drain pans

2g. 2h.	Cleaned drain pans		
	TIVITY 6: COILS Ensured that heating and cooling coils are clean	a	
2i.	TIVITY 7: AIR-HANDLING UNITS, UNIT VENTILATORS Ensured that the interior of air-handling unit(s) or unit ventilator (air-mixing chamber and fan blades) is clean		
21.	TIVITY 8: MECHANICAL ROOMS Checked mechanical room for unsanitary conditions, leaks, and spills		
3.	CONTROLS FOR OUTDOOR AIR SUPPLY		
	Ensured that air dampers are at least partially open (minimum position) Ensured that minimum position provides adequate outdoor air for occupants		
AC	TIVITY 9: CONTROLS INFORMATION		·
	Obtained and reviewed all design inside/outside temperature and humidity requirements, controls specifications, as-built mechanical drawings, and controls operations manuals (often uniquely designed)	Q	
	TIVITY 10: CLOCKS, TIMERS, SWITCHES		
	Turned summer-winter switches to the correct position		□ ≱
	Ensured that settings fit the actual schedule of building use (including night/weekend use)		
AC	TIVITY 11: CONTROL COMPONENTS		
3h.	Ensured appropriate system pressure by testing line pressure at both the occupied (day) setting and the unoccupied (night) setting Checked that the line dryer prevents moisture buildup		D
	compressor manufacturer's recommendation (for example, when you blow down the tank)		Zđ
3j.	Set the line pressure at each thermostat and damper actuator at the proper level (no leakage or obstructions)		ø
AC	TIVITY 12: OUTDOOR AIR DAMPERS		
	Ensured that the outdoor air damper is visible for inspection		
	Ensured that the recirculating relief and/or exhaust dampers are visible for inspection		٦
3m.	Ensured that air temperature in the indoor area(s) served by each outdoor air damper is within the normal operating range	a	

NOTE: It is necessary to ensure that the damper is operating properly and within the normal range to continue.



Yes No N/A

2 of 5



3n.	Checked that the outdoor air damper fully closes within a few minutes of shutting off appropriate air handler	Yes G	N 0 D	N/A
30.	Checked that the outdoor air damper opens (at least partially with no delay) when the air handler is turned on	., Z	۵	Q
3p.	If in heating mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 85°F	.0	D	P
3q.	If in cooling mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 60°F and mixed air thermostat is set to 45°F		D	•⁄
3r.	If the outdoor air damper does not move, confirmed the following items:			1
	 The damper actuator links to the damper shaft, and any linkage set screws or bolts are tight Moving parts are free of impediments (e.g., rust, corrosion) Electrical wire or pneumatic tubing connects to the damper actuator 			
	• The outside air thermostat(s) is functioning properly (e.g., in the right	-	/	

location, calibrated correctly).....

Proceed to Activities 13–16 if the damper seems to be operating properly.

ACTIVITY 13: FREEZE STATS

3s.	Disconnected power to controls (for automatic reset only) to test continuity across terminals	۵	ø
OR			1
3t.	Confirmed (if applicable) that depressing the manual reset button (usually red) trips the freeze stat (clicking sound indicates freeze stat was tripped)		
2		-	-
.5u.	Assessed the feasibility of replacing all manual reset freeze-stats with automatic reset freeze-stats	ø	

NOTE: HVAC systems with water coils need protection from the cold. The freeze-stat may close the outdoor air damper and disconnect the supply air when tripped. The typical trip range is 35°F to 42°F.

ACTIVITY 14: MIXED AIR THERMOSTATS

3v. Ensured that the mixed air stat for heating mode is set no higher than 65°F	D
3w. Ensured that the mixed air stat for cooling mode is set no lower than the room thermostat setting	
ACTIVITY 15: ECONOMIZERS 3x. Confirmed proper economizer settings based on design specifications or local practices	a
NOTE: The dry-bulb is typically set at 65°F or lower.	
3y. Checked that sensor on the economizer is shielded from direct sunlight	D

NOTE: Economizers use varying amounts of cool outdoor air to assist with the cooling load of the room or rooms. There are two types of economizers, dry-bulb and enthalpy. Dry-bulb economizers vary the amount of outdoor air based on outdoor temperature, and enthalpy economizers vary the amount of outdoor air based on outdoor temperature and humidity level.

ACTIVITY 16: FANS

NOTE: If fan shuts off when the thermostat is satisfied, adjust control cycle as necessary to ensure sufficient outdoor air supply.

4. AIR DISTRIBUTION

ACTIVITY 17: AIR DISTRIBUTION

4a. Ensured that supply and return air pathways in the existing ventilation system perform as required
4b. Ensured that passive gravity relief ventilation systems and transfer grilles between rooms and corridors are functioning
NOTE: If ventilation system is closed or blocked to meet current fire codes, consult with a professional engineer for remedies.
4c. Made sure every occupied space has supply of outdoor air (mechanical system or operable windows)
4d. Ensured that supply and return vents are open and unblocked
NOTE: If outlets have been blocked intentionally to correct drafts or discomfort, investigate and correct the cause of the discomfort and reopen the vents.
4e. Modified the HVAC system to supply outside air to areas without an outdoor air supply
4f. Modified existing HVAC systems to incorporate any room or zone layout and population changes
4g. Moved all barriers (for example, room dividers, large free-standing blackboards or displays, bookshelves) that could block movement of air in the room, especially those blocking air vents
4h. Ensured that unit ventilators are quiet enough to accommodate classroom activities
4i. Ensured that classrooms are free of uncomfortable drafts produced by air from supply terminals

ACTIVITY 18: PRESSURIZATION IN BUILDINGS

NOTE: To prevent infiltration of outdoor pollutants, the ventilation system is designed to maintain positive pressurization in the building. Therefore, ensure that the system, including any exhaust fans, is operating on the "occupied" cycle when doing this activity.

4j.	Ensured that air flows out of the building (using chemical smoke) through		,
	windows, doors, or other cracks and holes in exterior wall (for example,	/	
	floor joints, pipe openings)	2	Ŀ

5. EXHAUST SYSTEMS

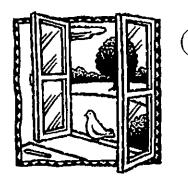
ACTIVITY 19: EXHAUST FAN OPERATION

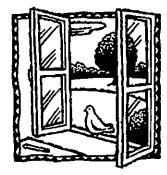
5a. Checked (using chemical smoke) that air flows into exhaust fan grille(s) \Box

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If fans are running but air is not flowing toward the exhaust intake, check for the following: • Inoperable dampers

- Obstructed, leaky, or disconnected ductwork
- Undersized or improperly installed fan
- Broken fan belt





5. EXHAUST SYSTEMS (continued)

ACTIVITY 20: EXHAUST AIRFLOW

NOTE: Prevent migration of indoor contaminants from areas such as bathrooms, kitchens, and labs by keeping them under negative pressure (as compared to surrounding spaces).

 5b. Checked (using chemical smoke) that air is drawn into the room from ves No N/A adjacent spaces
 Ves No N/A

 Stand outside the room with the door slightly open while checking airflow high and low in the door opening (see "How to Measure Airflow").
 Image: Comparison of the state is flowing toward the exhaust intake

ACTIVITY 21: EXHAUST DUCTWORK

6. QUANTITY OF OUTDOOR AIR

ACTIVITY 22: OUTDOOR AIR MEASUREMENTS AND CALCULATIONS

NOTE: Refer to "How to Measure Airflow" for techniques.

6a. Measured the quantity of outdoor air supplied (22a) to each ventilation 6b. Calculated the number of occupants served (22b) by the ventilation unit under consideration 6c. Divided outdoor air supply (22a) by the number of occupants (22b) to determine the existing quantity of outdoor air supply per person (22c) **ACTIVITY 23: ACCEPTABLE LEVELS OF OUTDOOR AIR OUANTITIES** 6d. Compared the existing outdoor air per person (22c) to the recommended levels in Table 1 6e. Corrected problems with ventilation units that supplied inadequate quantities of outdoor air to ensure that outdoor air quantities (22c) meet the recommended levels in Table 1.....

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Active DCV control is an acceptable alternate method to determine if ventilation requirements are met and could supersede rooms that may fail otherwise using traditional measured data collection procedures prescribed by established ASHRAE guidelines.

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Instructions

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- 3. Complete the Checklist.
 - Check the "yes," "no," or "not applicable" box beside each item. (A "no" response requires further attention.)
 - Make comments in the "Notes" section as necessary.
- Return the checklist portion of this document to the IAQ Coordinator.

Ventilation Checklist

Name:	Stephen	Martoni				
School:	Amity	Middle 3	School	Olonge		
Unit Vent	ilator/AHU No:	13	2			
Room or A	Area:	A12	Date	Completed:	1-29-24	
Signature	. In 1	45				

1. OUTDOOR AIR INTAKES

1a.	Marked locations of all outdoor air intakes on a small floor plan (for Yes example, a fire escape floor plan)	No Z	0 - 05	/A]
1b.	Ensured that the ventilation system was on and operating in "occupied" mode		Ç	ב
AC	TIVITY 1: OBSTRUCTIONS			
1c.	Ensured that outdoor air intakes are clear of obstructions, debris, clogs, or covers		Ç	ב
1d.	Installed corrective devices as necessary (e.g., if snowdrifts or leaves frequently block an intake)		' Ç	ב
AC	TIVITY 2: POLLUTANT SOURCES			
	Checked ground-level intakes for pollutant sources (dumpsters, loading docks, and bus-idling areas)		Ģ	ב
1f.	Checked rooftop intakes for pollutant sources (plumbing vents; kitchen, toilet, or laboratory exhaust fans; puddles; and mist from air-conditioning cooling towers)	D	ſ	٦
1g.	Resolved any problems with pollutant sources located near outdoor air intakes (e.g., relocated dumpster or extended exhaust pipe)		C	ב
AC	TIVITY 3: AIRFLOW			
1h.	Obtained chemical smoke (or a small piece of tissue paper or light plastic). \Box Confirmed that outdoor air is entering the intake appropriately			ב ב
2.	SYSTEM CLEANLINESS			
AC	TIVITY 4: AIR FILTERS			
2a.	Replaced filters per maintenance schedule		C	ב
2b.	Shut off ventilation system fans while replacing filters (prevents dirt from blowing downstream)	. 0	Ç	ב
2c.	Vacuumed filter areas before installing new filters		C	ב
2d.	Confirmed proper fit of filters to prevent air from bypassing (flowing around) the air filter			ב

2. SYSTEM CLEANLINESS (continued)

ACTIVITY 5: DRAIN PANS 2f. Ensured that drain pans slant toward the drain (to prevent water from 2g. Cleaned drain pans 2h. Checked drain pans for mold and mildew **ACTIVITY 6: COILS ACTIVITY 7: AIR-HANDLING UNITS, UNIT VENTILATORS** 2j. Ensured that the interior of air-handling unit(s) or unit ventilator **ACTIVITY 8: MECHANICAL ROOMS**

2m. Ensured that mechanical rooms and air-mixing chambers are free of trash, chemical products, and supplies

3. CONTROLS FOR OUTDOOR AIR SUPPLY

3a.	Ensured that air dampers are at least partially open (minimum position) \Box	Ø
3b.	Ensured that minimum position provides adequate outdoor air	1
	for occupants	ø

ACTIVITY 9: CONTROLS INFORMATION

3c. Obtained and reviewed all design inside/outside temperature and humidity requirements, controls specifications, as-built mechanical drawings, and controls operations manuals (often uniquely designed)

ACTIVITY 10: CLOCKS, TIMERS, SWITCHES

3d.	Turned summer-winter switches to the correct position	
3e.	Set time clocks appropriately	Ø
	Ensured that settings fit the actual schedule of building use (including	•
	night/weekend use)	

ACTIVITY 11: CONTROL COMPONENTS

-	Ensured appropriate system pressure by testing line pressure at both the occupied (day) setting and the unoccupied (night) setting	۵	Å Å
	Checked that the line dryer prevents moisture buildup	Ц	
31.	Replaced control system filters at the compressor inlet based on the compressor manufacturer's recommendation (for example, when you blow down the tank)	m	21
o :	•	-	7
<i>э</i>].	Set the line pressure at each thermostat and damper actuator at the proper level (no leakage or obstructions) \Box	ū	ø
AC	TIVITY 12: OUTDOOR AIR DAMPERS		
3k.	Ensured that the outdoor air damper is visible for inspection		
	Ensured that the recirculating relief and/or exhaust dampers are visible for inspection		
3m.	Ensured that air temperature in the indoor area(s) served by each outdoor air damper is within the normal operating range	п	

NOTE: It is necessary to ensure that the damper is operating properly and within the normal range to continue.



Yes No N/A



3n.	Checked that the outdoor air damper fully closes within a few minutes Ye of shutting off appropriate air handler			N/A
30.	Checked that the outdoor air damper opens (at least partially with no delay) when the air handler is turned on	2	l	
3р.	If in heating mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 85°F		l	⊊∕
3q.	If in cooling mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 60° F and mixed air thermostat is set to 45° F			, ,
3r.	If the outdoor air damper does not move, confirmed the following items:			4
	 The damper actuator links to the damper shaft, and any linkage set screws or bolts are tight			
	 Electrical wire or pneumatic tubing connects to the damper actuator			
	• The outside air thermostat(s) is functioning properly (e.g., in the right location, calibrated correctly)			
Pro	ceed to Activities 13–16 if the damper seems to be operating properly.			

ACTIVITY 13: FREEZE STATS

3s.	Disconnected power to controls (for automatic reset only) to test continuity across terminals	۵	ø
OR			7
3t.	Confirmed (if applicable) that depressing the manual reset button (usually red) trips the freeze stat (clicking sound indicates freeze stat was		
	tripped)	D	D
3u.	Assessed the feasibility of replacing all manual reset freeze-stats with automatic reset freeze-stats		

NOTE: HVAC systems with water coils need protection from the cold. The freeze-stat may close the outdoor air damper and disconnect the supply air when tripped. The typical trip range is $35^{\circ}F$ to $42^{\circ}F$.

ACTIVITY 14: MIXED AIR THERMOSTATS

3v.	Ensured that the mixed air stat for heating mode is set no higher than 65°F	
3w	Ensured that the mixed air stat for cooling mode is set no lower than the room thermostat setting	 G

ACTIVITY 15: ECONOMIZERS

3x.	Confirmed proper economizer settings based on design specifications or	
	local practices	

NOTE: The dry-bulb is typically set at 65°F or lower.

- 3y. Checked that sensor on the economizer is shielded from direct sunlight \square

NOTE: Economizers use varying amounts of cool outdoor air to assist with the cooling load of the room or rooms. There are two types of economizers, dry-bulb and enthalpy. Dry-bulb economizers vary the amount of outdoor air based on outdoor temperature, and enthalpy economizers vary the amount of outdoor air based on outdoor temperature and humidity level.

ACTIVITY 16: FANS

3aa. Ensured that all fans (supply fans and associated return or relief fans) that move outside air indoors continuously operate during occupied √No N/A Yes hours (even when room thermostat is satisfied)......

NOTE: If fan shuts off when the thermostat is satisfied, adjust control cycle as necessary to ensure sufficient outdoor air supply.

4. AIR DISTRIBUTION

ACTIVITY 17: AIR DISTRIBUTION

4a.	Ensured that supply and return air pathways in the existing ventilation system perform as required					
4b.	Ensured that passive gravity relief ventilation systems and transfer grilles between rooms and corridors are functioning					
NO	NOTE: If ventilation system is closed or blocked to meet current fire codes, consult with a					

professional engineer for remedies.

4c.	Made sure every occupied space has supply of outdoor air (mechanical	
	system or operable windows)	
4d.	Ensured that supply and return vents are open and unblocked	

NOTE: If outlets have been blocked intentionally to correct drafts or discomfort, investigate and correct the cause of the discomfort and reopen the vents.

4e.	Modified the HVAC system to supply outside air to areas without an outdoor	/	/
	air supply	ud I	u
4f.	Modified existing HVAC systems to incorporate any room or zone layout and population changes	D	
4g.	Moved all barriers (for example, room dividers, large free-standing blackboards or displays, bookshelves) that could block movement of air in the room, especially those blocking air vents		₫
4h.	Ensured that unit ventilators are quiet enough to accommodate classroom activities		
4i.	Ensured that classrooms are free of uncomfortable drafts produced by air from supply terminals	۵.	

ACTIVITY 18: PRESSURIZATION IN BUILDINGS

NOTE: To prevent infiltration of outdoor pollutants, the ventilation system is designed to maintain positive pressurization in the building. Therefore, ensure that the system, including any exhaust fans, is operating on the "occupied" cycle when doing this activity.

4j.	Ensured that air flows out of the building (using chemical smoke) through		,
	windows, doors, or other cracks and holes in exterior wall (for example,		
	floor joints, pipe openings)	ত্র	

5. EXHAUST SYSTEMS

ACTIVITY 19: EXHAUST FAN OPERATION 5a. Checked (using chemical smoke) that air flows into exhaust fan grille(s) D

If fans are running but air is not flowing toward the exhaust intake, check for the following:

- Inoperable dampers
- · Obstructed, leaky, or disconnected ductwork
- Undersized or improperly installed fan
- Broken fan belt





5. EXHAUST SYSTEMS (continued)

ACTIVITY 20: EXHAUST AIRFLOW

NOTE: Prevent migration of indoor contaminants from areas such as bathrooms, kitchens, and labs by keeping them under negative pressure (as compared to surrounding spaces).

5b. Checked (using chemical smoke) that air is drawn into the room from Yes. No N/A adjacent spaces

Stand outside the room with the door slightly open while checking airflow high and low in the door opening (see "How to Measure Airflow").

ACTIVITY 21: EXHAUST DUCTWORK

5d. Checked that the exhaust ductwork downstream of the exhaust fan (which is under positive pressure) is sealed and in good condition......

6. QUANTITY OF OUTDOOR AIR

ACTIVITY 22: OUTDOOR AIR MEASUREMENTS AND CALCULATIONS

NOTE: Refer to "How to Measure Airflow" for techniques.

6a. Measured the quantity of outdoor air supplied (22a) to each ventilation unit 6b. Calculated the number of occupants served (22b) by the ventilation unit under consideration 6c. Divided outdoor air supply (22a) by the number of occupants (22b) to determine the existing quantity of outdoor air supply per person (22c) **ACTIVITY 23: ACCEPTABLE LEVELS OF OUTDOOR AIR QUANTITIES** 6d. Compared the existing outdoor air per person (22c) to the recommended levels in Table 1 6e. Corrected problems with ventilation units that supplied inadequate quantities of outdoor air to ensure that outdoor air quantities (22c) meet the recommended levels in Table 1

NOTES All HVAC units through the BAS have advanced ventilation control logic deployed associated with the spaces they serve. The system will modulate the outdoor air damper and return dampers to provide the proper amount of air as needed to maintain space CO2 levels. This type of control is called CO2 based Demand-Controlled Ventilation (DCV). DCV provides proper ventilation air quantities as well as energy savings by reducing the amount of required ventilation air based on the CO2 levels measured by the sensor. The CO2 levels in parts per million (PPM) is used as an indicator of the number of occupants in a room. When the room has less than design occupancy, the required volume of ventilation is reduced. The CO2 sensor allows the VFD to reduce the fan speed to deliver a reduced volume of outside air for ventilation during these periods. An increase in the CO2 level is an indication that more people are in the room, so the fan speed is increased to maintain the required volume of ventilation air under all occupancy conditions.

Active DCV control is an acceptable alternate method to determine if ventilation requirements are met and could supersede rooms that may fail otherwise using traditional measured data collection procedures prescribed by established ASHRAE guidelines.

The ideal supply of outside air to interior occupied spaces should be based upon the 2018 Connecticut Building Code, which is based on the most currently adopted 2015 International Mechanical Code and coincides with ASHRAE-62.1, (2010) guidelines

5 of 5

BAS: Building Automation System VFD: Variable Frequency Drive (Controls the speed of the fan motor) ASHRAE: American Society of Heating, Refrigerating and Air Conditioning Engineers

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Instructions

- 1. Read the *IAQ Backgrounder* and the Background Information for this checklist.
- 2. Keep the Background Information and make a copy of this checklist for **each** ventilation unit in your school, as well as a copy for future reference.
- 3. Complete the Checklist.
 - Check the "yes," "no," or "not applicable" box beside each item. (A "no" response requires further attention.)
 - Make comments in the "Notes" section as necessary.
- Return the checklist portion of this document to the IAQ Coordinator.

Ventilation Checklist

Name:	Stephyn	Martoni				
School:	Amity	Middle	School	OTUNGE	8 Gannan an a	
Unit Vent	tilator/AHU No	14				
Room or	Area:	A-14	Date	Completed:	1-29-24	1
Signature	:: LY - f	45				

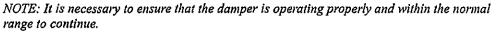
1. OUTDOOR AIR INTAKES

la.	Marked locations of all outdoor air intakes on a small floor plan (for example, a fire escape floor plan)			N/A	
1b.	Ensured that the ventilation system was on and operating in "occupied" mode	,	۵		
AC	TIVITY 1: OBSTRUCTIONS				
1c.	Ensured that outdoor air intakes are clear of obstructions, debris, clogs, or covers	6			
1d.	Installed corrective devices as necessary (e.g., if snowdrifts or leaves frequently block an intake)	ב	ø	٦	
AC	TIVITY 2: POLLUTANT SOURCES				
	Checked ground-level intakes for pollutant sources (dumpsters, loading docks, and bus-idling areas)/	Z	D	D	
1f.	Checked rooftop intakes for pollutant sources (plumbing vents; kitchen, toilet, or laboratory exhaust fans; puddles; and mist from air-conditioning cooling towers)	Z			
1g.	Resolved any problems with pollutant sources located near outdoor air intakes (e.g., relocated dumpster or extended exhaust pipe)	-	D		
AC	TIVITY 3: AIRFLOW			,	
lh.	Obtained chemical smoke (or a small piece of tissue paper or light plastic) Confirmed that outdoor air is entering the intake appropriately				
2.	SYSTEM CLEANLINESS				
AC	TIVITY 4: AIR FILTERS				
2a.	Replaced filters per maintenance schedule	Z			
2b.	Shut off ventilation system fans while replacing filters (prevents dirt from blowing downstream)	₫,	D	D	
2c.	Vacuumed filter areas before installing new filters	Z			
2d.	Confirmed proper fit of filters to prevent air from bypassing (flowing around) the air filter				

2. SYSTEM CLEANLINESS (continued)

ACTIVITY 5: DRAIN PANS

ACTIVITY 5: DRAIN PANS			
	Yes.		
accumulating)	.ų		
2h. Checked drain pans for mold and mildew	М	n	n
	7	-	9
ACTIVITY 6: COILS	_/	_	_
2i. Ensured that heating and cooling coils are clean	.🗖	Q	
ACTIVITY 7: AIR-HANDLING UNITS, UNIT VENTILATORS			
2i. Ensured that the interior of air-handling unit(s) or unit ventilator	,		
(air-mixing chamber and fan blades) is clean	.ø,	D	a
(air-mixing chamber and fan blades) is clean	.¤		
ACTIVITY 8: MECHANICAL ROOMS	•		
21. Checked mechanical room for unsanitary conditions, leaks, and spills	.z		
2m. Ensured that mechanical rooms and air-mixing chambers are free of trash,	-	-	
2m. Ensured that mechanical rooms and air-mixing chambers are free of trash, chemical products, and supplies	.ø		
3. CONTROLS FOR OUTDOOR AIR SUPPLY			
	_	_	_/
3a. Ensured that air dampers are at least partially open (minimum position)	. D	a	
3b. Ensured that minimum position provides adequate outdoor air for occupants		n	
tor occupants	• 🖵		7
ACTIVITY 9: CONTROLS INFORMATION			
3c. Obtained and reviewed all design inside/outside temperature and humidity			
requirements, controls specifications, as-built mechanical drawings,	-	_	_
and controls operations manuals (often uniquely designed)	. д		
ACTIVITY 10: CLOCKS, TIMERS, SWITCHES			
3d. Turned summer-winter switches to the correct position	<u>Þ</u>		
3e. Set time clocks appropriately	. 🗆		Ø
3f. Ensured that settings fit the actual schedule of building use (including	_		·
night/weekend use)	.p		
ACTIVITY 11: CONTROL COMPONENTS			
3g. Ensured appropriate system pressure by testing line pressure at both the			_
occupied (day) setting and the unoccupied (night) setting	.α		Д
3h. Checked that the line dryer prevents moisture buildup	.0		A
3i. Replaced control system filters at the compressor inlet based on the			
compressor manufacturer's recommendation (for example, when you			Ø
blow down the tank)	. 🖵	9	Я
level (no leakage or obstructions)	. 🗆		4
ACTIVITY 12: OUTDOOR AIR DAMPERS	4	-	
3k. Ensured that the outdoor air damper is visible for inspection	. <u>µ</u>		
31. Ensured that the recirculating relief and/or exhaust dampers are visible for inspection	А		
3m. Ensured that air temperature in the indoor area(s) served by each			-
outdoor air damper is within the normal operating range	م .		
NOTE: It is presenten to any up that the downay is analyting properly and with			nal







3n.	Checked that the outdoor air damper fully closes within a few minutes of shutting off appropriate air handler	∕es ≩∕	م الا ت	N/A
30.	Checked that the outdoor air damper opens (at least partially with no delay) when the air handler is turned on	ø	۵	
3р.	If in heating mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 85°F		a	۶,
3q.	If in cooling mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 60°F and mixed air thermostat is set to 45°F	n D	G	9⁄
3r.	If the outdoor air damper does not move, confirmed the following items:			4
	 The damper actuator links to the damper shaft, and any linkage set screws or bolts are tight 	a ⁄	í 🗖	Q
	• Moving parts are free of impediments (e.g., rust, corrosion)	2		Q
	· Electrical wire or pneumatic tubing connects to the damper actuator	9⁄	í a	
	• The outside air thermostat(s) is functioning properly (e.g., in the right location, calibrated correctly)	ď		a

Proceed to Activities 13-16 if the damper seems to be operating properly.

ACTIVITY 13: FREEZE STATS

3s.	Disconnected power to controls (for automatic reset only) to test continuity across terminals		ø
OR			1
3t.	Confirmed (if applicable) that depressing the manual reset button (usually red) trips the freeze stat (clicking sound indicates freeze stat was		
	tripped)	Q	
3u.	Assessed the feasibility of replacing all manual reset freeze-stats with automatic reset freeze-stats	ø	D

NOTE: HVAC systems with water coils need protection from the cold. The freeze-stat may close the outdoor air damper and disconnect the supply air when tripped. The typical trip range is 35°F to 42°F.

ACTIVITY 14: MIXED AIR THERMOSTATS

3v. Ensured that the mixed air stat for heating mode is set no higher than 65°F	
3w. Ensured that the mixed air stat for cooling mode is set no lower than the room thermostat setting	Q
ACTIVITY 15: ECONOMIZERS 3x. Confirmed proper economizer settings based on design specifications or local practices	D
NOTE: The dry-bulb is typically set at 65°F or lower.	
3y. Checked that sensor on the economizer is shielded from direct sunlight	ū

NOTE: Economizers use varying amounts of cool outdoor air to assist with the cooling load of the room or rooms. There are two types of economizers, dry-bulb and enthalpy. Dry-bulb economizers vary the amount of outdoor air based on outdoor temperature, and enthalpy economizers vary the amount of outdoor air based on outdoor temperature and humidity level.

ACTIVITY 16: FANS

3aa. Ensured that all fans (supply fans and associated return or relief fans) that move outside air indoors continuously operate during occupied Yes No N/A hours (even when room thermostat is satisfied)......

NOTE: If fan shuts off when the thermostat is satisfied, adjust control cycle as necessary to ensure sufficient outdoor air supply.

4. AIR DISTRIBUTION

ACTIVITY 17: AIR DISTRIBUTION

4a.	Ensured that supply and return air pathways in the existing ventilation system perform as required	, D	
4b.	Ensured that passive gravity relief ventilation systems and transfer grilles between rooms and corridors are functioning		
	TE: If ventilation system is closed or blocked to meet current fire codes, consult wi fessional engineer for remedies.	ith a	
	Made sure every occupied space has supply of outdoor air (mechanical system or operable windows)	/ [] []	
NO	TE: If outlets have been blocked intentionally to correct drafts or discomfort, inves correct the cause of the discomfort and reopen the vents.	tigat	e
	Modified the HVAC system to supply outside air to areas without an outdoor air supply		, D
	Modified existing HVAC systems to incorporate any room or zone layout and population changes	D	
4g.	Moved all barriers (for example, room dividers, large free-standing blackboards or displays, bookshelves) that could block movement of air in the room, especially those blocking air vents	ļ	ø
4h.	Ensured that unit ventilators are quiet enough to accommodate classroom activities		
4i.	Ensured that classrooms are free of uncomfortable drafts produced by air from supply terminals	α.	

ACTIVITY 18: PRESSURIZATION IN BUILDINGS

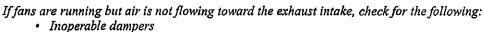
NOTE: To prevent infiltration of outdoor pollutants, the ventilation system is designed to maintain positive pressurization in the building. Therefore, ensure that the system, including any exhaust fans, is operating on the "occupied" cycle when doing this activity.

4j.	Ensured that air flows out of the building (using chemical smoke) through		,
	windows, doors, or other cracks and holes in exterior wall (for example,	/	/
	floor joints, pipe openings)	ত্র	Ū

5. EXHAUST SYSTEMS

ACTIVITY 19: EXHAUST FAN OPERATION

5a. Checked (using chemical smoke) that air flows into exhaust fan grille(s) D



- Obstructed, leaky, or disconnected ductwork
- · Undersized or improperly installed fan
- Broken fan belt





5. EXHAUST SYSTEMS (continued)

ACTIVITY 20: EXHAUST AIRFLOW

NOTE: Prevent migration of indoor contaminants from areas such as bathrooms, kitchens, and labs by keeping them under negative pressure (as compared to surrounding spaces).

5b. Checked (using chemical smoke) that air is drawn into the room from Yes. No N/A adjacent spaces

Stand outside the room with the door slightly open while checking airflow high and low in the door opening (see "How to Measure Airflow").

ACTIVITY 21: EXHAUST DUCTWORK

5d. Checked that the exhaust ductwork downstream of the exhaust fan (which is under positive pressure) is sealed and in good condition.....

6. QUANTITY OF OUTDOOR AIR

ACTIVITY 22: OUTDOOR AIR MEASUREMENTS AND CALCULATIONS

NOTE: Refer to "How to Measure Airflow" for techniques.

6a. Measured the quantity of outdoor air supplied (22a) to each ventilation 6b. Calculated the number of occupants served (22b) by the ventilation unit under consideration 6c. Divided outdoor air supply (22a) by the number of occupants (22b) to determine the existing quantity of outdoor air supply per person (22c) **ACTIVITY 23: ACCEPTABLE LEVELS OF OUTDOOR AIR OUANTITIES** 6d. Compared the existing outdoor air per person (22c) to the recommended levels in Table 1 6e. Corrected problems with ventilation units that supplied inadequate quantities of outdoor air to ensure that outdoor air quantities (22c) meet the recommended levels in Table 1.....

NOTES All HVAC units through the BAS have advanced ventilation control logic deployed associated with the spaces they serve. The system will modulate the outdoor air damper and return dampers to provide the proper amount of air as needed to maintain space CO2 levels. This type of control is called CO2 based Demand-Controlled Ventilation (DCV). DCV provides proper ventilation air quantities as well as energy savings by reducing the amount of required ventilation air based on the CO2 levels measured by the sensor. The CO2 levels in parts per million (PPM) is used as an indicator of the number of occupants in a room. When the room has less than design occupancy, the required volume of ventilation is reduced. The CO2 sensor allows the VFD to reduce the fan speed to deliver a reduced volume of outside air for ventilation during these periods. An increase in the CO2 level is an indication that more people are in the room, so the fan speed is increased to maintain the required volume of ventilation air under all occupancy conditions.

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BAS: Building Automation System VFD: Variable Frequency Drive (Controls the speed of the fan motor) ASHRAE: American Society of Heating, Refrigerating and Air Conditioning Engineers . (

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 - Make comments in the "Notes" section as necessary.
- Return the checklist portion of this document to the IAQ Coordinator.

Ventilation Checklist

Name:	Stephen	Martoni	* 2			aadagaaanaaadaaaaa
School:	Amity	Middle	School	Orange		
Unit Vent	ilator/AHU No:	16				
Room or	Area:	16	Date	Completed:	1-29-24	(
Signature	:	45				

1. OUTDOOR AIR INTAKES

1a.	Marked locations of all outdoor air intakes on a small floor plan (for Yes example, a fire escape floor plan)		N/A
1b.	Ensured that the ventilation system was on and operating in "occupied" mode	Ġ	
AC	TIVITY 1: OBSTRUCTIONS		
1c.	Ensured that outdoor air intakes are clear of obstructions, debris, clogs,		00.000
	or covers		
1d.	Installed corrective devices as necessary (e.g., if snowdrifts or leaves frequently block an intake)	ø	٦
AC	TIVITY 2: POLLUTANT SOURCES		
	Checked ground-level intakes for pollutant sources (dumpsters, loading docks, and bus-idling areas)		
1f.	Checked rooftop intakes for pollutant sources (plumbing vents; kitchen,		
	toilet, or laboratory exhaust fans; puddles; and mist from air-conditioning cooling towers)		
1g.	Resolved any problems with pollutant sources located near outdoor air intakes (e.g., relocated dumpster or extended exhaust pipe)	Ó	D
AC	TIVITY 3: AIRFLOW		/
1h.	Obtained chemical smoke (or a small piece of tissue paper or light plastic). \Box	a	
	Confirmed that outdoor air is entering the intake appropriately		
2.	SYSTEM CLEANLINESS		
AC	TIVITY 4: AIR FILTERS		
2a.	Replaced filters per maintenance schedule		
2b.	Shut off ventilation system fans while replacing filters (prevents dirt from		
2c.	blowing downstream)		
2d.	Confirmed proper fit of filters to prevent air from bypassing (flowing		
2e.	around) the air filter		

2. SYSTEM CLEANLINESS (continued)

ACTIVITY 5: DRAIN PANS

ACTIVITY 5: DRAIN PANS		
accumulating)		N/A
2g. Cleaned drain pans	΄ Ω	
2h. Checked drain pans for mold and mildew	΄ο	ū
ACTIVITY 6: COILS	/ _	_
2i. Ensured that heating and cooling coils are clean	Q	
ACTIVITY 7: AIR-HANDLING UNITS, UNIT VENTILATORS		
2j. Ensured that the interior of air-handling unit(s) or unit ventilator (air-mixing chamber and fan blades) is clean	, 	
2k. Ensured that ducts are clean		
ACTIVITY 8: MECHANICAL ROOMS		
21. Checked mechanical room for unsanitary conditions, leaks, and spills		D
2m. Ensured that mechanical rooms and air-mixing chambers are free of trash, chemical products, and supplies		Ξ
	-	9
3. CONTROLS FOR OUTDOOR AIR SUPPLY		
3a. Ensured that air dampers are at least partially open (minimum position)		ø
3b. Ensured that minimum position provides adequate outdoor air for occupants□		ø
		1
ACTIVITY 9: CONTROLS INFORMATION 3c. Obtained and reviewed all design inside/outside temperature and humidity		
requirements, controls specifications, as-built mechanical drawings,	, _	_
and controls operations manuals (often uniquely designed)		
ACTIVITY 10: CLOCKS, TIMERS, SWITCHES		
3d. Turned summer-winter switches to the correct position		
 3e. Set time clocks appropriately□ 3f. Ensured that settings fit the actual schedule of building use (including 		A
night/weekend use)		
ACTIVITY 11: CONTROL COMPONENTS		
3g. Ensured appropriate system pressure by testing line pressure at both the		
occupied (day) setting and the unoccupied (night) setting		Å
 3h. Checked that the line dryer prevents moisture buildup 3i. Replaced control system filters at the compressor inlet based on the 		Z
compressor manufacturer's recommendation (for example, when you		•
blow down the tank)		Þ
3j. Set the line pressure at each thermostat and damper actuator at the proper level (no leakage or obstructions)□	ü	ø
ACTIVITY 12: OUTDOOR AIR DAMPERS		
3k. Ensured that the outdoor air damper is visible for inspection		
31. Ensured that the recirculating relief and/or exhaust dampers are visible		-
for inspection		ū
outdoor air damper is within the normal operating range	Q	

NOTE: It is necessary to ensure that the damper is operating properly and within the normal range to continue.



3n.	Checked that the outdoor air damper fully closes within a few minutes Yes of shutting off appropriate air handler	ok D	N/A
30.	Checked that the outdoor air damper opens (at least partially with no delay) when the air handler is turned on	ū	a
3р.	If in heating mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 85°F	D	۶,
-	If in cooling mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 60°F and mixed air thermostat is set to 45° F	D	7
51.	 The damper actuator links to the damper shaft, and any linkage set screws or bolts are tight	ם מים	

Proceed to Activities 13–16 if the damper seems to be operating properly.

ACTIVITY 13: FREEZE STATS

3s.	Disconnected power to controls (for automatic reset only) to test continuity across terminals	ū	ø
OR			1
3t.	Confirmed (if applicable) that depressing the manual reset button (usually red) trips the freeze stat (clicking sound indicates freeze stat was		
	tripped)	Q	D
3u.	Assessed the feasibility of replacing all manual reset freeze-stats with automatic reset freeze-stats	ø	۵

NOTE: HVAC systems with water coils need protection from the cold. The freeze-stat may close the outdoor air damper and disconnect the supply air when tripped. The typical trip range is 35°F to 42°F.

ACTIVITY 14: MIXED AIR THERMOSTATS

3v.	Ensured that the mixed air stat for heating mode is set no higher than 65°F	
3w	. Ensured that the mixed air stat for cooling mode is set no lower than the room thermostat setting	

ACTIVITY 15: ECONOMIZERS

3x.	Confirmed proper economizer settings based on design specifications or		
	local practices	D	D

NOTE: The dry-bulb is typically set at 65°F or lower.

- 3y. Checked that sensor on the economizer is shielded from direct sunlight \Box

a

NOTE: Economizers use varying amounts of cool outdoor air to assist with the cooling load of the room or rooms. There are two types of economizers, dry-bulb and enthalpy. Dry-bulb economizers vary the amount of outdoor air based on outdoor temperature, and enthalpy economizers vary the amount of outdoor air based on outdoor temperature and humidity level.

ACTIVITY 16: FANS

NOTE: If fan shuts off when the thermostat is satisfied, adjust control cycle as necessary to ensure sufficient outdoor air supply.

4. AIR DISTRIBUTION

ACTIVITY 17: AIR DISTRIBUTION

 4a. Ensured that supply and return air pathways in the existing ventilation system perform as required
NOTE: If ventilation system is closed or blocked to meet current fire codes, consult with a professional engineer for remedies.
 4c. Made sure every occupied space has supply of outdoor air (mechanical system or operable windows) 4d. Ensured that supply and return vents are open and unblocked
NOTE: If outlets have been blocked intentionally to correct drafts or discomfort, investigate and correct the cause of the discomfort and reopen the vents.
4e. Modified the HVAC system to supply outside air to areas without an outdoor air supply
4f. Modified existing HVAC systems to incorporate any room or zone layout and population changes
4g. Moved all barriers (for example, room dividers, large free-standing blackboards or displays, bookshelves) that could block movement of air in the room, especially those blocking air vents
 4h. Ensured that unit ventilators are quiet enough to accommodate classroom activities 4i. Ensured that classrooms are free of uncomfortable drafts produced by air

ACTIVITY 18: PRESSURIZATION IN BUILDINGS

NOTE: To prevent infiltration of outdoor pollutants, the ventilation system is designed to maintain positive pressurization in the building. Therefore, ensure that the system, including any exhaust fans, is operating on the "occupied" cycle when doing this activity.

4j.	Ensured that air flows out of the building (using chemical smoke) through		,
	windows, doors, or other cracks and holes in exterior wall (for example,	/	
	floor joints, pipe openings)	Ø	Ø

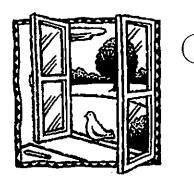
5. EXHAUST SYSTEMS

ACTIVITY 19: EXHAUST FAN OPERATION

5a. Checked (using chemical smoke) that air flows into exhaust fan grille(s) \dots

If fans are running but air is not flowing toward the exhaust intake, check for the following:

- Inoperable dampers
- Obstructed, leaky, or disconnected ductwork
- Undersized or improperly installed fan
- Broken fan belt



4 of 5



5. EXHAUST SYSTEMS (continued)

ACTIVITY 20: EXHAUST AIRFLOW

NOTE: Prevent migration of indoor contaminants from areas such as bathrooms, kitchens, and labs by keeping them under negative pressure (as compared to surrounding spaces).

5b. Checked (using chemical smoke) that air is drawn into the room from Yes. No N/A adjacent spaces

Stand outside the room with the door slightly open while checking airflow high and low in the door opening (see "How to Measure Airflow").

ACTIVITY 21: EXHAUST DUCTWORK

5d. Checked that the exhaust ductwork downstream of the exhaust fan (which is under positive pressure) is sealed and in good condition.....

6. QUANTITY OF OUTDOOR AIR

ACTIVITY 22: OUTDOOR AIR MEASUREMENTS AND CALCULATIONS

NOTE: Refer to "How to Measure Airflow" for techniques.

6a. Measured the quantity of outdoor air supplied (22a) to each ventilation unit 🗅 6b. Calculated the number of occupants served (22b) by the ventilation unit under consideration 6c. Divided outdoor air supply (22a) by the number of occupants (22b) to determine the existing quantity of outdoor air supply per person (22c) α **ACTIVITY 23: ACCEPTABLE LEVELS OF OUTDOOR AIR QUANTITIES** 6d. Compared the existing outdoor air per person (22c) to the recommended levels in Table 1 6e. Corrected problems with ventilation units that supplied inadequate quantities of outdoor air to ensure that outdoor air quantities (22c) meet the recommended levels in Table 1.....

NOTES All HVAC units through the BAS have advanced ventilation control logic deployed associated with the spaces they serve. The system will modulate the outdoor air damper and return dampers to provide the proper amount of air as needed to maintain space CO2 levels. This type of control is called CO2 based Demand-Controlled Ventilation (DCV). DCV provides proper ventilation air quantities as well as energy savings by reducing the amount of required ventilation air based on the CO2 levels measured by the sensor. The CO2 levels in parts per million (PPM) is used as an indicator of the number of occupants in a room. When the room has less than design occupancy, the required volume of ventilation is reduced. The CO2 sensor allows the VFD to reduce the fan speed to deliver a reduced volume of outside air for ventilation during these periods. An increase in the CO2 level is an indication that more people are in the room, so the fan speed is increased to maintain the required volume of ventilation air under all occupancy conditions.

Active DCV control is an acceptable alternate method to determine if ventilation requirements are met and could supersede rooms that may fail otherwise using traditional measured data collection procedures prescribed by established ASHRAE guidelines.

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 - Check the "yes," "no," or "not applicable" box beside each item. (A "no" response requires further attention.)
 - Make comments in the "Notes" section as necessary.
- Return the checklist portion of this document to the IAQ Coordinator.

Ventilation Checklist

Name:	Stephen	Martoni	*		
School:	Amity	Middle	School	OTUNGE	,
Unit Vent	ilator/AHU No	: 20			
Room or .	Area:	1-20	Date	Completed:	1-30-24
Signature	: LA f	45			

1. OUTDOOR AIR INTAKES

la.	Marked locations of all outdoor air intakes on a small floor plan (for Yes example, a fire escape floor plan)		N/A
1b.	Ensured that the ventilation system was on and operating in "occupied" mode	D	D
AC	TIVITY 1: OBSTRUCTIONS		
1c.	Ensured that outdoor air intakes are clear of obstructions, debris, clogs,		
	or covers		
۱d.	Installed corrective devices as necessary (e.g., if snowdrifts or leaves frequently block an intake)	ø	٦
AC	TIVITY 2: POLLUTANT SOURCES		
	Checked ground-level intakes for pollutant sources (dumpsters, loading docks, and bus-idling areas)		٦
1f.	Checked rooftop intakes for pollutant sources (plumbing vents; kitchen, toilet, or laboratory exhaust fans; puddles; and mist from		
	air-conditioning cooling towers)		
1g.	Resolved any problems with pollutant sources located near outdoor air intakes (e.g., relocated dumpster or extended exhaust pipe)	ū	۵
AC	TIVITY 3: AIRFLOW		1
1h.	Obtained chemical smoke (or a small piece of tissue paper or light plastic) \Box	a	
	Confirmed that outdoor air is entering the intake appropriately		
2.	SYSTEM CLEANLINESS		
AC	TIVITY 4: AIR FILTERS		
	Replaced filters per maintenance schedule		
2b.	Shut off ventilation system fans while replacing filters (prevents dirt from		
	blowing downstream)	, D	
	Confirmed proper fit of filters to prevent air from bypassing (flowing around) the air filter		
2e.	Confirmed proper installation of filters (correct direction for airflow)		

2. SYSTEM CLEANLINESS (continued)

ACTIVITY 5: DRAIN PANS

.

ACTIVITY 5: DRAIN PANS			
2f. Ensured that drain pans slant toward the drain (to prevent water from	Yes	No	N/A
accumulating)	.¤		
2g. Cleaned drain pans	.മ		
2h. Checked drain pans for mold and mildew	. ¤		
ACTIVITY 6: COILS	/		
2i. Ensured that heating and cooling coils are clean	.⊿	٦	
ACTIVITY 7: AIR-HANDLING UNITS, UNIT VENTILATORS			
2j. Ensured that the interior of air-handling unit(s) or unit ventilator (air-mixing chamber and fan blades) is clean	М	п	П
(air-mixing chamber and fan blades) is clean 2k. Ensured that ducts are clean	.Z		
ACTIVITY 8: MECHANICAL ROOMS	, ,		
21. Checked mechanical room for unsanitary conditions, leaks, and spills	.z		
2m. Ensured that mechanical rooms and air-mixing chambers are free of trash.			
chemical products, and supplies	.⊿	۵	Q
3. CONTROLS FOR OUTDOOR AIR SUPPLY			
3a. Ensured that air dampers are at least partially open (minimum position)	.0		ø
3b. Ensured that minimum position provides adequate outdoor air			<i>•</i> /
for occupants	. 🗆		ø
ACTIVITY 9: CONTROLS INFORMATION	•		
3c. Obtained and reviewed all design inside/outside temperature and humidity			
requirements, controls specifications, as-built mechanical drawings,	_/	_	_
and controls operations manuals (often uniquely designed)	.ø		
ACTIVITY 10: CLOCKS, TIMERS, SWITCHES			
3d. Turned summer-winter switches to the correct position			
3e. Set time clocks appropriately	.0		Ø
3f. Ensured that settings fit the actual schedule of building use (including	æ	_	_
night/weekend use)	.µ		
ACTIVITY 11: CONTROL COMPONENTS			
3g. Ensured appropriate system pressure by testing line pressure at both the	_	_	£
occupied (day) setting and the unoccupied (night) setting			4
3h. Checked that the line dryer prevents moisture buildup3i. Replaced control system filters at the compressor inlet based on the	.u		
compressor manufacturer's recommendation (for example, when you			•
blow down the tank)	.0		Ø
3j. Set the line pressure at each thermostat and damper actuator at the proper			_
level (no leakage or obstructions)	.0		Ø
ACTIVITY 12: OUTDOOR AIR DAMPERS	,		
3k. Ensured that the outdoor air damper is visible for inspection	£۲.	۵	
31. Ensured that the recirculating relief and/or exhaust dampers are visible		_	-
for inspection	.Д		
3m. Ensured that air temperature in the indoor area(s) served by each outdoor air damper is within the normal operating range	. ¤	Q	
NOTE. It is necessary to ensure that the damper is one value property and with	-	HOP	mat

NOTE: It is necessary to ensure that the damper is operating properly and within the normal range to continue.



3n. Checked that the outdoor air damper fully closes within a few minutes Yes No of shutting off appropriate air handler	N/A
30. Checked that the outdoor air damper opens (at least partially with no delay) when the air handler is turned on	Q
 3p. If in heating mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 85°F 	P
 3q. If in cooling mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 60°F and mixed air thermostat is set to 45°F. 	9⁄
3r. If the outdoor air damper does not move, confirmed the following items:	2
 The damper actuator links to the damper shaft, and any linkage set screws or bolts are tight	
 Electrical wire or pneumatic tubing connects to the damper actuator	
 The outside air thermostat(s) is functioning properly (e.g., in the right location, calibrated correctly)	
Proceed to Activities 13–16 if the damper seems to be operating properly.	

ACTIVITY 13: FREEZE STATS

3s.	Disconnected power to controls (for automatic reset only) to test continuity across terminals	۵	ø
OR			,
3t.	Confirmed (if applicable) that depressing the manual reset button (usually red) trips the freeze stat (clicking sound indicates freeze stat was		
	tripped)	Q	
3u.	Assessed the feasibility of replacing all manual reset freeze-stats with automatic reset freeze-stats	-	

NOTE: HVAC systems with water coils need protection from the cold. The freeze-stat may close the outdoor air damper and disconnect the supply air when tripped. The typical trip range is $35^{\circ}F$ to $42^{\circ}F$.

ACTIVITY 14: MIXED AIR THERMOSTATS

3v.	Ensured that the mixed air stat for heating mode is set no higher than 65°F		
3w	• Ensured that the mixed air stat for cooling mode is set no lower than the room thermostat setting	· /	

ACTIVITY 15: ECONOMIZERS

3x.	Confirmed proper economizer settings based on design specifications or	
	local practices	

NOTE: The dry-bulb is typically set at 65°F or lower.

- 3y. Checked that sensor on the economizer is shielded from direct sunlight \square

NOTE: Economizers use varying amounts of cool outdoor air to assist with the cooling load of the room or rooms. There are two types of economizers, dry-bulb and enthalpy. Dry-bulb economizers vary the amount of outdoor air based on outdoor temperature, and enthalpy economizers vary the amount of outdoor air based on outdoor temperature and humidity level.

ACTIVITY 16: FANS

3aa. Ensured that all fans (supply fans and associated return or relief fans) Yes No N/A that move outside air indoors continuously operate during occupied hours (even when room thermostat is satisfied)......

NOTE: If fan shuts off when the thermostat is satisfied, adjust control cycle as necessary to ensure sufficient outdoor air supply.

4. AIR DISTRIBUTION

ACTIVITY 17: AIR DISTRIBUTION

4a. Ensured that supply and return air pathways in the existing ventilation system perform as required
4b. Ensured that passive gravity relief ventilation systems and transfer grilles between rooms and corridors are functioning
NOTE: If ventilation system is closed or blocked to meet current fire codes, consult with a professional engineer for remedies.
 4c. Made sure every occupied space has supply of outdoor air (mechanical system or operable windows) 4d. Ensured that supply and return vents are open and unblocked
NOTE: If outlets have been blocked intentionally to correct drafts or discomfort, investigate and correct the cause of the discomfort and reopen the vents.
4e. Modified the HVAC system to supply outside air to areas without an outdoor

4e.	Modified the HVAC system to supply outside air to areas without an outdoor air supply	ď	
4f.	Modified existing HVAC systems to incorporate any room or zone layout and population changes	D	
4g.	Moved all barriers (for example, room dividers, large free-standing blackboards or displays, bookshelves) that could block movement of air in the room, especially those blocking air vents		ø
4h.	Ensured that unit ventilators are quiet enough to accommodate classroom activities		
4i.	Ensured that classrooms are free of uncomfortable drafts produced by air from supply terminals	, a.	

ACTIVITY 18: PRESSURIZATION IN BUILDINGS

NOTE: To prevent infiltration of outdoor pollutants, the ventilation system is designed to maintain positive pressurization in the building. Therefore, ensure that the system, including any exhaust fans, is operating on the "occupied" cycle when doing this activity.

4j.	Ensured that air flows out of the building (using chemical smoke) through		,
	windows, doors, or other cracks and holes in exterior wall (for example,	/	/
	floor joints, pipe openings)	ত্র	$\mathbf{\overline{O}}$

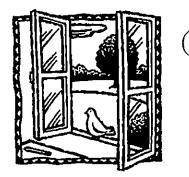
5. EXHAUST SYSTEMS

ACTIVITY 19: EXHAUST FAN OPERATION

5a. Checked (using chemical smoke) that air flows into exhaust fan grille(s) D

If fans are running but air is not flowing toward the exhaust intake, check for the following:

- Inoperable dampers
- Obstructed, leaky, or disconnected ductwork
- Undersized or improperly installed fan
- Broken fan belt





5. EXHAUST SYSTEMS (continued)

ACTIVITY 20: EXHAUST AIRFLOW

NOTE: Prevent migration of indoor contaminants from areas such as bathrooms, kitchens, and labs by keeping them under negative pressure (as compared to surrounding spaces).

5b. Checked (using chemical smoke) that air is drawn into the room from Yes. No N/A adjacent spaces

Stand outside the room with the door slightly open while checking airflow high and low in the door opening (see "How to Measure Airflow").

ACTIVITY 21: EXHAUST DUCTWORK

6. QUANTITY OF OUTDOOR AIR

ACTIVITY 22: OUTDOOR AIR MEASUREMENTS AND CALCULATIONS

NOTE: Refer to "How to Measure Airflow" for techniques.

6a. Measured the quantity of outdoor air supplied (22a) to each ventilation 6b. Calculated the number of occupants served (22b) by the ventilation unit under consideration 6c. Divided outdoor air supply (22a) by the number of occupants (22b) to determine the existing quantity of outdoor air supply per person (22c) **ACTIVITY 23: ACCEPTABLE LEVELS OF OUTDOOR AIR QUANTITIES** 6d. Compared the existing outdoor air per person (22c) to the recommended levels in Table 1 6e. Corrected problems with ventilation units that supplied inadequate quantities of outdoor air to ensure that outdoor air quantities (22c) meet the recommended levels in Table 1.....

NOTES All HVAC units through the BAS have advanced ventilation control logic deployed associated with the spaces they serve. The system will modulate the outdoor air damper and return dampers to provide the proper amount of air as needed to maintain space CO2 levels. This type of control is called CO2 based Demand-Controlled Ventilation (DCV). DCV provides proper ventilation air quantities as well as energy savings by reducing the amount of required ventilation air based on the CO2 levels measured by the sensor. The CO2 levels in parts per million (PPM) is used as an indicator of the number of occupants in a room. When the room has less than design occupancy, the required volume of ventilation is reduced. The CO2 sensor allows the VFD to reduce the fan speed to deliver a reduced volume of outside air for ventilation during these periods. An increase in the CO2 level is an indication that more people are in the room, so the fan speed is increased to maintain the required volume of ventilation air under all occupancy conditions.

Active DCV control is an acceptable alternate method to determine if ventilation requirements are met and could supersede rooms that may fail otherwise using traditional measured data collection procedures prescribed by established ASHRAE guidelines.

The ideal supply of outside air to interior occupied spaces should be based upon the 2018 Connecticut Building Code, which is based on the most currently adopted 2015 International Mechanical Code and coincides with ASHRAE-62.1, (2010) guidelines



BAS: Building Automation System VFD: Variable Frequency Drive (Controls the speed of the fan motor) ASHRAE: American Society of Heating, Refrigerating and Air Conditioning Engineers



Instructions

- 1. Read the *IAQ Backgrounder* and the Background Information for this checklist.
- 2. Keep the Background Information and make a copy of this checklist for each ventilation unit in your school, as well as a copy for future reference.
- 3. Complete the Checklist.
 - Check the "yes," "no," or "not applicable" box beside each item. (A "no" response requires further attention.)
 - Make comments in the "Notes" section as necessary.
- Return the checklist portion of this document to the IAQ Coordinator.

Ventilation Checklist

Name:	Stephen Morto	ní
School:	Amity Middle	School Orange
Unit Vent	ilator/AHU No:	1
Room or	Area: A71	Date Completed: $1 - 30 - 24$
Signature	. Ly ft	

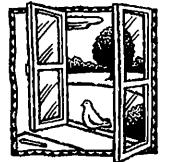
1. OUTDOOR AIR INTAKES

la.	Marked locations of all outdoor air intakes on a small floor plan (for example, a fire escape floor plan)			N/A	
1b.	Ensured that the ventilation system was on and operating in "occupied" mode	,			
AC	TIVITY 1: OBSTRUCTIONS				
1c.	Ensured that outdoor air intakes are clear of obstructions, debris, clogs, or covers				
1d.	Installed corrective devices as necessary (e.g., if snowdrifts or leaves frequently block an intake)		ø		
AC	TIVITY 2: POLLUTANT SOURCES				
	Checked ground-level intakes for pollutant sources (dumpsters, loading docks, and bus-idling areas)				
lf.	Checked rooftop intakes for pollutant sources (plumbing vents; kitchen, toilet, or laboratory exhaust fans; puddles; and mist from air-conditioning cooling towers)				
1g.	Resolved any problems with pollutant sources located near outdoor air intakes (e.g., relocated dumpster or extended exhaust pipe)	-			
AC	TIVITY 3: AIRFLOW				
lh.	Obtained chemical smoke (or a small piece of tissue paper or light plastic). \Box Confirmed that outdoor air is entering the intake appropriately \Box				
2.	SYSTEM CLEANLINESS				
AC	TIVITY 4: AIR FILTERS				
	Replaced filters per maintenance schedule				
2b.	Shut off ventilation system fans while replacing filters (prevents dirt from				
2c.	blowing downstream)	1			
	Confirmed proper fit of filters to prevent air from bypassing (flowing around) the air filter.				

2. SYSTEM CLEANLINESS (continued)

ACTIVITY 5: DRAIN PANS

ACTIVITY 5: DRAIN PANS			
2f. Ensured that drain pans slant toward the drain (to prevent water from accumulating)			N/A
2g. Cleaned drain pans			_
2h. Checked drain pans for mold and mildew			ū
ACTIVITY 6: COILS	/		
2i. Ensured that heating and cooling coils are clean	A	Q	
ACTIVITY 7: AIR-HANDLING UNITS, UNIT VENTILATORS			
2j. Ensured that the interior of air-handling unit(s) or unit ventilator		_	_
(air-mixing chamber and fan blades) is clean			
	<u>/</u>	u	ч
ACTIVITY 8: MECHANICAL ROOMS			
21. Checked mechanical room for unsanitary conditions, leaks, and spills .			
2m. Ensured that mechanical rooms and air-mixing chambers are free of tra chemical products, and supplies	ush,	D	
	·····/	-	9
3. CONTROLS FOR OUTDOOR AIR SUPPLY			
3a. Ensured that air dampers are at least partially open (minimum position)	ם (ø
3b. Ensured that minimum position provides adequate outdoor air for occupants	-		
for occupants	······ ·	۵	μ
ACTIVITY 9: CONTROLS INFORMATION			
3c. Obtained and reviewed all design inside/outside temperature and humid	lity		
requirements, controls specifications, as-built mechanical drawings, and controls operations manuals (often uniquely designed)	4		
and controls operations manuals (often uniquely designed)	yu	U	L.
ACTIVITY 10: CLOCKS, TIMERS, SWITCHES			
3d. Turned summer-winter switches to the correct position			
3e. Set time clocks appropriately			P
3f. Ensured that settings fit the actual schedule of building use (including night/weekend use)			
		-	-
ACTIVITY 11: CONTROL COMPONENTS			
3g. Ensured appropriate system pressure by testing line pressure at both the occupied (day) setting and the unoccupied (night) setting			5
3h. Checked that the line dryer prevents moisture buildup			Z
3i. Replaced control system filters at the compressor inlet based on the		-	/-
compressor manufacturer's recommendation (for example, when you			•
blow down the tank)			Þ
by level (no leakage or obstructions)			Ø
		-	-
ACTIVITY 12: OUTDOOR AIR DAMPERS	4	-	_
3k. Ensured that the outdoor air damper is visible for inspection3l. Ensured that the recirculating relief and/or exhaust dampers are visible	¥		
for inspection	£		
3m. Ensured that air temperature in the indoor area(s) served by each		_	_
outdoor air damper is within the normal operating range	•		
NOTE: It is preasons to ensure that the downar is operating property and	within the		u a I



NOTE: It is necessary to ensure that the damper is operating properly and within the normal range to continue.



(

3. CONTROLS FOR OUTDOOR AIR SUPPLY (continued)

3	n. Checked that the outdoor air damper fully closes within a few minutes of shutting off appropriate air handler	Yes 🖬	№ □	N/A
3	o. Checked that the outdoor air damper opens (at least partially with no delay) when the air handler is turned on	, "	a	
3	p. If in heating mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 85°F	🖸	a	ø
3	q. If in cooling mode, checked that the outdoor air damper goes to its minimu position (without completely closing) when the room thermostat is set to 60°F and mixed air thermostat is set to 45°F		D	9⁄
3	r. If the outdoor air damper does not move, confirmed the following items:			1
	• The damper actuator links to the damper shaft, and any linkage set screws or bolts are tight		, o _ o	
	• Moving parts are free of impediments (e.g., rust, corrosion)		٣	<u>_</u>
	• Electrical wire or pneumatic tubing connects to the damper actuator		ц,	L)
	• The outside air thermostat(s) is functioning properly (e.g., in the right		/	

Proceed to Activities 13-16 if the damper seems to be operating properly.

ACTIVITY 13: FREEZE STATS

3s.	Disconnected power to controls (for automatic reset only) to test continuity across terminals	ü	ø
OR			1
3t.	Confirmed (if applicable) that depressing the manual reset button (usually red) trips the freeze stat (clicking sound indicates freeze stat was tripped)	п	п
~		-	-
3u.	Assessed the feasibility of replacing all manual reset freeze-stats with automatic reset freeze-stats	Ø	

location, calibrated correctly)

NOTE: HVAC systems with water coils need protection from the cold. The freeze-stat may close the outdoor air damper and disconnect the supply air when tripped. The typical trip range is $35^{\circ}F$ to $42^{\circ}F$.

ACTIVITY 14: MIXED AIR THERMOSTATS

3v.	Ensured that the mixed air stat for heating mode is set no higher than 65°F.	D
3w.	Ensured that the mixed air stat for cooling mode is set no lower than the room thermostat setting	۵
AC	TIVITY 15: ECONOMIZERS	
3x.	Confirmed proper economizer settings based on design specifications or local practices	a
NO	TE: The dry-bulb is typically set at 65°F or lower.	
Зу,	Checked that sensor on the economizer is shielded from direct sunlight \square	a
3z.	Ensured that dampers operate properly (for outside air, return air, exhaust/relief air, and recirculated air), per the design specifications	

NOTE: Economizers use varying amounts of cool outdoor air to assist with the cooling load of the room or rooms. There are two types of economizers, dry-bulb and enthalpy. Dry-bulb economizers vary the amount of outdoor air based on outdoor temperature, and enthalpy economizers vary the amount of outdoor air based on outdoor temperature and humidity level.

ACTIVITY 16: FANS

NOTE: If fan shuts off when the thermostat is satisfied, adjust control cycle as necessary to ensure sufficient outdoor air supply.

4. AIR DISTRIBUTION

ACTIVITY 17: AIR DISTRIBUTION

4a. Ensured that sup perform as requi	ply and return air pathways in the existing ventilation system ired		
4b. Ensured that pas	sive gravity relief ventilation systems and transfer grilles and corridors are functioning		
NOTE: If ventilation professional engineer	system is closed or blocked to meet current fire codes, consult w r for remedies.	vith a	
system or operal	occupied space has supply of outdoor air (mechanical ble windows)		
4d. Ensured that sup	pply and return vents are open and unblocked	ū	ū
	e been blocked intentionally to correct drafts or discomfort, inve e of the discomfort and reopen the vents.	stiga	te
air supply	JAC system to supply outside air to areas without an outdoor		
	g HVAC systems to incorporate any room or zone layout changes	Q	
blackboards or d	rs (for example, room dividers, large free-standing lisplays, bookshelves) that could block movement of especially those blocking air vents		2
	t ventilators are quiet enough to accommodate classroom	/	-

ACTIVITY 18: PRESSURIZATION IN BUILDINGS

NOTE: To prevent infiltration of outdoor pollutants, the ventilation system is designed to maintain positive pressurization in the building. Therefore, ensure that the system, including any exhaust fans, is operating on the "occupied" cycle when doing this activity.

4j.	Ensured that air flows out of the building (using chemical smoke) through		,
	windows, doors, or other cracks and holes in exterior wall (for example,	/	/
	floor joints, pipe openings)	đ	Θ

5. EXHAUST SYSTEMS

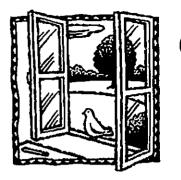
ACTIVITY 19: EXHAUST FAN OPERATION

5a. Checked (using chemical smoke) that air flows into exhaust fan grille(s) 🗅

i a

If fans are running but air is not flowing toward the exhaust intake, check for the following: • Inoperable dampers

- Obstructed, leaky, or disconnected ductwork
- Undersized or improperly installed fan
- Broken fan belt





5. EXHAUST SYSTEMS (continued)

ACTIVITY 20: EXHAUST AIRFLOW

NOTE: Prevent migration of indoor contaminants from areas such as bathrooms, kitchens, and labs by keeping them under negative pressure (as compared to surrounding spaces).

Stand outside the room with the door slightly open while checking airflow high and low in the door opening (see "How to Measure Airflow").

ACTIVITY 21: EXHAUST DUCTWORK

5d. Checked that the exhaust ductwork downstream of the exhaust fan (which is under positive pressure) is sealed and in good condition.......

6. QUANTITY OF OUTDOOR AIR

ACTIVITY 22: OUTDOOR AIR MEASUREMENTS AND CALCULATIONS

NOTE: Refer to "How to Measure Airflow" for techniques.

6a. Measured the quantity of outdoor air supplied (22a) to each ventilation unit 6b. Calculated the number of occupants served (22b) by the ventilation unit under consideration...... 6c. Divided outdoor air supply (22a) by the number of occupants (22b) to determine the existing quantity of outdoor air supply per person (22c) **ACTIVITY 23: ACCEPTABLE LEVELS OF OUTDOOR AIR QUANTITIES** 6d. Compared the existing outdoor air per person (22c) to the recommended levels in Table 1 6e. Corrected problems with ventilation units that supplied inadequate quantities of outdoor air to ensure that outdoor air quantities (22c) meet the recommended levels in Table 1.....

NOTES All HVAC units through the BAS have advanced ventilation control logic deployed associated with the spaces they serve. The system will modulate the outdoor air damper and return dampers to provide the proper amount of air as needed to maintain space CO2 levels. This type of control is called CO2 based Demand-Controlled Ventilation (DCV). DCV provides proper ventilation air quantities as well as energy savings by reducing the amount of required ventilation air based on the CO2 levels measured by the sensor. The CO2 levels in parts per million (PPM) is used as an indicator of the number of occupants in a room. When the room has less than design occupancy, the required volume of ventilation is reduced. The CO2 sensor allows the VFD to reduce the fan speed to deliver a reduced volume of outside air for ventilation during these periods. An increase in the CO2 level is an indication that more people are in the room, so the fan speed is increased to maintain the required volume of ventilation air under all occupancy conditions.

Active DCV control is an acceptable alternate method to determine if ventilation requirements are met and could supersede rooms that may fail otherwise using traditional measured data collection procedures prescribed by established ASHRAE guidelines.

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BAS: Building Automation System

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Instructions

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 - Check the "yes," "no," or "not applicable" box beside each item. (A "no" response requires further attention.)
 - Make comments in the "Notes" section as necessary.
- Return the checklist portion of this document to the IAQ Coordinator.

Ventilation Checklist

Name:	Stephyn	Martoni	2		
School:	Amity	Middle	School	Olonge	7
Unit Vent	ilator/AHU No:	105			
Room or .	Area: Elo	5	Date	Completed:	1-30-24
Signature	: JA /	45			

1. OUTDOOR AIR INTAKES

la	. Marked locations of all outdoor air intakes on a small floor plan (for Yes example, a fire escape floor plan)	· · · · · · · · · · · · · · · · · · ·	N/A
lb	. Ensured that the ventilation system was on and operating in "occupied" mode	۵	D
Á	CTIVITY 1: OBSTRUCTIONS		
10	. Ensured that outdoor air intakes are clear of obstructions, debris, clogs,	-	Data
	or covers		
1d	. Installed corrective devices as necessary (e.g., if snowdrifts or leaves frequently block an intake)	ø	٦
A	CTIVITY 2: POLLUTANT SOURCES		
le	. Checked ground-level intakes for pollutant sources (dumpsters, loading	party	
	docks, and bus-idling areas)		U
1f.	1 I I I I I I I I I I I I I I I I I I I		
	toilet, or laboratory exhaust fans; puddles; and mist from air-conditioning cooling towers)		
10	. Resolved any problems with pollutant sources located near outdoor air		Nesed
. 9	intakes (e.g., relocated dumpster or extended exhaust pipe)		
A	CTIVITY 3: AIRFLOW		1
1h	. Obtained chemical smoke (or a small piece of tissue paper or light plastic) \Box	2	
	Confirmed that outdoor air is entering the intake appropriately		
2.	SYSTEM CLEANLINESS		
A	CTIVITY 4: AIR FILTERS		
2a	. Replaced filters per maintenance schedule		
	. Shut off ventilation system fans while replacing filters (prevents dirt from		
	blowing downstream)	, 🗆	
2c	blowing downstream)		
2d	. Confirmed proper fit of filters to prevent air from bypassing (flowing		
200	around) the air filter		
2e	. Confirmed proper installation of filters (correct direction for airflow)		

2. SYSTEM CLEANLINESS (continued)

ACTIVITY 5: DRAIN PANS

AC	TIVITY 5: DRAIN PANS			
	accumulating)			N/A D
2g.	Cleaned drain pans	Ø		Q
2h.	Checked drain pans for mold and mildew	¤		Q
	TIVITY 6: COILS	_/	_	_
21.	Ensured that heating and cooling coils are clean		ū	
	TIVITY 7: AIR-HANDLING UNITS, UNIT VENTILATORS			
2j.	Ensured that the interior of air-handling unit(s) or unit ventilator (air-mixing chamber and fan blades) is clean	7	п	п
2k.	(air-mixing chamber and fan blades) is clean Ensured that ducts are clean	.Z		ū
	TIVITY 8: MECHANICAL ROOMS	/		
	Checked mechanical room for unsanitary conditions, leaks, and spills	.z	D	
2m.	Ensured that mechanical rooms and air-mixing chambers are free of trash, chemical products, and supplies	_		_
	chemical products, and supplies	0.,		
3.	CONTROLS FOR OUTDOOR AIR SUPPLY			
	Ensured that air dampers are at least partially open (minimum position)			ø
3b.	Ensured that minimum position provides adequate outdoor air for occupants	. 🗆		
			-	1
	TIVITY 9: CONTROLS INFORMATION			
30.	Obtained and reviewed all design inside/outside temperature and humidity			
	requirements, controls specifications, as-built mechanical drawings, and controls operations manuals (often uniquely designed)	. <u>Z</u>	Q	ū
۸C	FIVITY 10: CLOCKS, TIMERS, SWITCHES			
	Turned summer-winter switches to the correct position			
	Set time clocks appropriately			
3f.	Ensured that settings fit the actual schedule of building use (including			•
	night/weekend use)	צו	u	
	FIVITY 11: CONTROL COMPONENTS			
3g.	Ensured appropriate system pressure by testing line pressure at both the occupied (day) setting and the unoccupied (night) setting	п		2
	Checked that the line dryer prevents moisture buildup			Ā
3i.	Replaced control system filters at the compressor inlet based on the			
	compressor manufacturer's recommendation (for example, when you blow down the tank)	. 🗆		ø
3j.	Set the line pressure at each thermostat and damper actuator at the proper			~
	level (no leakage or obstructions)			Ø
	TIVITY 12: OUTDOOR AIR DAMPERS			
3k.	Ensured that the outdoor air damper is visible for inspection	.12	۵	
31,	Ensured that the recirculating relief and/or exhaust dampers are visible for inspection	. z		
3m.	Ensured that air temperature in the indoor area(s) served by each		~	-
	outdoor air damper is within the normal operating range		u	
1111 11	α το το αναγραφατίο το ραγτίερο του ταρ σαμίδαν το οποιγατικά περιοθία από υπο			117 MI

NOTE: It is necessary to ensure that the damper is operating properly and within the normal range to continue.



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3. CONTROLS FOR OUTDOOR AIR SUPPLY (continued)

3n.	Checked that the outdoor air damper fully closes within a few minutes of shutting off appropriate air handler	Yes G	№	N/A
30.	Checked that the outdoor air damper opens (at least partially with no delay) when the air handler is turned on	ø		Q
3р.	If in heating mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 85°F		D	P
-	If in cooling mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 60°F and mixed air thermostat is set to 45°F			9⁄
3r.	 If the outdoor air damper does not move, confirmed the following items: The damper actuator links to the damper shaft, and any linkage set screws or bolts are tight Moving parts are free of impediments (e.g., rust, corrosion) 	୍ ଅ		
	 Electrical wire or pneumatic tubing connects to the damper actuator The outside air thermostat(s) is functioning properly (e.g., in the right location, calibrated correctly) 			
n				

Proceed to Activities 13-16 if the damper seems to be operating properly.

ACTIVITY 13: FREEZE STATS

3s.	Disconnected power to controls (for automatic reset only) to test continuity across terminals	۵	ø
OR			*
3t.	Confirmed (if applicable) that depressing the manual reset button (usually red) trips the freeze stat (clicking sound indicates freeze stat was tripped)		D
311	Assessed the feasibility of replacing all manual reset freeze-stats with		-
Ju.	automatic reset freeze-stats	ø	D

NOTE: HVAC systems with water coils need protection from the cold. The freeze-stat may close the outdoor air damper and disconnect the supply air when tripped. The typical trip range is 35°F to 42°F.

ACTIVITY 14: MIXED AIR THERMOSTATS

3v.	Ensured that the mixed air stat for heating mode is set no higher than 65°F	a
3w.	Ensured that the mixed air stat for cooling mode is set no lower than the room thermostat setting	
	TIVITY 15: ECONOMIZERS	
3x.	Confirmed proper economizer settings based on design specifications or local practices	Q
NO	TE: The dry-bulb is typically set at 65°F or lower.	
Зу.	Checked that sensor on the economizer is shielded from direct sunlight \square	Q
3z.	Ensured that dampers operate properly (for outside air, return air, exhaust/relief air, and recirculated air), per the design specifications	a

NOTE: Economizers use varying amounts of cool outdoor air to assist with the cooling load of the room or rooms. There are two types of economizers, dry-bulb and enthalpy. Dry-bulb economizers vary the amount of outdoor air based on outdoor temperature, and enthalpy economizers vary the amount of outdoor air based on outdoor temperature and humidity level.

ACTIVITY 16: FANS

NOTE: If fan shuts off when the thermostat is satisfied, adjust control cycle as necessary to ensure sufficient outdoor air supply.

4. AIR DISTRIBUTION

ACTIVITY 17: AIR DISTRIBUTION

MÇ.			
	Ensured that supply and return air pathways in the existing ventilation system perform as required	, D	
4Ъ.	Ensured that passive gravity relief ventilation systems and transfer grilles between rooms and corridors are functioning		
	TE: If ventilation system is closed or blocked to meet current fire codes, consult wi fessional engineer for remedies.	ith a	
	Made sure every occupied space has supply of outdoor air (mechanical system or operable windows)	/ 12 0	
NO	TE: If outlets have been blocked intentionally to correct drafts or discomfort, inves correct the cause of the discomfort and reopen the vents.	tigat	е
4 e .	Modified the HVAC system to supply outside air to areas without an outdoor air supply		, D
4f.	Modified existing HVAC systems to incorporate any room or zone layout and population changes	D	
4g.	Moved all barriers (for example, room dividers, large free-standing blackboards or displays, bookshelves) that could block movement of air in the room, especially those blocking air vents	þ	⊿
4h.	Ensured that unit ventilators are quiet enough to accommodate classroom	_	_

ACTIVITY 18: PRESSURIZATION IN BUILDINGS

NOTE: To prevent infiltration of outdoor pollutants, the ventilation system is designed to maintain positive pressurization in the building. Therefore, ensure that the system, including any exhaust fans, is operating on the "occupied" cycle when doing this activity.

4j.	Ensured that air flows out of the building (using chemical smoke) through	
	windows, doors, or other cracks and holes in exterior wall (for example,	
	floor joints, pipe openings)	E

5. EXHAUST SYSTEMS

ACTIVITY 19: EXHAUST FAN OPERATION

5a. Checked (using chemical smoke) that air flows into exhaust fan grille(s) 🛛

Д

If fans are running but air is not flowing toward the exhaust intake, check for the following: • Inoperable dampers

- Obstructed, leaky, or disconnected ductwork
- · Undersized or improperly installed fan
- Broken fan belt





5. EXHAUST SYSTEMS (continued)

ACTIVITY 20: EXHAUST AIRFLOW

NOTE: Prevent migration of indoor contaminants from areas such as bathrooms, kitchens, and labs by keeping them under negative pressure (as compared to surrounding spaces).

Stand outside the room with the door slightly open while checking airflow high and low in the door opening (see "How to Measure Airflow").

ACTIVITY 21: EXHAUST DUCTWORK

5d. Checked that the exhaust ductwork downstream of the exhaust fan (which is under positive pressure) is sealed and in good condition......

6. QUANTITY OF OUTDOOR AIR

ACTIVITY 22: OUTDOOR AIR MEASUREMENTS AND CALCULATIONS

NOTE: Refer to "How to Measure Airflow" for techniques.

6a. Measured the quantity of outdoor air supplied (22a) to each ventilation unit 6b. Calculated the number of occupants served (22b) by the ventilation unit under consideration 6c. Divided outdoor air supply (22a) by the number of occupants (22b) to determine the existing quantity of outdoor air supply per person (22c) **ACTIVITY 23: ACCEPTABLE LEVELS OF OUTDOOR AIR QUANTITIES** 6d. Compared the existing outdoor air per person (22c) to the recommended levels in Table 1 6e. Corrected problems with ventilation units that supplied inadequate quantities of outdoor air to ensure that outdoor air quantities (22c) meet the recommended levels in Table 1

NOTES All HVAC units through the BAS have advanced ventilation control logic deployed associated with the spaces they serve. The system will modulate the outdoor air damper and return dampers to provide the proper amount of air as needed to maintain space CO2 levels. This type of control is called CO2 based Demand-Controlled Ventilation (DCV). DCV provides proper ventilation air quantities as well as energy savings by reducing the amount of required ventilation air based on the CO2 levels measured by the sensor. The CO2 levels in parts per million (PPM) is used as an indicator of the number of occupants in a room. When the room has less than design occupancy, the required volume of ventilation is reduced. The CO2 sensor allows the VFD to reduce the fan speed to deliver a reduced volume of outside air for ventilation during these periods. An increase in the CO2 level is an indication that more people are in the room, so the fan speed is increased to maintain the required volume of ventilation air under all occupancy conditions.

Active DCV control is an acceptable alternate method to determine if ventilation requirements are met and could supersede rooms that may fail otherwise using traditional measured data collection procedures prescribed by established ASHRAE guidelines.

The ideal supply of outside air to interior occupied spaces should be based upon the 2018 Connecticut Building Code, which is based on the most currently adopted 2015 International Mechanical Code and coincides with ASHRAE-62.1, (2010) guidelines

BAS: Building Automation System VFD: Variable Frequency Drive (Controls the speed of the fan motor) ASHRAE: American Society of Heating, Refrigerating and Air Conditioning Engineers

1 . ~



Instructions

- 1. Read the *IAQ Backgrounder* and the Background Information for this checklist.
- 2. Keep the Background Information and make a copy of this checklist for each ventilation unit in your school, as well as a copy for future reference.
- 3. Complete the Checklist.
 - Check the "yes," "no," or "not applicable" box beside each item. (A "no" response requires further attention.)
 - Make comments in the "Notes" section as necessary.
- Return the checklist portion of this document to the IAQ Coordinator.

Ventilation Checklist

Name:	Stephen	Martoni	· · · · · · · · · · · · · · · · · · ·		
School:	Amity	Middle	School	OTUNGe	
Unit Vent	tilator/AHU No:	106	1		
Room or	Area: _ E106	1 1	Date	Completed:	1-30-24
Signature	: Ly f	45			

1. OUTDOOR AIR INTAKES

la.	Marked locations of all outdoor air intakes on a small floor plan (for ves example, a fire escape floor plan)		N/A
1b.	Ensured that the ventilation system was on and operating in "occupied" mode		
AC	TIVITY 1: OBSTRUCTIONS		
1c.	Ensured that outdoor air intakes are clear of obstructions, debris, clogs, or covers		
1d.	Installed corrective devices as necessary (e.g., if snowdrifts or leaves frequently block an intake)		
AC	TIVITY 2: POLLUTANT SOURCES		
	Checked ground-level intakes for pollutant sources (dumpsters, loading docks, and bus-idling areas)		٦
lf.	Checked rooftop intakes for pollutant sources (plumbing vents; kitchen, toilet, or laboratory exhaust fans; puddles; and mist from air-conditioning cooling towers)		
1g.	Resolved any problems with pollutant sources located near outdoor air intakes (e.g., relocated dumpster or extended exhaust pipe)	-	
AC	TIVITY 3: AIRFLOW		/
1h.	Obtained chemical smoke (or a small piece of tissue paper or light plastic). \Box Confirmed that outdoor air is entering the intake appropriately		
2.	SYSTEM CLEANLINESS		
AC	TIVITY 4: AIR FILTERS		
	Replaced filters per maintenance schedule		
	Shut off ventilation system fans while replacing filters (prevents dirt from blowing downstream)	n	
2c.	blowing downstream)	, D	
	Confirmed proper fit of filters to prevent air from bypassing (flowing around) the air filter.		

2. SYSTEM CLEANLINESS (continued)

ACTIVITY 5: DRAIN PANS Yes, No N/A 2f. Ensured that drain pans slant toward the drain (to prevent water from accumulating) 2g. Cleaned drain pans 2h. Checked drain pans for mold and mildew п **ACTIVITY 6: COILS** П **ACTIVITY 7: AIR-HANDLING UNITS, UNIT VENTILATORS** 2i. Ensured that the interior of air-handling unit(s) or unit ventilator **ACTIVITY 8: MECHANICAL ROOMS** 2m. Ensured that mechanical rooms and air-mixing chambers are free of trash, chemical products, and supplies 3. CONTROLS FOR OUTDOOR AIR SUPPLY 3a. Ensured that air dampers are at least partially open (minimum position) \Box 3b. Ensured that minimum position provides adequate outdoor air **ACTIVITY 9: CONTROLS INFORMATION** 3c. Obtained and reviewed all design inside/outside temperature and humidity requirements, controls specifications, as-built mechanical drawings, and controls operations manuals (often uniquely designed) **ACTIVITY 10: CLOCKS, TIMERS, SWITCHES** 3d. Turned summer-winter switches to the correct position 3e. Set time clocks appropriately Ø 3f. Ensured that settings fit the actual schedule of building use (including night/weekend use) **ACTIVITY 11: CONTROL COMPONENTS** 3g. Ensured appropriate system pressure by testing line pressure at both the occupied (day) setting and the unoccupied (night) setting ДĨ А 3h. Checked that the line dryer prevents moisture buildup 3i. Replaced control system filters at the compressor inlet based on the compressor manufacturer's recommendation (for example, when you blow down the tank)..... Ø 3j. Set the line pressure at each thermostat and damper actuator at the proper level (no leakage or obstructions) Z **ACTIVITY 12: OUTDOOR AIR DAMPERS** 31. Ensured that the recirculating relief and/or exhaust dampers are visible for inspection 3m. Ensured that air temperature in the indoor area(s) served by each

NOTE: It is necessary to ensure that the damper is operating properly and within the normal range to continue.

2 of 5



3. CONTROLS FOR OUTDOOR AIR SUPPLY (continued)

3n.	Checked that the outdoor air damper fully closes within a few minutes of shutting off appropriate air handler		N/A	
30.	Checked that the outdoor air damper opens (at least partially with no delay) when the air handler is turned on		a	
3р.	If in heating mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 85°F		بر	
3q.	If in cooling mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 60°F and mixed air thermostat is set to 45° F	D	, ,	•
3r.	If the outdoor air damper does not move, confirmed the following items:		4	
	 The damper actuator links to the damper shaft, and any linkage set screws or bolts are tight 	<u>_</u> _		
	• Moving parts are free of impediments (e.g., rust, corrosion)	۵	Q	
	• Electrical wire or pneumatic tubing connects to the damper actuator	/ a	D	
	• The outside air thermostat(s) is functioning properly (e.g., in the right location, calibrated correctly)	∕_		
Pro	ceed to Activities 13-16 if the damper seems to be operating properly.			

ACTIVITY 13: FREEZE STATS

3s.	Disconnected power to controls (for automatic reset only) to test continuity across terminals	ü	ø
OR			1
3t.	Confirmed (if applicable) that depressing the manual reset button (usually red) trips the freeze stat (clicking sound indicates freeze stat was		
	tripped)		D
3u.	Assessed the feasibility of replacing all manual reset freeze-stats with automatic reset freeze-stats		

NOTE: HVAC systems with water coils need protection from the cold. The freeze-stat may close the outdoor air damper and disconnect the supply air when tripped. The typical trip range is 35°F to 42°F.

ACTIVITY 14: MIXED AIR THERMOSTATS

3 v .	Ensured that the mixed air stat for heating mode is set no higher than 65°F	
3w.	Ensured that the mixed air stat for cooling mode is set no lower than the room thermostat setting	۵
AC	TIVITY 15: ECONOMIZERS	
3x.	Confirmed proper economizer settings based on design specifications or local practices	D
NO	TE: The dry-bulb is typically set at $65^{\circ}F$ or lower.	
Зу.	Checked that sensor on the economizer is shielded from direct sunlight \Box	a
3z.	Ensured that dampers operate properly (for outside air, return air,	_

NOTE: Economizers use varying amounts of cool outdoor air to assist with the cooling load of the room or rooms. There are two types of economizers, dry-bulb and enthalpy. Dry-bulb economizers vary the amount of outdoor air based on outdoor temperature, and enthalpy economizers vary the amount of outdoor air based on outdoor temperature and humidity level.

ACTIVITY 16: FANS

NOTE: If fan shuts off when the thermostat is satisfied, adjust control cycle as necessary to ensure sufficient outdoor air supply.

4. AIR DISTRIBUTION

ACTIVITY 17: AIR DISTRIBUTION

4a. Ensured that supply and return air pathways in the existing ventilation system perform as required	ב
4b. Ensured that passive gravity relief ventilation systems and transfer grilles between rooms and corridors are functioning	
NOTE: If ventilation system is closed or blocked to meet current fire codes, consult with a professional engineer for remedies.	
 4c. Made sure every occupied space has supply of outdoor air (mechanical system or operable windows) 4d. Ensured that supply and return vents are open and unblocked	
NOTE: If outlets have been blocked intentionally to correct drafts or discomfort, investigate and correct the cause of the discomfort and reopen the vents.	
4e. Modified the HVAC system to supply outside air to areas without an outdoor	-1

40.	air supply	G	
4f.	Modified existing HVAC systems to incorporate any room or zone layout and population changes		
4g.	Moved all barriers (for example, room dividers, large free-standing blackboards or displays, bookshelves) that could block movement of air in the room, especially those blocking air vents	þ	ø
4h.	Ensured that unit ventilators are quiet enough to accommodate classroom activities		
4i.	Ensured that classrooms are free of uncomfortable drafts produced by air from supply terminals	.	

ACTIVITY 18: PRESSURIZATION IN BUILDINGS

NOTE: To prevent infiltration of outdoor pollutants, the ventilation system is designed to maintain positive pressurization in the building. Therefore, ensure that the system, including any exhaust fans, is operating on the "occupied" cycle when doing this activity.

4j.	Ensured that air flows out of the building (using chemical smoke) through	
_	windows, doors, or other cracks and holes in exterior wall (for example,	
	floor joints, pipe openings)	1

5. EXHAUST SYSTEMS

ACTIVITY 19: EXHAUST FAN OPERATION

5a. Checked (using chemical smoke) that air flows into exhaust fan grille(s) D

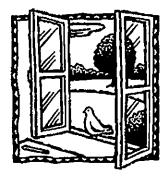
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П

If fans are running but air is not flowing toward the exhaust intake, check for the following: • Inoperable dampers

- Obstructed, leaky, or disconnected ductwork
- Undersized or improperly installed fan
- Broken fan belt





5. EXHAUST SYSTEMS (continued)

ACTIVITY 20: EXHAUST AIRFLOW

NOTE: Prevent migration of indoor contaminants from areas such as bathrooms, kitchens, and labs by keeping them under negative pressure (as compared to surrounding spaces).

5b. Checked (using chemical smoke) that air is drawn into the room from Yes. No N/A adjacent spaces
Stand outside the room with the door slightly open while checking airflow high and low in the door opening (see "How to Measure Airflow").
5c. Ensured that air is flowing toward the exhaust intake
ACTIVITY 21: EXHAUST DUCTWORK 5d. Checked that the exhaust ductwork downstream of the exhaust fan (which is under positive pressure) is sealed and in good condition
6. QUANTITY OF OUTDOOR AIR ACTIVITY 22: OUTDOOR AIR MEASUREMENTS AND CALCULATIONS

NOTE: Refer to "How to Measure Airflow" for techniques.

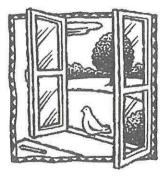
ба.	Measured the quantity of outdoor air supplied (22a) to each ventilation unit		
6b.	Calculated the number of occupants served (22b) by the ventilation unit under consideration	Q	
бс.	Divided outdoor air supply (22a) by the number of occupants (22b) to determine the existing quantity of outdoor air supply per person (22c)		
AC	TIVITY 23: ACCEPTABLE LEVELS OF OUTDOOR AIR QUANTITIES		
		۵	۵
6d.	TIVITY 23: ACCEPTABLE LEVELS OF OUTDOOR AIR QUANTITIES Compared the existing outdoor air per person (22c) to the recommended	0	۵

NOTES All HVAC units through the BAS have advanced ventilation control logic deployed associated with the spaces they serve. The system will modulate the outdoor air damper and return dampers to provide the proper amount of air as needed to maintain space CO2 levels. This type of control is called CO2 based Demand-Controlled Ventilation (DCV). DCV provides proper ventilation air quantities as well as energy savings by reducing the amount of required ventilation air based on the CO2 levels measured by the sensor. The CO2 levels in parts per million (PPM) is used as an indicator of the number of occupants in a room. When the room has less than design occupancy, the required volume of ventilation is reduced. The CO2 sensor allows the VFD to reduce the fan speed to deliver a reduced volume of outside air for ventilation during these periods. An increase in the CO2 level is an indication that more people are in the room, so the fan speed is increased to maintain the required volume of ventilation air under all occupancy conditions.

Active DCV control is an acceptable alternate method to determine if ventilation requirements are met and could supersede rooms that may fail otherwise using traditional measured data collection procedures prescribed by established ASHRAE guidelines.

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Instructions

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- 2. Keep the Background Information and make a copy of this checklist for **each** ventilation unit in your school, as well as a copy for future reference.
- 3. Complete the Checklist.
 - Check the "yes," "no," or "not applicable" box beside each item. (A "no" response requires further attention.)
 - Make comments in the "Notes" section as necessary.
- Return the checklist portion of this document to the IAQ Coordinator.

Ventilation Checklist

Name:	Stephen	Mortoni				
School:	Amity	Middle	School	OTUNGE	6	
Unit Vent	ilator/AHU No:	104				
Room or a	Area: Ell	4	Date	Completed:	1-30-2	4
Signature	: LY f	45				

1. OUTDOOR AIR INTAKES

1a.	Marked locations of all outdoor air intakes on a small floor plan (for example, a fire escape floor plan)			N/A
1b.	Ensured that the ventilation system was on and operating in "occupied" mode	¤	D	D
AC	TIVITY 1: OBSTRUCTIONS			
1c.	Ensured that outdoor air intakes are clear of obstructions, debris, clogs, or covers	⊿		D
1d.	Installed corrective devices as necessary (e.g., if snowdrifts or leaves frequently block an intake)			٦
AC	TIVITY 2: POLLUTANT SOURCES			
	Checked ground-level intakes for pollutant sources (dumpsters, loading docks, and bus-idling areas)	Zi		
1f.	Checked rooftop intakes for pollutant sources (plumbing vents; kitchen, toilet, or laboratory exhaust fans; puddles; and mist from air-conditioning cooling towers)	Z		
1g.	Resolved any problems with pollutant sources located near outdoor air intakes (e.g., relocated dumpster or extended exhaust pipe)	-	D	۵
AC	TIVITY 3: AIRFLOW			
10 - 77	Obtained chemical smoke (or a small piece of tissue paper or light plastic)	D	2	
	Confirmed that outdoor air is entering the intake appropriately			
2.	SYSTEM CLEANLINESS			
	TIVITY 4: AIR FILTERS			
	Replaced filters per maintenance schedule	Z		
	Shut off ventilation system fans while replacing filters (prevents dirt from blowing downstream)	¤,		
	Vacuumed filter areas before installing new filters	¤		
20.	Confirmed proper fit of filters to prevent air from bypassing (flowing			

2. SYSTEM CLEANLINESS (continued)

ACTIVITY 5: DRAIN PANS

ACTIVITY 5: DRAIN PANS			
accumulating)	∡		N/A
2g. Cleaned drain pans	6		Q
2h. Checked drain pans for mold and mildew	z		
ACTIVITY 6: COILS	,		
2i. Ensured that heating and cooling coils are clean	z		
ACTIVITY 7: AIR-HANDLING UNITS, UNIT VENTILATORS			
2j. Ensured that the interior of air-handling unit(s) or unit ventilator (air-mixing chamber and fan blades) is clean	4		a
(air-mixing chamber and fan blades) is clean	3	ū	ā
ACTIVITY 8: MECHANICAL ROOMS			
21. Checked mechanical room for unsanitary conditions, leaks, and spills	ፈ		
2m. Ensured that mechanical rooms and air-mixing chambers are free of trash, chemical products, and supplies			
chemical products, and supplies	2		
3. CONTROLS FOR OUTDOOR AIR SUPPLY			
3a. Ensured that air dampers are at least partially open (minimum position)	ב		ø
3b. Ensured that minimum position provides adequate outdoor air	–		
for occupants		9	۴
ACTIVITY 9: CONTROLS INFORMATION			
3c. Obtained and reviewed all design inside/outside temperature and humidity			
requirements, controls specifications, as-built mechanical drawings, and controls operations manuals (often uniquely designed)	K		
and controls operations manuals (often uniquely designed)	-	-	<u> </u>
ACTIVITY 10: CLOCKS, TIMERS, SWITCHES			
3d. Turned summer-winter switches to the correct position	1		
3e. Set time clocks appropriately	ב		ø
3f. Ensured that settings fit the actual schedule of building use (including	_	_	_
night/weekend use)	נ		
ACTIVITY 11: CONTROL COMPONENTS			
3g. Ensured appropriate system pressure by testing line pressure at both the	_	_	~
occupied (day) setting and the unoccupied (night) setting			
3h. Checked that the line dryer prevents moisture buildup	-1	a	L7
3i. Replaced control system filters at the compressor inlet based on the compressor manufacturer's recommendation (for example, when you			•
blow down the tank)	ב		Z
3j. Set the line pressure at each thermostat and damper actuator at the proper	-	-	•
level (no leakage or obstructions)	ב	۵	A
ACTIVITY 12: OUTDOOR AIR DAMPERS			
3k. Ensured that the outdoor air damper is visible for inspection	1		
31. Ensured that the recirculating relief and/or exhaust dampers are visible			
for inspection	<u>ک</u>		ū
3m. Ensured that air temperature in the indoor area(s) served by each		_	-
outdoor air damper is within the normal operating range	1	Ч	



NOTE: It is necessary to ensure that the damper is operating properly and within the normal range to continue.



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3. CONTROLS FOR OUTDOOR AIR SUPPLY (continued)

3n.	Checked that the outdoor air damper fully closes within a few minutes Yes No of shutting off appropriate air handler	N/A
	Checked that the outdoor air damper opens (at least partially with no delay) when the air handler is turned on	D
3p.	If in heating mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 85°F	ø
3q.	If in cooling mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 60° F and mixed air thermostat is set to 45° F	
3r.	If the outdoor air damper does not move, confirmed the following items:	1
	• The damper actuator links to the damper shaft, and any linkage set screws or bolts are tight	
	• Moving parts are free of impediments (e.g., rust, corrosion)	Q
	• Electrical wire or pneumatic tubing connects to the damper actuator	
	• The outside air thermostat(s) is functioning properly (e.g., in the right location, calibrated correctly)	۵

Proceed to Activities 13-16 if the damper seems to be operating properly.

ACTIVITY 13: FREEZE STATS

3s.	Disconnected power to controls (for automatic reset only) to test continuity across terminals	ü	ø
OR			7
3t.	Confirmed (if applicable) that depressing the manual reset button (usually red) trips the freeze stat (clicking sound indicates freeze stat was		-
	tripped)	ч	ч
3u.	Assessed the feasibility of replacing all manual reset freeze-stats with automatic reset freeze-stats	ø	

NOTE: HVAC systems with water coils need protection from the cold. The freeze-stat may close the outdoor air damper and disconnect the supply air when tripped. The typical trip range is $35^{\circ}F$ to $42^{\circ}F$.

ACTIVITY 14: MIXED AIR THERMOSTATS

3v.	Ensured that the mixed air stat for heating mode is set no higher than 65°F	
3w.	Ensured that the mixed air stat for cooling mode is set no lower than the room thermostat setting	D
AC	TIVITY 15: ECONOMIZERS	
3x.	Confirmed proper economizer settings based on design specifications or local practices	a
NO	TE: The dry-bulb is typically set at 65°F or lower.	
•	Checked that sensor on the economizer is shielded from direct sunlight	Q
3z.	Ensured that dampers operate properly (for outside air, return air, exhaust/relief air, and recirculated air), per the design specifications	

NOTE: Economizers use varying amounts of cool outdoor air to assist with the cooling load of the room or rooms. There are two types of economizers, dry-bulb and enthalpy. Dry-bulb economizers vary the amount of outdoor air based on outdoor temperature, and enthalpy economizers vary the amount of outdoor air based on outdoor temperature and humidity level.

ACTIVITY 16: FANS

3aa. Ensured that all fans (supply fans and associated return or relief fans)			
that move outside air indoors continuously operate during occupied	Yes	٨lo	N/A
hours (even when room thermostat is satisfied)	Ø	D	

NOTE: If fan shuts off when the thermostat is satisfied, adjust control cycle as necessary to ensure sufficient outdoor air supply.

4. AIR DISTRIBUTION

ACTIVITY 17: AIR DISTRIBUTION

4a. Ensured that supply and return air pathways in the existing ventilation system perform as required	
4b. Ensured that passive gravity relief ventilation systems and transfer grilles between rooms and corridors are functioning	
NOTE: If ventilation system is closed or blocked to meet current fire codes, consult with a professional engineer for remedies.	
 4c. Made sure every occupied space has supply of outdoor air (mechanical system or operable windows) 4d. Ensured that supply and return vents are open and unblocked 	
NOTE: If outlets have been blocked intentionally to correct drafts or discomfort, investigate and correct the cause of the discomfort and reopen the vents.	
 4e. Modified the HVAC system to supply outside air to areas without an outdoor air supply 4f. Modified existing HVAC systems to incorporate any room or zone layout 	

		_	_
4f.	Modified existing HVAC systems to incorporate any room or zone layout and population changes	D	
4g.	Moved all barriers (for example, room dividers, large free-standing		
	blackboards or displays, bookshelves) that could block movement of air in the room, especially those blocking air vents	D	⊿
4h.	Ensured that unit ventilators are quiet enough to accommodate classroom activities		
4i.	Ensured that classrooms are free of uncomfortable drafts produced by air from supply terminals	, Q.	

ACTIVITY 18: PRESSURIZATION IN BUILDINGS

NOTE: To prevent infiltration of outdoor pollutants, the ventilation system is designed to maintain positive pressurization in the building. Therefore, ensure that the system, including any exhaust fans, is operating on the "occupied" cycle when doing this activity.

4j.	Ensured that air flows out of the building (using chemical smoke) through	
	windows, doors, or other cracks and holes in exterior wall (for example,	
	floor joints, pipe openings)	Ø

5. EXHAUST SYSTEMS

ACTIVITY 19: EXHAUST FAN OPERATION

5a. Checked (using chemical smoke) that air flows into exhaust fan grille(s) D

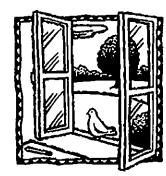
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If fans are running but air is not flowing toward the exhaust intake, check for the following: • Inoperable dampers

- Obstructed, leaky, or disconnected ductwork
- · Undersized or improperly installed fan
- Broken fan belt





5. EXHAUST SYSTEMS (continued)

ACTIVITY 20: EXHAUST AIRFLOW

NOTE: Prevent migration of indoor contaminants from areas such as bathrooms, kitchens, and labs by keeping them under negative pressure (as compared to surrounding spaces).

5b. Checked (using chemical smoke) that air is drawn into the room from Yes, No N/A

Stand outside the room with the door slightly open while checking airflow high and low in the door opening (see "How to Measure Airflow").

ACTIVITY 21: EXHAUST DUCTWORK

5d. Checked that the exhaust ductwork downstream of the exhaust fan (which is

6. QUANTITY OF OUTDOOR AIR

ACTIVITY 22: OUTDOOR AIR MEASUREMENTS AND CALCULATIONS

NOTE: Refer to "How to Measure Airflow" for techniques.

ба.	Measured the quantity of outdoor air supplied (22a) to each ventilation unit	D
6b.	Calculated the number of occupants served (22b) by the ventilation unit under consideration	
бс.	Divided outdoor air supply (22a) by the number of occupants (22b) to determine the existing quantity of outdoor air supply per person (22c)	D
AC	TIVITY 23: ACCEPTABLE LEVELS OF OUTDOOR AIR OUANTITIES	

ACTIVITY 23: ACCEPTABLE LEVELS OF OUTDOOR AIR QUANTI

6d.	Compared the existing outdoor air per person (22c) to the recommended	
	levels in Table 1	
6e.	Corrected problems with ventilation units that supplied inadequate	
	quantities of outdoor air to ensure that outdoor air quantities (22c) meet	
	the recommended levels in Table 1	

NOTES All HVAC units through the BAS have advanced ventilation control logic deployed associated with the spaces they serve. The system will modulate the outdoor air damper and return dampers to provide the proper amount of air as needed to maintain space CO2 levels. This type of control is called CO2 based Demand-Controlled Ventilation (DCV). DCV provides proper ventilation air quantities as well as energy savings by reducing the amount of required ventilation air based on the CO2 levels measured by the sensor. The CO2 levels in parts per million (PPM) is used as an indicator of the number of occupants in a room. When the room has less than design occupancy, the required volume of ventilation is reduced. The CO2 sensor allows the VFD to reduce the fan speed to deliver a reduced volume of outside air for ventilation during these periods. An increase in the CO2 level is an indication that more people are in the room, so the fan speed is increased to maintain the required volume of ventilation air under all occupancy conditions.

Active DCV control is an acceptable alternate method to determine if ventilation requirements are met and could supersede rooms that may fail otherwise using traditional measured data collection procedures prescribed by established ASHRAE guidelines.

The ideal supply of outside air to interior occupied spaces should be based upon the 2018 Connecticut Building Code, which is based on the most currently adopted 2015 International Mechanical Code and coincides with ASHRAE-62.1, (2010) guidelines



BAS: Building Automation System VFD: Variable Frequency Drive (Controls the speed of the fan motor) ASHRAE: American Society of Heating, Refrigerating and Air Conditioning Engineers

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Instructions

- 1. Read the *IAQ Backgrounder* and the Background Information for this checklist.
- 2. Keep the Background Information and make a copy of this checklist for **each** ventilation unit in your school, as well as a copy for future reference.
- 3. Complete the Checklist.
 - Check the "yes," "no," or "not applicable" box beside each item. (A "no" response requires further attention.)
 - Make comments in the "Notes" section as necessary.
- Return the checklist portion of this document to the IAQ Coordinator.

Ventilation Checklist

Name:	Stephen	Martoni			
School:	Amity	Middle	School	0 runge	-
Room or	tilator/AHU No:	100	Date	Completed:	1-30,24
Signature	: Ly f	10			

1. OUTDOOR AIR INTAKES

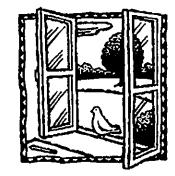
la.	Marked locations of all outdoor air intakes on a small floor plan (for Yes example, a fire escape floor plan)		N/A
1b.	Ensured that the ventilation system was on and operating in "occupied" mode	۵	D
AC	TIVITY 1: OBSTRUCTIONS		
1c.	Ensured that outdoor air intakes are clear of obstructions, debris, clogs,		
	or covers		
ld.	Installed corrective devices as necessary (e.g., if snowdrifts or leaves frequently block an intake)	ø	٦
AC	TIVITY 2: POLLUTANT SOURCES		
1e.	Checked ground-level intakes for pollutant sources (dumpsters, loading		
1.01.022	docks, and bus-idling areas)		
lf.	Checked rooftop intakes for pollutant sources (plumbing vents; kitchen,		
	toilet, or laboratory exhaust fans; puddles; and mist from air-conditioning cooling towers)		
1g.	Resolved any problems with pollutant sources located near outdoor air		-
0	intakes (e.g., relocated dumpster or extended exhaust pipe)		۵
AC	TIVITY 3: AIRFLOW		/
1h.	Obtained chemical smoke (or a small piece of tissue paper or light plastic) \Box	2	
	Confirmed that outdoor air is entering the intake appropriately		
2.	SYSTEM CLEANLINESS		
	TIVITY 4: AIR FILTERS		
2a.	Replaced filters per maintenance schedule		
2b.	Shut off ventilation system fans while replacing filters (prevents dirt from		
2c.	blowing downstream)		
	Confirmed proper fit of filters to prevent air from bypassing (flowing		
an cebits	around) the air filter		

2. SYSTEM CLEANLINESS (continued)

ACTIVITY 5: DRAIN PANS 2f. Ensured that drain pans slant toward the drain (to prevent water from Yes, No N/A accumulating) 2g. Cleaned drain pans 2h. Checked drain pans for mold and mildew **ACTIVITY 6: COILS ACTIVITY 7: AIR-HANDLING UNITS, UNIT VENTILATORS** 2j. Ensured that the interior of air-handling unit(s) or unit ventilator **ACTIVITY 8: MECHANICAL ROOMS** 2m. Ensured that mechanical rooms and air-mixing chambers are free of trash, chemical products, and supplies 3. CONTROLS FOR OUTDOOR AIR SUPPLY 3a. Ensured that air dampers are at least partially open (minimum position) \Box \Box \swarrow 3b. Ensured that minimum position provides adequate outdoor air **ACTIVITY 9: CONTROLS INFORMATION** 3c. Obtained and reviewed all design inside/outside temperature and humidity requirements, controls specifications, as-built mechanical drawings. and controls operations manuals (often uniquely designed) **ACTIVITY 10: CLOCKS, TIMERS, SWITCHES** 3d. Turned summer-winter switches to the correct position 3e. Set time clocks appropriately Ø 3f. Ensured that settings fit the actual schedule of building use (including night/weekend use) **ACTIVITY 11: CONTROL COMPONENTS** 3g. Ensured appropriate system pressure by testing line pressure at both the occupied (day) setting and the unoccupied (night) setting Д Д 3h. Checked that the line dryer prevents moisture buildup 3i. Replaced control system filters at the compressor inlet based on the compressor manufacturer's recommendation (for example, when you blow down the tank)..... ø Set the line pressure at each thermostat and damper actuator at the proper 3i. level (no leakage or obstructions) Z **ACTIVITY 12: OUTDOOR AIR DAMPERS** 31. Ensured that the recirculating relief and/or exhaust dampers are visible for inspection 3m. Ensured that air temperature in the indoor area(s) served by each outdoor air damper is within the normal operating range

NOTE: It is necessary to ensure that the damper is operating properly and within the normal range to continue.

2 of 5



3n.	Checked that the outdoor air damper fully closes within a few minutes Yes of shutting off appropriate air handler	ok D	N/A
	Checked that the outdoor air damper opens (at least partially with no delay) when the air handler is turned on	D	a
3p.	If in heating mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 85°F	D	ø
•	If in cooling mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 60° F and mixed air thermostat is set to 45° F		9
3r.	 If the outdoor air damper does not move, confirmed the following items: The damper actuator links to the damper shaft, and any linkage set screws or bolts are tight		
	• Moving parts are free of impediments (e.g., rust, corrosion)	ē	D
	• Electrical wire or pneumatic tubing connects to the damper actuator		D
	• The outside air thermostat(s) is functioning properly (e.g., in the right location, calibrated correctly)	ū	

Proceed to Activities 13-16 if the damper seems to be operating properly.

ACTIVITY 13: FREEZE STATS

3s.	Disconnected power to controls (for automatic reset only) to test continuity across terminals	۵	ø
OR			4
3t.	Confirmed (if applicable) that depressing the manual reset button (usually red) trips the freeze stat (clicking sound indicates freeze stat was	-	_
	tripped)	ч	ч
3u.	Assessed the feasibility of replacing all manual reset freeze-stats with automatic reset freeze-stats	ø	

NOTE: HVAC systems with water coils need protection from the cold. The freeze-stat may close the outdoor air damper and disconnect the supply air when tripped. The typical trip range is $35^{\circ}F$ to $42^{\circ}F$.

ACTIVITY 14: MIXED AIR THERMOSTATS

3v. Ensured that the mixed air stat for heating mode is set no higher than 65°F.	a
3w. Ensured that the mixed air stat for cooling mode is set no lower than the room thermostat setting	
ACTIVITY 15: ECONOMIZERS	
3x. Confirmed proper economizer settings based on design specifications or local practices	Q
NOTE: The dry-bulb is typically set at 65°F or lower.	

- 3y. Checked that sensor on the economizer is shielded from direct sunlight \square

NOTE: Economizers use varying amounts of cool outdoor air to assist with the cooling load of the room or rooms. There are two types of economizers, dry-bulb and enthalpy. Dry-bulb economizers vary the amount of outdoor air based on outdoor temperature, and enthalpy economizers vary the amount of outdoor air based on outdoor temperature and humidity level.

ACTIVITY 16: FANS

3aa. Ensured that all fans (supply fans and associated return or relief fans)			
that move outside air indoors continuously operate during occupied	Yes	ŇО	N/A
hours (even when room thermostat is satisfied)	Ø		

NOTE: If fan shuts off when the thermostat is satisfied, adjust control cycle as necessary to ensure sufficient outdoor air supply.

4. AIR DISTRIBUTION

ACTIVITY 17: AIR DISTRIBUTION

 4a. Ensured that supply and return air pathways in the existing ventilation system perform as required. 4b. Ensured that passive gravity relief ventilation systems and transfer grilles between rooms and corridors are functioning. 	
NOTE: If ventilation system is closed or blocked to meet current fire codes, consult with a professional engineer for remedies.	
 4c. Made sure every occupied space has supply of outdoor air (mechanical system or operable windows)	
NOTE: If outlets have been blocked intentionally to correct drafts or discomfort, investigate and correct the cause of the discomfort and reopen the vents.	
4e. Modified the HVAC system to supply outside air to areas without an outdoor air supply	
4f. Modified existing HVAC systems to incorporate any room or zone layout and population changes	
4g. Moved all barriers (for example, room dividers, large free-standing blackboards or displays, bookshelves) that could block movement of air in the room, especially those blocking air vents	
4h. Ensured that unit ventilators are quiet enough to accommodate classroom activities	
4i. Ensured that classrooms are free of uncomfortable drafts produced by air	

ACTIVITY 18: PRESSURIZATION IN BUILDINGS

NOTE: To prevent infiltration of outdoor pollutants, the ventilation system is designed to maintain positive pressurization in the building. Therefore, ensure that the system, including any exhaust fans, is operating on the "occupied" cycle when doing this activity.

from supply terminals

4j.	Ensured that air flows out of the building (using chemical smoke) through		,
	windows, doors, or other cracks and holes in exterior wall (for example,	/	
	floor joints, pipe openings)	Ø	6

5. EXHAUST SYSTEMS

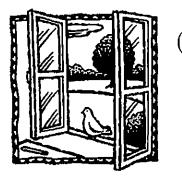
ACTIVITY 19: EXHAUST FAN OPERATION

5a. Checked (using chemical smoke) that air flows into exhaust fan grille(s) D

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If fans are running but air is not flowing toward the exhaust intake, check for the following:

- Inoperable dampers
- Obstructed, leaky, or disconnected ductwork
- Undersized or improperly installed fan
- Broken fan belt





5. EXHAUST SYSTEMS (continued)

ACTIVITY 20: EXHAUST AIRFLOW

NOTE: Prevent migration of indoor contaminants from areas such as bathrooms, kitchens, and labs by keeping them under negative pressure (as compared to surrounding spaces).

5b. Checked (using chemical smoke) that air is drawn into the room from Yes. No N/A adjacent spaces

Stand outside the room with the door slightly open while checking airflow high and low in the door opening (see "How to Measure Airflow").

ACTIVITY 21: EXHAUST DUCTWORK

6. QUANTITY OF OUTDOOR AIR

ACTIVITY 22: OUTDOOR AIR MEASUREMENTS AND CALCULATIONS

NOTE: Refer to "How to Measure Airflow" for techniques.

6a. Measured the quantity of outdoor air supplied (22a) to each ventilation unit 🛛 6b. Calculated the number of occupants served (22b) by the ventilation unit under consideration 6c. Divided outdoor air supply (22a) by the number of occupants (22b) to determine the existing quantity of outdoor air supply per person (22c) **ACTIVITY 23: ACCEPTABLE LEVELS OF OUTDOOR AIR QUANTITIES** 6d. Compared the existing outdoor air per person (22c) to the recommended levels in Table 1 6e. Corrected problems with ventilation units that supplied inadequate quantities of outdoor air to ensure that outdoor air quantities (22c) meet the recommended levels in Table 1

NOTES All HVAC units through the BAS have advanced ventilation control logic deployed associated with the spaces they serve. The system will modulate the outdoor air damper and return dampers to provide the proper amount of air as needed to maintain space CO2 levels. This type of control is called CO2 based Demand-Controlled Ventilation (DCV). DCV provides proper ventilation air quantities as well as energy savings by reducing the amount of required ventilation air based on the CO2 levels measured by the sensor. The CO2 levels in parts per million (PPM) is used as an indicator of the number of occupants in a room. When the room has less than design occupancy, the required volume of ventilation is reduced. The CO2 sensor allows the VFD to reduce the fan speed to deliver a reduced volume of outside air for ventilation during these periods. An increase in the CO2 level is an indication that more people are in the room, so the fan speed is increased to maintain the required volume of ventilation air under all occupancy conditions.

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 - Make comments in the "Notes" section as necessary.
- Return the checklist portion of this document to the IAQ Coordinator.

Ventilation Checklist

Name:	Stephyn	Martoni			
School:	Amity	Middle	School	Orunge	2
Unit Vent	ilator/AHU No:	107		<i>.</i>	
Room or	Area:	107	Date	Completed:	1-30-24
Signature	: Ly f	45			

1. OUTDOOR AIR INTAKES

la.	Marked locations of all outdoor air intakes on a small floor plan (for Yes example, a fire escape floor plan)		N/A
1b.	Ensured that the ventilation system was on and operating in "occupied" mode		
AC	TIVITY 1: OBSTRUCTIONS		
1c.	Ensured that outdoor air intakes are clear of obstructions, debris, clogs,		
	or covers	اسب	I
Id.	Installed corrective devices as necessary (e.g., if snowdrifts or leaves frequently block an intake)	ø	
AC	TIVITY 2: POLLUTANT SOURCES		
1e.	Checked ground-level intakes for pollutant sources (dumpsters, loading		-
	docks, and bus-idling areas)		9
11,	Checked rooftop intakes for pollutant sources (plumbing vents; kitchen,		
	toilet, or laboratory exhaust fans; puddles; and mist from		
	air-conditioning cooling towers)	L.	U
lg.	Resolved any problems with pollutant sources located near outdoor air intakes (e.g., relocated dumpster or extended exhaust pipe)	D	D
AC	TIVITY 3: AIRFLOW		/
1h.	Obtained chemical smoke (or a small piece of tissue paper or light plastic) \Box	a	
	Confirmed that outdoor air is entering the intake appropriately		
2.	SYSTEM CLEANLINESS		
AC	TIVITY 4: AIR FILTERS		
T 77 77	Replaced filters per maintenance schedule		
	Shut off ventilation system fans while replacing filters (prevents dirt from	-und	
		, D	
2c.	blowing downstream)		
2d.	Confirmed proper fit of filters to prevent air from bypassing (flowing		
•	around) the air filter	U	
2e.	Confirmed proper installation of filters (correct direction for airflow)		

2. SYSTEM CLEANLINESS (continued)

ACTIVITY 5: DRAIN PANS

AC	TIVITY 5: DRAIN PANS			
	accumulating)	Yes.		
2g.	Cleaned drain pans	🗹		Q
2h.	Checked drain pans for mold and mildew	¤		D
	TIVITY 6: COILS Ensured that heating and cooling coils are clean	2	D	
			u	u
	TIVITY 7: AIR-HANDLING UNITS, UNIT VENTILATORS			
2j.	Ensured that the interior of air-handling unit(s) or unit ventilator (air-mixing chamber and fan blades) is clean	. Z .		٦
2k.	(air-mixing chamber and fan blades) is clean Ensured that ducts are clean	<u>`</u> Z		
	TIVITY 8: MECHANICAL ROOMS	•		
	Checked mechanical room for unsanitary conditions, leaks, and spills	,Z		
2m.	Ensured that mechanical rooms and air-mixing chambers are free of trash, chemical products, and supplies	_ Z	۵	
•		,		
З.	CONTROLS FOR OUTDOOR AIR SUPPLY			
	Ensured that air dampers are at least partially open (minimum position) Ensured that minimum position provides adequate outdoor air	ם	D	ø
50.	for occupants			ø
۸C	TIVITY 9: CONTROLS INFORMATION	•		1
	Obtained and reviewed all design inside/outside temperature and humidity			
50.	requirements, controls specifications, as-built mechanical drawings,			
	and controls operations manuals (often uniquely designed)	Z		
AC'	TIVITY 10: CLOCKS, TIMERS, SWITCHES			
3d.	Turned summer-winter switches to the correct position	Z		
	Set time clocks appropriately			Ø
3f.	Ensured that settings fit the actual schedule of building use (including night/weekend use)	.ช		·
			_	_
-	FIVITY 11: CONTROL COMPONENTS			
3g.	Ensured appropriate system pressure by testing line pressure at both the			R
2h	occupied (day) setting and the unoccupied (night) setting Checked that the line dryer prevents moisture buildup			7
	Replaced control system filters at the compressor inlet based on the		ч	
51.	compressor manufacturer's recommendation (for example, when you	_	_	
3j.	blow down the tank) Set the line pressure at each thermostat and damper actuator at the proper			ø
J.	level (no leakage or obstructions)	Q		ø
ACTIVITY 12: OUTDOOR AIR DAMPERS				
	Ensured that the outdoor air damper is visible for inspection	. 🗹		
31.	Ensured that the recirculating relief and/or exhaust dampers are visible	,	_	_
3m	for inspection Ensured that air temperature in the indoor area(s) served by each			
<u>э</u> щ.	outdoor air damper is within the normal operating range	. ¤	a	
1700				,

NOTE: It is necessary to ensure that the damper is operating properly and within the normal range to continue.



3n.	Checked that the outdoor air damper fully closes within a few minutes of shutting off appropriate air handler	Yes	No L	N/A
30.	Checked that the outdoor air damper opens (at least partially with no delay) when the air handler is turned on	.,@	ū	
3р.	If in heating mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 85°F	. 🗆	Q	Ø
	If in cooling mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 60° F and mixed air thermostat is set to 45° F			9⁄
3r.	If the outdoor air damper does not move, confirmed the following items:			1
	 The damper actuator links to the damper shaft, and any linkage set screws or bolts are tight Moving parts are free of impediments (e.g., rust, corrosion) 	_		
	· Electrical wire or pneumatic tubing connects to the damper actuator		۵,	D
	• The outside air thermostat(s) is functioning properly (e.g., in the right location, calibrated correctly)	. @		þ
Proc	ceed to Activities 13-16 if the damper seems to be operating properly.			
AC	FIVITY 13: FREEZE STATS			

3s.	Disconnected power to controls (for automatic reset only) to test continuity across terminals		ø
OR			,
3t.	Confirmed (if applicable) that depressing the manual reset button (usually red) trips the freeze stat (clicking sound indicates freeze stat was	-	_
	tripped)	ч	Ч
3u.	Assessed the feasibility of replacing all manual reset freeze-stats with automatic reset freeze-stats	ø	

NOTE: HVAC systems with water coils need protection from the cold. The freeze-stat may close the outdoor air damper and disconnect the supply air when tripped. The typical trip range is 35°F to 42°F.

ACTIVITY 14: MIXED AIR THERMOSTATS

3v. Ensured that the mixed air stat for heating mode is set no higher than 65°F		
3w. Ensured that the mixed air stat for cooling mode is set no lower than the room thermostat setting	• /	

ACTIVITY 15: ECONOMIZERS

3x.	Confirmed proper economizer settings based on design specifications or	
	local practices	

NOTE: The dry-bulb is typically set at 65°F or lower.

- 3y. Checked that sensor on the economizer is shielded from direct sunlight \square
- 3z. Ensured that dampers operate properly (for outside air, return air, exhaust/relief air, and recirculated air), per the design specifications

NOTE: Economizers use varying amounts of cool outdoor air to assist with the cooling load of the room or rooms. There are two types of economizers, dry-bulb and enthalpy. Dry-bulb economizers vary the amount of outdoor air based on outdoor temperature, and enthalpy economizers vary the amount of outdoor air based on outdoor temperature and humidity level.

ACTIVITY 16: FANS

3aa. Ensured that all fans (supply fans and associated return or relief fans) that move outside air indoors continuously operate during occupied Yes No N/A hours (even when room thermostat is satisfied).....

NOTE: If fan shuts off when the thermostat is satisfied, adjust control cycle as necessary to ensure sufficient outdoor air supply.

4. AIR DISTRIBUTION

ACTIVITY 17: AIR DISTRIBUTION

 4a. Ensured that supply and return air pathways in the existing ventilation system perform as required
NOTE: If ventilation system is closed or blocked to meet current fire codes, consult with a professional engineer for remedies.
4c. Made sure every occupied space has supply of outdoor air (mechanical system or operable windows)
4d. Ensured that supply and return vents are open and unblocked
NOTE: If outlets have been blocked intentionally to correct drafts or discomfort, investigate and correct the cause of the discomfort and reopen the vents.
4e. Modified the HVAC system to supply outside air to areas without an outdoor air supply
air supply air supply
air supply
 air supply

ACTIVITY 18: PRESSURIZATION IN BUILDINGS

NOTE: To prevent infiltration of outdoor pollutants, the ventilation system is designed to maintain positive pressurization in the building. Therefore, ensure that the system, including any exhaust fans, is operating on the "occupied" cycle when doing this activity.

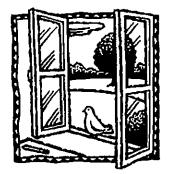
4j.	Ensured that air flows out of the building (using chemical smoke) through		,
	windows, doors, or other cracks and holes in exterior wall (for example,	/	
	floor joints, pipe openings)	ত্র	$\overline{}$

5. EXHAUST SYSTEMS

ACTIVITY 19: EXHAUST FAN OPERATION 5a. Checked (using chemical smoke) that air flows into exhaust fan grille(s) D

If fans are running but air is not flowing toward the exhaust intake, check for the following:

- Inoperable dampers
- · Obstructed, leaky, or disconnected ductwork
- · Undersized or improperly installed fan
- Broken fan belt





5. EXHAUST SYSTEMS (continued)

ACTIVITY 20: EXHAUST AIRFLOW

NOTE: Prevent migration of indoor contaminants from areas such as bathrooms, kitchens, and labs by keeping them under negative pressure (as compared to surrounding spaces).

5b. Checked (using chemical smoke) that air is drawn into the room from Yes. No N/A adjacent spaces

Stand outside the room with the door slightly open while checking airflow high and low in the door opening (see "How to Measure Airflow").

ACTIVITY 21: EXHAUST DUCTWORK

6. QUANTITY OF OUTDOOR AIR

ACTIVITY 22: OUTDOOR AIR MEASUREMENTS AND CALCULATIONS

NOTE: Refer to "How to Measure Airflow" for techniques.

ба.	Measured the quantity of outdoor air supplied (22a) to each ventilation unit		D
6b.	Calculated the number of occupants served (22b) by the ventilation unit under consideration		D
бс.	Divided outdoor air supply (22a) by the number of occupants (22b) to determine the existing quantity of outdoor air supply per person (22c)	۵	
AC	TIVITY 23: ACCEPTABLE LEVELS OF OUTDOOR AIR QUANTITIES		
	TIVITY 23: ACCEPTABLE LEVELS OF OUTDOOR AIR QUANTITIES Compared the existing outdoor air per person (22c) to the recommended levels in Table 1		

NOTES All HVAC units through the BAS have advanced ventilation control logic deployed associated with the spaces they serve. The system will modulate the outdoor air damper and return dampers to provide the proper amount of air as needed to maintain space CO2 levels. This type of control is called CO2 based Demand-Controlled Ventilation (DCV). DCV provides proper ventilation air quantities as well as energy savings by reducing the amount of required ventilation air based on the CO2 levels measured by the sensor. The CO2 levels in parts per million (PPM) is used as an indicator of the number of occupants in a room. When the room has less than design occupancy, the required volume of ventilation is reduced. The CO2 sensor allows the VFD to reduce the fan speed to deliver a reduced volume of outside air for ventilation during these periods. An increase in the CO2 level is an indication that more people are in the room, so the fan speed is increased to maintain the required volume of ventilation air under all occupancy conditions.

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 - Check the "yes," "no," or "not applicable" box beside each item. (A "no" response requires further attention.)
 - Make comments in the "Notes" section as necessary.
- Return the checklist portion of this document to the IAQ Coordinator.

Ventilation Checklist

Name:	Stephan	Mortoni				
School:	Amity	Middle	School	Olonge		
Jnit Ventil	lator/AHU No	. 97				
Room or A	vrea:	97	Date	Completed:	1-30.2	4
Signature:	LA 1	45				

1. OUTDOOR AIR INTAKES

1a.	Marked locations of all outdoor air intakes on a small floor plan (for Yes example, a fire escape floor plan)		N/A
1b.	Ensured that the ventilation system was on and operating in "occupied" mode	D	D
AC	TIVITY 1: OBSTRUCTIONS		
	Ensured that outdoor air intakes are clear of obstructions, debris, clogs, or covers	D	
1d.	Installed corrective devices as necessary (e.g., if snowdrifts or leaves frequently block an intake)	ø	
AC	TIVITY 2: POLLUTANT SOURCES		
	Checked ground-level intakes for pollutant sources (dumpsters, loading docks, and bus-idling areas)	D	D
1f,	Checked rooftop intakes for pollutant sources (plumbing vents; kitchen, toilet, or laboratory exhaust fans; puddles; and mist from air-conditioning cooling towers)		D
1g.	Resolved any problems with pollutant sources located near outdoor air intakes (e.g., relocated dumpster or extended exhaust pipe)		D
AC	TIVITY 3: AIRFLOW		,
1h.	Obtained chemical smoke (or a small piece of tissue paper or light plastic) Confirmed that outdoor air is entering the intake appropriately		
2.	SYSTEM CLEANLINESS		
AC	TIVITY 4: AIR FILTERS		
2a.	Replaced filters per maintenance schedule		
	Shut off ventilation system fans while replacing filters (prevents dirt from blowing downstream)	D	D
2d.	Confirmed proper fit of filters to prevent air from bypassing (flowing around) the air filter		۵

2. SYSTEM CLEANLINESS (continued)

ACTIVITY 5: DRAIN PANS 2f. Ensured that drain pans slant toward the drain (to prevent water from Yes No N/A 2h. Checked drain pans for mold and mildew **ACTIVITY 6: COILS ACTIVITY 7: AIR-HANDLING UNITS, UNIT VENTILATORS** 2j. Ensured that the interior of air-handling unit(s) or unit ventilator **ACTIVITY 8: MECHANICAL ROOMS** 2m. Ensured that mechanical rooms and air-mixing chambers are free of trash, chemical products, and supplies 3. CONTROLS FOR OUTDOOR AIR SUPPLY 3a. Ensured that air dampers are at least partially open (minimum position) \Box \Box Δ 3b. Ensured that minimum position provides adequate outdoor air **ACTIVITY 9: CONTROLS INFORMATION** 3c. Obtained and reviewed all design inside/outside temperature and humidity requirements, controls specifications, as-built mechanical drawings, **ACTIVITY 10: CLOCKS, TIMERS, SWITCHES** 3d. Turned summer-winter switches to the correct position 3e. Set time clocks appropriately 3f. Ensured that settings fit the actual schedule of building use (including night/weekend use) **ACTIVITY 11: CONTROL COMPONENTS** 3g. Ensured appropriate system pressure by testing line pressure at both the occupied (day) setting and the unoccupied (night) setting Z 3h. Checked that the line dryer prevents moisture buildup 3i. Replaced control system filters at the compressor inlet based on the compressor manufacturer's recommendation (for example, when you blow down the tank)..... 3j. Set the line pressure at each thermostat and damper actuator at the proper level (no leakage or obstructions) **ACTIVITY 12: OUTDOOR AIR DAMPERS** 31. Ensured that the recirculating relief and/or exhaust dampers are visible for inspection 3m. Ensured that air temperature in the indoor area(s) served by each

NOTE: It is necessary to ensure that the damper is operating properly and within the normal range to continue.



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2 of 5



3n.	Checked that the outdoor air damper fully closes within a few minutes Yes of shutting off appropriate air handler		N/A □
30.	Checked that the outdoor air damper opens (at least partially with no delay) when the air handler is turned on	Ē	D
3p.	If in heating mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 85°F	D	۶ź
-	If in cooling mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 60°F and mixed air thermostat is set to 45°F	Q	9
3r.	If the outdoor air damper does not move, confirmed the following items:		*
	 The damper actuator links to the damper shaft, and any linkage set screws or bolts are tight 		D
	• Moving parts are free of impediments (e.g., rust, corrosion)		Q
	• Electrical wire or pneumatic tubing connects to the damper actuator		
	 The outside air thermostat(s) is functioning properly (e.g., in the right location, calibrated correctly) 		٦

Proceed to Activities 13-16 if the damper seems to be operating properly.

ACTIVITY 13: FREEZE STATS

3s.	Disconnected power to controls (for automatic reset only) to test continuity across terminals	ū	ø
OR			4
3t.	Confirmed (if applicable) that depressing the manual reset button (usually red) trips the freeze stat (clicking sound indicates freeze stat was	_	_
	tripped)	a	
3u.	Assessed the feasibility of replacing all manual reset freeze-stats with automatic reset freeze-stats	ø	

NOTE: HVAC systems with water coils need protection from the cold. The freeze-stat may close the outdoor air damper and disconnect the supply air when tripped. The typical trip range is $35^{\circ}F$ to $42^{\circ}F$.

ACTIVITY 14: MIXED AIR THERMOSTATS

י3	v. Ensured that the mixed air stat for heating mode is set no higher than 65°F	
3'	w. Ensured that the mixed air stat for cooling mode is set no lower than the room thermostat setting	
	CTIVITY 15: ECONOMIZERS K. Confirmed proper economizer settings based on design specifications or local practices	ū
	OTE: The dry-bulb is typically set at 65°F or lower.	
3	y. Checked that sensor on the economizer is shielded from direct sunlight \square	D

NOTE: Economizers use varying amounts of cool outdoor air to assist with the cooling load of the room or rooms. There are two types of economizers, dry-bulb and enthalpy. Dry-bulb economizers vary the amount of outdoor air based on outdoor temperature, and enthalpy economizers vary the amount of outdoor air based on outdoor temperature and humidity level.

ACTIVITY 16: FANS

3aa. Ensured that all fans (supply fans and associated return or relief fans)			
that move outside air indoors continuously operate during occupied	Yes	Ńо	N/A
hours (even when room thermostat is satisfied)	Z		

NOTE: If fan shuts off when the thermostat is satisfied, adjust control cycle as necessary to ensure sufficient outdoor air supply.

4. AIR DISTRIBUTION

ACTIVITY 17: AIR DISTRIBUTION

4a.	Ensured that supply and return air pathways in the existing ventilation system perform as required		
4b.	Ensured that passive gravity relief ventilation systems and transfer grilles between rooms and corridors are functioning		
	TE: If ventilation system is closed or blocked to meet current fire codes, consult fessional engineer for remedies.	with a	
	Made sure every occupied space has supply of outdoor air (mechanical system or operable windows)		
	TE: If outlets have been blocked intentionally to correct drafts or discomfort, inv l correct the cause of the discomfort and reopen the vents.	estiga	te
	Modified the HVAC system to supply outside air to areas without an outdoor air supply	G	
4f.	Modified existing HVAC systems to incorporate any room or zone layout and population changes	D	
4g.	Moved all barriers (for example, room dividers, large free-standing blackboards or displays, bookshelves) that could block movement of air in the room, especially those blocking air vents	ū	⊿

4h	Ensured that unit ventilators are quiet enough to accommodate classroom	_	•
,	activities	ב	
4i.	Ensured that classrooms are free of uncomfortable drafts produced by air		
	from supply terminals \mathbf{E}'	ם.	

ACTIVITY 18: PRESSURIZATION IN BUILDINGS

NOTE: To prevent infiltration of outdoor pollutants, the ventilation system is designed to maintain positive pressurization in the building. Therefore, ensure that the system, including any exhaust fans, is operating on the "occupied" cycle when doing this activity.

4j.	Ensured that air flows out of the building (using chemical smoke) through		,
	windows, doors, or other cracks and holes in exterior wall (for example,	/	
	floor joints, pipe openings)	ত্র	Ø

5. EXHAUST SYSTEMS

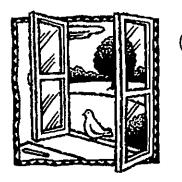
ACTIVITY 19: EXHAUST FAN OPERATION

5a. Checked (using chemical smoke) that air flows into exhaust fan grille(s) D

pí 🗆

If fans are running but air is not flowing toward the exhaust intake, check for the following:

- Inoperable dampers
- Obstructed, leaky, or disconnected ductwork
- Undersized or improperly installed fan
- Broken fan belt





5. EXHAUST SYSTEMS (continued)

ACTIVITY 20: EXHAUST AIRFLOW

NOTE: Prevent migration of indoor contaminants from areas such as bathrooms, kitchens, and labs by keeping them under negative pressure (as compared to surrounding spaces).

5b. Checked (using chemical smoke) that air is drawn into the room from Yes, No N/A

Stand outside the room with the door slightly open while checking airflow high and low in the door opening (see "How to Measure Airflow").

ACTIVITY 21: EXHAUST DUCTWORK

5d. Checked that the exhaust ductwork downstream of the exhaust fan (which is

6. QUANTITY OF OUTDOOR AIR

ACTIVITY 22: OUTDOOR AIR MEASUREMENTS AND CALCULATIONS

NOTE: Refer to "How to Measure Airflow" for techniques.

ба.	Measured the quantity of outdoor air supplied (22a) to each ventilation	 _
	unit 🛛	
6b.	Calculated the number of occupants served (22b) by the ventilation unit under consideration	
6c.	Divided outdoor air supply (22a) by the number of occupants (22b) to determine the existing quantity of outdoor air supply per person (22c)	a
AC	TIVITY 23: ACCEPTABLE LEVELS OF OUTDOOR AIR QUANTITIES	

- 6d. Compared the existing outdoor air per person (22c) to the recommended levels in Table 1 6e. Corrected problems with ventilation units that supplied inadequate
 - quantities of outdoor air to ensure that outdoor air quantities (22c) meet the recommended levels in Table 1

NOTES All HVAC units through the BAS have advanced ventilation control logic deployed associated with the spaces they serve. The system will modulate the outdoor air damper and return dampers to provide the proper amount of air as needed to maintain space CO2 levels. This type of control is called CO2 based Demand-Controlled Ventilation (DCV). DCV provides proper ventilation air quantities as well as energy savings by reducing the amount of required ventilation air based on the CO2 levels measured by the sensor. The CO2 levels in parts per million (PPM) is used as an indicator of the number of occupants in a room. When the room has less than design occupancy, the required volume of ventilation is reduced. The CO2 sensor allows the VFD to reduce the fan speed to deliver a reduced volume of outside air for ventilation during these periods. An increase in the CO2 level is an indication that more people are in the room, so the fan speed is increased to maintain the required volume of ventilation air under all occupancy conditions.

Active DCV control is an acceptable alternate method to determine if ventilation requirements are met and could supersede rooms that may fail otherwise using traditional measured data collection procedures prescribed by established ASHRAE guidelines.

The ideal supply of outside air to interior occupied spaces should be based upon the 2018 Connecticut Building Code, which is based on the most currently adopted 2015 International Mechanical Code and coincides with ASHRAE-62.1, (2010) guidelines



BAS: Building Automation System VFD: Variable Frequency Drive (Controls the speed of the fan motor) ASHRAE: American Society of Heating, Refrigerating and Air Conditioning Engineers

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Instructions

- 1. Read the *IAQ Backgrounder* and the Background Information for this checklist.
- 2. Keep the Background Information and make a copy of this checklist for each ventilation unit in your school, as well as a copy for future reference.
- 3. Complete the Checklist.
 - Check the "yes," "no," or "not applicable" box beside each item. (A "no" response requires further attention.)
 - Make comments in the "Notes" section as necessary.
- Return the checklist portion of this document to the IAQ Coordinator.

Ventilation Checklist

Name:	Stephyn	Mortoni	9 			
School:	Amity	Middle	School	Orange	2 6	
Unit Vent	tilator/AHU No:	96	******			
Room or	Area: E9	6	Date	Completed:	1-30-24	(
Signature	: Ly f	45				

1. OUTDOOR AIR INTAKES

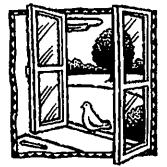
la.	Marked locations of all outdoor air intakes on a small floor plan (for Yes example, a fire escape floor plan)		N/A
1b.	Ensured that the ventilation system was on and operating in "occupied" mode	D	
AC	TIVITY 1: OBSTRUCTIONS		
1c.	Ensured that outdoor air intakes are clear of obstructions, debris, clogs, or covers		
1d.	Installed corrective devices as necessary (e.g., if snowdrifts or leaves frequently block an intake)	ø	
AC	TIVITY 2: POLLUTANT SOURCES		
lf.	Checked rooftop intakes for pollutant sources (plumbing vents; kitchen, toilet, or laboratory exhaust fans; puddles; and mist from air-conditioning cooling towers)	٦	
1g.	Resolved any problems with pollutant sources located near outdoor air intakes (e.g., relocated dumpster or extended exhaust pipe)		
AC	TIVITY 3: AIRFLOW		/
1h.	Obtained chemical smoke (or a small piece of tissue paper or light plastic) \Box	a	
	Confirmed that outdoor air is entering the intake appropriately		
2.	SYSTEM CLEANLINESS		
AC	TIVITY 4: AIR FILTERS		
-	Replaced filters per maintenance schedule		
	Shut off ventilation system fans while replacing filters (prevents dirt from		0.000
2c.	blowing downstream)		
2d.	Confirmed proper fit of filters to prevent air from bypassing (flowing around) the air filter		
2e.	Confirmed proper installation of filters (correct direction for airflow)		

1 of 5

2. SYSTEM CLEANLINESS (continued)

ACTIVITY 5: DRAIN PANS

ACTIVITY 5: DRAIN PANS		
accumulating)		N/A
2g. Cleaned drain pans		Q
2h. Checked drain pans for mold and mildew	۵	D
ACTIVITY 6: COILS		_
2i. Ensured that heating and cooling coils are clean	Q	
ACTIVITY 7: AIR-HANDLING UNITS, UNIT VENTILATORS		
2j. Ensured that the interior of air-handling unit(s) or unit ventilator		
(air-mixing chamber and fan blades) is clean	Q	
2k. Ensured that ducts are clean		
ACTIVITY 8: MECHANICAL ROOMS		
21. Checked mechanical room for unsanitary conditions, leaks, and spills	Q	
2m. Ensured that mechanical rooms and air-mixing chambers are free of trash,		
chemical products, and supplies		
3. CONTROLS FOR OUTDOOR AIR SUPPLY		
3a. Ensured that air dampers are at least partially open (minimum position)		ø
3b. Ensured that minimum position provides adequate outdoor air		• /
for occupants		Ø
ACTIVITY 9: CONTROLS INFORMATION		
3c. Obtained and reviewed all design inside/outside temperature and humidity		
requirements, controls specifications, as-built mechanical drawings,		
and controls operations manuals (often uniquely designed)		
ACTIVITY 10: CLOCKS, TIMERS, SWITCHES		
3d. Turned summer-winter switches to the correct position		
3e. Set time clocks appropriately		ø
3f. Ensured that settings fit the actual schedule of building use (including		•
night/weekend use)		
ACTIVITY 11: CONTROL COMPONENTS		
3g. Ensured appropriate system pressure by testing line pressure at both the		•
occupied (day) setting and the unoccupied (night) setting \Box		Д,
3h. Checked that the line dryer prevents moisture buildup		A
3i. Replaced control system filters at the compressor inlet based on the		
compressor manufacturer's recommendation (for example, when you		
blow down the tank)		Ø
3j. Set the line pressure at each thermostat and damper actuator at the proper		6
level (no leakage or obstructions)		4
ACTIVITY 12: OUTDOOR AIR DAMPERS		
3k. Ensured that the outdoor air damper is visible for inspection		
31. Ensured that the recirculating relief and/or exhaust dampers are visible	_	—
for inspection		
3m. Ensured that air temperature in the indoor area(s) served by each outdoor air damper is within the normal operating range		
NOTE: It is necessary to ensure that the domner is one ating property and within the	-	_
The contraction of any the second to any the second of the second second within the	2 11 0 14	



NOTE: It is necessary to ensure that the damper is operating properly and within the normal range to continue.



3n.	Checked that the outdoor air damper fully closes within a few minutes of shutting off appropriate air handler	Yes G	No D	N/A
30.	Checked that the outdoor air damper opens (at least partially with no delay) when the air handler is turned on	ø		
3p.	If in heating mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 85°F	D	D	Ģ∕
3q.	If in cooling mode, checked that the outdoor air damper goes to its minimur position (without completely closing) when the room thermostat is set to 60°F and mixed air thermostat is set to 45°F	n D		, ,
3r.	If the outdoor air damper does not move, confirmed the following items:			1
	 The damper actuator links to the damper shaft, and any linkage set screws or bolts are tight 	6	, D	
	• Moving parts are free of impediments (e.g., rust, corrosion)	2⁄		D
	· Electrical wire or pneumatic tubing connects to the damper actuator	9 ⁄	ίΩ.	D
	• The outside air thermostat(s) is functioning properly (e.g., in the right location, calibrated correctly)	œ⁄		D

Proceed to Activities 13-16 if the damper seems to be operating properly.

ACTIVITY 13: FREEZE STATS

3s.	Disconnected power to controls (for automatic reset only) to test continuity across terminals	۵	ø
OR			1
3t.	Confirmed (if applicable) that depressing the manual reset button (usually red) trips the freeze stat (clicking sound indicates freeze stat was tripped)		D
311.	Assessed the feasibility of replacing all manual reset freeze-stats with		-
2 41	automatic reset freeze-stats	ø	

NOTE: HVAC systems with water coils need protection from the cold. The freeze-stat may close the outdoor air damper and disconnect the supply air when tripped. The typical trip range is 35°F to 42°F.

ACTIVITY 14: MIXED AIR THERMOSTATS

3v.	Ensured that the mixed air stat for heating mode is set no higher than 65°F		a
3w,	Ensured that the mixed air stat for cooling mode is set no lower than the room thermostat setting		٩
	CTIVITY 15: ECONOMIZERS Confirmed proper economizer settings based on design specifications or	/	
	local practices	⊒∕ u	Q
NO	TE: The dry-bulb is typically set at $65^{\circ}F$ or lower.	,	
3у.	Checked that sensor on the economizer is shielded from direct sunlight	e g	a
3z.	Ensured that dampers operate properly (for outside air, return air, exhaust/relief air, and recirculated air), per the design specifications		

NOTE: Economizers use varying amounts of cool outdoor air to assist with the cooling load of the room or rooms. There are two types of economizers, dry-bulb and enthalpy. Dry-bulb economizers vary the amount of outdoor air based on outdoor temperature, and enthalpy economizers vary the amount of outdoor air based on outdoor temperature and humidity level.

ACTIVITY 16: FANS

3aa. Ensured that all fans (supply fans and associated return or relief fans)			
that move outside air indoors continuously operate during occupied	Yes	Ńо	N/A
hours (even when room thermostat is satisfied)	Ø		

NOTE: If fan shuts off when the thermostat is satisfied, adjust control cycle as necessary to ensure sufficient outdoor air supply.

4. AIR DISTRIBUTION

ACTIVITY 17: AIR DISTRIBUTION

4a.	Ensured that supply and return air pathways in the existing ventilation system perform as required.		
4b.	Ensured that passive gravity relief ventilation systems and transfer grilles between rooms and corridors are functioning		
	TE: If ventilation system is closed or blocked to meet current fire codes, consult w fessional engineer for remedies.	vith a	
	Made sure every occupied space has supply of outdoor air (mechanical system or operable windows)		
NO	TE: If outlets have been blocked intentionally to correct drafts or discomfort, inve correct the cause of the discomfort and reopen the vents.	stigai	!e
4e.	Modified the HVAC system to supply outside air to areas without an outdoor air supply	ď	
4f.	Modified existing HVAC systems to incorporate any room or zone layout and population changes		۵
4g.	Moved all barriers (for example, room dividers, large free-standing		

	blackboards or displays, bookshelves) that could block movement of air in the room, especially those blocking air vents	ם	ū	⊿
4h,	Ensured that unit ventilators are quiet enough to accommodate classroom activities			
4i.	Ensured that classrooms are free of uncomfortable drafts produced by air from supply terminals		, D.	

ACTIVITY 18: PRESSURIZATION IN BUILDINGS

NOTE: To prevent infiltration of outdoor pollutants, the ventilation system is designed to maintain positive pressurization in the building. Therefore, ensure that the system, including any exhaust fans, is operating on the "occupied" cycle when doing this activity.

4j.	Ensured that air flows out of the building (using chemical smoke) through		,
	windows, doors, or other cracks and holes in exterior wall (for example,	/	
	floor joints, pipe openings)	র্ত্র	Ŀ

5. EXHAUST SYSTEMS

ACTIVITY 19: EXHAUST FAN OPERATION

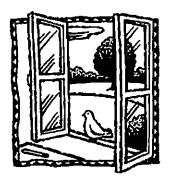
5a. Checked (using chemical smoke) that air flows into exhaust fan grille(s) \dots

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If fans are running but air is not flowing toward the exhaust intake, check for the following: • Inoperable dampers

- Obstructed, leaky, or disconnected ductwork
- Undersized or improperly installed fan
- Broken fan belt





5. EXHAUST SYSTEMS (continued)

ACTIVITY 20: EXHAUST AIRFLOW

NOTE: Prevent migration of indoor contaminants from areas such as bathrooms, kitchens, and labs by keeping them under negative pressure (as compared to surrounding spaces).

5b. Checked (using chemical smoke) that air is drawn into the room from Yes. No N/A adjacent spaces

Stand outside the room with the door slightly open while checking airflow high and low in the door opening (see "How to Measure Airflow").

ACTIVITY 21: EXHAUST DUCTWORK

5d. Checked that the exhaust ductwork downstream of the exhaust fan (which is under positive pressure) is sealed and in good condition......

6. QUANTITY OF OUTDOOR AIR

ACTIVITY 22: OUTDOOR AIR MEASUREMENTS AND CALCULATIONS

NOTE: Refer to "How to Measure Airflow" for techniques.

6a. Measured the quantity of outdoor air supplied (22a) to each ventilation unit		a
6b. Calculated the number of occupants served (22b) by the ventilation unit under consideration	Q	
6c. Divided outdoor air supply (22a) by the number of occupants (22b) to determine the existing quantity of outdoor air supply per person (22c)	a	a
ACTIVITY 23: ACCEPTABLE LEVELS OF OUTDOOR AIR QUANTITIES		
 ACTIVITY 23: ACCEPTABLE LEVELS OF OUTDOOR AIR QUANTITIES 6d. Compared the existing outdoor air per person (22c) to the recommended levels in Table 1 		
6d. Compared the existing outdoor air per person (22c) to the recommended		

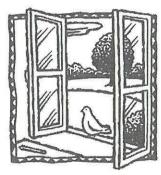
NOTES All HVAC units through the BAS have advanced ventilation control logic deployed associated with the spaces they serve. The system will modulate the outdoor air damper and return dampers to provide the proper amount of air as needed to maintain space CO2 levels. This type of control is called CO2 based Demand-Controlled Ventilation (DCV). DCV provides proper ventilation air quantities as well as energy savings by reducing the amount of required ventilation air based on the CO2 levels measured by the sensor. The CO2 levels in parts per million (PPM) is used as an indicator of the number of occupants in a room. When the room has less than design occupancy, the required volume of ventilation is reduced. The CO2 sensor allows the VFD to reduce the fan speed to deliver a reduced volume of outside air for ventilation during these periods. An increase in the CO2 level is an indication that more people are in the room, so the fan speed is increased to maintain the required volume of ventilation air under all occupancy conditions.

Active DCV control is an acceptable alternate method to determine if ventilation requirements are met and could supersede rooms that may fail otherwise using traditional measured data collection procedures prescribed by established ASHRAE guidelines.

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BAS: Building Automation System VFD: Variable Frequency Drive (Controls the speed of the fan motor) ASHRAE: American Society of Heating, Refrigerating and Air Conditioning Engineers



Instructions

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- 3. Complete the Checklist.
 - Check the "yes," "no," or "not applicable" box beside each item. (A "no" response requires further attention.)
 - Make comments in the "Notes" section as necessary.
- Return the checklist portion of this document to the IAQ Coordinator.

Ventilation Checklist

Name:	Stephyn Morton	1	
School:	Amity Middle	School Orange	2
Unit Vent	tilator/AHU No:	14	2
Room or	110 110	Date Completed:	1-30-24
Signature			

1. OUTDOOR AIR INTAKES

1a.	Marked locations of all outdoor air intakes on a small floor plan (for example, a fire escape floor plan)			N/A
1b.	Ensured that the ventilation system was on and operating in "occupied" mode	,	۵	D
AC	TIVITY 1: OBSTRUCTIONS			
1c.	Ensured that outdoor air intakes are clear of obstructions, debris, clogs, or covers	Z		D
1d.	Installed corrective devices as necessary (e.g., if snowdrifts or leaves frequently block an intake)		ø	D
AC	TIVITY 2: POLLUTANT SOURCES			
	Checked ground-level intakes for pollutant sources (dumpsters, loading docks, and bus-idling areas)	Zi		۵
1f.	Checked rooftop intakes for pollutant sources (plumbing vents; kitchen, toilet, or laboratory exhaust fans; puddles; and mist from air-conditioning cooling towers)	7		
1g.	Resolved any problems with pollutant sources located near outdoor air intakes (e.g., relocated dumpster or extended exhaust pipe)		ū	
AC	TIVITY 3: AIRFLOW			1.22
1h.	Obtained chemical smoke (or a small piece of tissue paper or light plastic) Confirmed that outdoor air is entering the intake appropriately			
2.	SYSTEM CLEANLINESS			
AC	TIVITY 4: AIR FILTERS			
	Replaced filters per maintenance schedule			
2b.	Shut off ventilation system fans while replacing filters (prevents dirt from blowing downstream)		D	
2c.	Vacuumed filter areas before installing new filters			
2d.	Confirmed proper fit of filters to prevent air from bypassing (flowing			

2. SYSTEM CLEANLINESS (continued)

ACTIVITY 5: DRAIN PANS 2f. Ensured that drain pans slant toward the drain (to prevent water from Yes No N/A 2h. Checked drain pans for mold and mildew **ACTIVITY 6: COILS ACTIVITY 7: AIR-HANDLING UNITS, UNIT VENTILATORS** 2i. Ensured that the interior of air-handling unit(s) or unit ventilator **ACTIVITY 8: MECHANICAL ROOMS** 21. Checked mechanical room for unsanitary conditions, leaks, and spills \square 2m. Ensured that mechanical rooms and air-mixing chambers are free of trash, chemical products, and supplies 3. CONTROLS FOR OUTDOOR AIR SUPPLY ø 3a. Ensured that air dampers are at least partially open (minimum position) \Box 3b. Ensured that minimum position provides adequate outdoor air **ACTIVITY 9: CONTROLS INFORMATION** 3c. Obtained and reviewed all design inside/outside temperature and humidity requirements, controls specifications, as-built mechanical drawings, and controls operations manuals (often uniquely designed) **ACTIVITY 10: CLOCKS, TIMERS, SWITCHES** 3d. Turned summer-winter switches to the correct position 3e. Set time clocks appropriately Ø 3f. Ensured that settings fit the actual schedule of building use (including night/weekend use) **ACTIVITY 11: CONTROL COMPONENTS** 3g. Ensured appropriate system pressure by testing line pressure at both the occupied (day) setting and the unoccupied (night) setting Ъ 3i. Replaced control system filters at the compressor inlet based on the compressor manufacturer's recommendation (for example, when you blow down the tank)..... Z 3j. Set the line pressure at each thermostat and damper actuator at the proper level (no leakage or obstructions) Z **ACTIVITY 12: OUTDOOR AIR DAMPERS** 31. Ensured that the recirculating relief and/or exhaust dampers are visible for inspection 3m. Ensured that air temperature in the indoor area(s) served by each outdoor air damper is within the normal operating range

NOTE: It is necessary to ensure that the damper is operating properly and within the normal range to continue.



2 of 5



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3. CONTROLS FOR OUTDOOR AIR SUPPLY (continued)

3n.	Checked that the outdoor air damper fully closes within a few minutes Yes No of shutting off appropriate air handler	N/A
30.	Checked that the outdoor air damper opens (at least partially with no delay) when the air handler is turned on	D
3p.	If in heating mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 85°F	ø
•	If in cooling mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 60° F and mixed air thermostat is set to 45° F	7
3r.	If the outdoor air damper does not move, confirmed the following items:	4
	• The damper actuator links to the damper shaft, and any linkage set screws or bolts are tight	Q
	• Moving parts are free of impediments (e.g., rust, corrosion)	Q
	• Electrical wire or pneumatic tubing connects to the damper actuator 🖵 🖸	
	• The outside air thermostat(s) is functioning properly (e.g., in the right location, calibrated correctly)	

Proceed to Activities 13-16 if the damper seems to be operating properly.

ACTIVITY 13: FREEZE STATS

3s.	Disconnected power to controls (for automatic reset only) to test continuity across terminals	ü	ø
OR			1
'3t,	Confirmed (if applicable) that depressing the manual reset button (usually red) trips the freeze stat (clicking sound indicates freeze stat was		
	tripped)		
3u.	Assessed the feasibility of replacing all manual reset freeze-stats with automatic reset freeze-stats		

NOTE: HVAC systems with water coils need protection from the cold. The freeze-stat may close the outdoor air damper and disconnect the supply air when tripped. The typical trip range is 35°F to 42°F.

ACTIVITY 14: MIXED AIR THERMOSTATS

3v.	Ensured that the mixed air stat for heating mode is set no higher than 65°F	D
3w.	Ensured that the mixed air stat for cooling mode is set no lower than the room thermostat setting	
AC	TIVITY 15: ECONOMIZERS	
3x.	Confirmed proper economizer settings based on design specifications or local practices	D
NO	TE: The dry-bulb is typically set at 65°F or lower.	
3y. 3z.	Checked that sensor on the economizer is shielded from direct sunlight	a

load of the room or rooms. There are two types of economizers, dry-bulb and enthalpy. Dry-bulb economizers vary the amount of outdoor air based on outdoor temperature, and enthalpy economizers vary the amount of outdoor air based on outdoor temperature and humidity level.

ACTIVITY 16: FANS

NOTE: If fan shuts off when the thermostat is satisfied, adjust control cycle as necessary to ensure sufficient outdoor air supply.

4. AIR DISTRIBUTION

ACTIVITY 17: AIR DISTRIBUTION

4a. Ensured that supply and return air pathways in the existing ventilation system perform as required	ב
4b. Ensured that passive gravity relief ventilation systems and transfer grilles between rooms and corridors are functioning	ב
NOTE: If ventilation system is closed or blocked to meet current fire codes, consult with a professional engineer for remedies.	
 4c. Made sure every occupied space has supply of outdoor air (mechanical system or operable windows) 4d. Ensured that supply and return vents are open and unblocked	ב ב
NOTE: If outlets have been blocked intentionally to correct drafts or discomfort, investigate and correct the cause of the discomfort and reopen the vents.	
4e. Modified the HVAC system to supply outside air to areas without an outdoor	

4e.	Modified the HVAC system to supply outside air to areas without an outdoor air supply	œ	
4f.	Modified existing HVAC systems to incorporate any room or zone layout and population changes	Q	
4g.	Moved all barriers (for example, room dividers, large free-standing blackboards or displays, bookshelves) that could block movement of air in the room, especially those blocking air vents	Q	⊿
4h.	Ensured that unit ventilators are quiet enough to accommodate classroom activities		۵
4i.	Ensured that classrooms are free of uncomfortable drafts produced by air from supply terminals	/ 	

ACTIVITY 18: PRESSURIZATION IN BUILDINGS

NOTE: To prevent infiltration of outdoor pollutants, the ventilation system is designed to maintain positive pressurization in the building. Therefore, ensure that the system, including any exhaust fans, is operating on the "occupied" cycle when doing this activity.

4j.	Ensured that air flows out of the building (using chemical smoke) through	
	windows, doors, or other cracks and holes in exterior wall (for example,	
	floor joints, pipe openings)	ত্র

5. EXHAUST SYSTEMS

ACTIVITY 19: EXHAUST FAN OPERATION

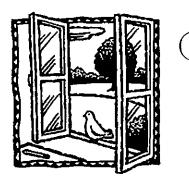
5a. Checked (using chemical smoke) that air flows into exhaust fan grille(s) D

Z

Ø

If fans are running but air is not flowing toward the exhaust intake, check for the following: • Inoperable dampers

- Obstructed, leaky, or disconnected ductwork
- Undersized or improperly installed fan
- Broken fan belt





5. EXHAUST SYSTEMS (continued)

ACTIVITY 20: EXHAUST AIRFLOW

NOTE: Prevent migration of indoor contaminants from areas such as bathrooms, kitchens, and labs by keeping them under negative pressure (as compared to surrounding spaces).

5b.	Checked (using chemical smoke) that air is drawn into the room from adjacent spaces		No D	N/A D
the	nd outside the room with the door slightly open while checking airflow high door opening (see "How to Measure Airflow").		ow ii	1
5c.	Ensured that air is flowing toward the exhaust intake	. 🗖		
	TIVITY 21: EXHAUST DUCTWORK			
5d.	Checked that the exhaust ductwork downstream of the exhaust fan (which is under positive pressure) is sealed and in good condition		́ ם	
6.	QUANTITY OF OUTDOOR AIR			
AC	TIVITY 22: OUTDOOR AIR MEASUREMENTS AND CALCULATIO	NS		
NO	TE: Refer to "How to Measure Airflow" for techniques.			
	Measured the quantity of outdoor air supplied (22a) to each ventilation unit	.0		a
6b.	Calculated the number of occupants served (22b) by the ventilation unit under consideration	. 🗆		
бс.	Divided outdoor air supply (22a) by the number of occupants (22b) to determine the existing quantity of outdoor air supply per person (22c)	.0	a	
AC	TIVITY 23: ACCEPTABLE LEVELS OF OUTDOOR AIR QUANTITI	ES		
6 d .	Compared the existing outdoor air per person (22c) to the recommended levels in Table 1	. D		
бе.	Corrected problems with ventilation units that supplied inadequate quantities of outdoor air to ensure that outdoor air quantities (22c) meet	_	_	_
	the recommended levels in Table 1	.0		

NOTES All HVAC units through the BAS have advanced ventilation control logic deployed associated with the spaces they serve. The system will modulate the outdoor air damper and return dampers to provide the proper amount of air as needed to maintain space CO2 levels. This type of control is called CO2 based Demand-Controlled Ventilation (DCV). DCV provides proper ventilation air quantities as well as energy savings by reducing the amount of required ventilation air based on the CO2 levels measured by the sensor. The CO2 levels in parts per million (PPM) is used as an indicator of the number of occupants in a room. When the room has less than design occupancy, the required volume of ventilation is reduced. The CO2 sensor allows the VFD to reduce the fan speed to deliver a reduced volume of outside air for ventilation during these periods. An increase in the CO2 level is an indication that more people are in the room, so the fan speed is increased to maintain the required volume of ventilation air under all occupancy conditions.

Active DCV control is an acceptable alternate method to determine if ventilation requirements are met and could supersede rooms that may fail otherwise using traditional measured data collection procedures prescribed by established ASHRAE guidelines.

The ideal supply of outside air to interior occupied spaces should be based upon the 2018 Connecticut Building Code, which is based on the most currently adopted 2015 International Mechanical Code and coincides with ASHRAE-62.1, (2010) guidelines

BAS: Building Automation System VFD: Variable Frequency Drive (Controls the speed of the fan motor) ASHRAE: American Society of Heating, Refrigerating and Air Conditioning Engineers



Instructions

- 1. Read the *IAQ Backgrounder* and the Background Information for this checklist.
- 2. Keep the Background Information and make a copy of this checklist for each ventilation unit in your school, as well as a copy for future reference.
- 3. Complete the Checklist.
 - Check the "yes," "no," or "not applicable" box beside each item. (A "no" response requires further attention.)
 - Make comments in the "Notes" section as necessary.
- Return the checklist portion of this document to the IAQ Coordinator.

Ventilation Checklist

Name:	Stephen	Mortoni			
School:	Amity	Middle	School	Orunge	s Gamman
Unit Venti	ilator/AHU No:	109			
Room or A	Area: El	29	Date	Completed:	1-20-24
Signature:	: In l	45			-

1. OUTDOOR AIR INTAKES

la.	Marked locations of all outdoor air intakes on a small floor plan (for Yes example, a fire escape floor plan)		N/A
1b.	Ensured that the ventilation system was on and operating in "occupied" mode		
AC	TIVITY 1: OBSTRUCTIONS		
1c.	Ensured that outdoor air intakes are clear of obstructions, debris, clogs,		
	or covers	D	
1d.	Installed corrective devices as necessary (e.g., if snowdrifts or leaves frequently block an intake)	ø	
AC	TIVITY 2: POLLUTANT SOURCES		
lf.	Checked rooftop intakes for pollutant sources (plumbing vents; kitchen,		
	toilet, or laboratory exhaust fans; puddles; and mist from air-conditioning cooling towers)		
10	Resolved any problems with pollutant sources located near outdoor air	<u></u>	<u></u>
ig.	intakes (e.g., relocated dumpster or extended exhaust pipe)		
AC	TIVITY 3: AIRFLOW		1
1h.	Obtained chemical smoke (or a small piece of tissue paper or light plastic) \Box	a	
	Confirmed that outdoor air is entering the intake appropriately		
2.	SYSTEM CLEANLINESS		
AC	TIVITY 4: AIR FILTERS		
2a.	Replaced filters per maintenance schedule		
2b.	Shut off ventilation system fans while replacing filters (prevents dirt from		
	blowing downstream)		
	Confirmed proper fit of filters to prevent air from bypassing (flowing around) the air filter		
2e.	around) the air filter		

1 of 5

2. SYSTEM CLEANLINESS (continued)

ACTIVITY 5: DRAIN PANS

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ACTIVITY 5: DRAIN PANS			
accumulating)	Ø	D	N/A
2g. Cleaned drain pans			
2h. Checked drain pans for mold and mildew	Ø	ū	Q
ACTIVITY 6: COILS	_	۵	
2i. Ensured that heating and cooling coils are clean	٩	u	u
ACTIVITY 7: AIR-HANDLING UNITS, UNIT VENTILATORS			
2j. Ensured that the interior of air-handling unit(s) or unit ventilator	1		
(air-mixing chamber and fan blades) is clean	ø,		
2k. Ensured that ducts are clean	ø		
ACTIVITY 8: MECHANICAL ROOMS	,		
21. Checked mechanical room for unsanitary conditions, leaks, and spills	Ø		
2m. Ensured that mechanical rooms and air-mixing chambers are free of trash,	_>	_	
chemical products, and supplies	Ø		
3. CONTROLS FOR OUTDOOR AIR SUPPLY			
3a. Ensured that air dampers are at least partially open (minimum position)			ø
3b Ensured that minimum position provides adequate outdoor air			•
for occupants	ū		ø
-			(
ACTIVITY 9: CONTROLS INFORMATION			
3c. Obtained and reviewed all design inside/outside temperature and humidity			
requirements, controls specifications, as-built mechanical drawings,			
and controls operations manuals (often uniquely designed)	Ø		
ACTIVITY 10: CLOCKS, TIMERS, SWITCHES			
3d. Turned summer-winter switches to the correct position			
3e. Set time clocks appropriately	Q		7
3f. Ensured that settings fit the actual schedule of building use (including			•
night/weekend use)	ø		
ACTIVITY 11: CONTROL COMPONENTS			
3g. Ensured appropriate system pressure by testing line pressure at both the			
occupied (day) setting and the unoccupied (night) setting			Z
3h. Checked that the line dryer prevents moisture buildup			6
3i. Replaced control system filters at the compressor inlet based on the	_	-	•
compressor manufacturer's recommendation (for example, when you			•
blow down the tank)			ø
3j. Set the line pressure at each thermostat and damper actuator at the proper			•
level (no leakage or obstructions)			Ø
ACTIVITY 12: OUTDOOR AIR DAMPERS	/		-
3k. Ensured that the outdoor air damper is visible for inspection	Ø		
31. Ensured that the recirculating relief and/or exhaust dampers are visible	,	_	_
for inspection	Д		
3m. Ensured that air temperature in the indoor area(s) served by each			_
outdoor air damper is within the normal operating range	р		
NOTE: It is necessary to ensure that the damper is operating properly and within	1 the	nore	nal

NOTE: It is necessary to ensure that the damper is operating properly and within the normal range to continue.



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3. CONTROLS FOR OUTDOOR AIR SUPPLY (continued)

-		54 -	
3n.			N/A
	of shutting off appropriate air handler	ч	4
30.	Checked that the outdoor air damper opens (at least partially with no delay) when the air handler is turned on	۵	ū
3p.	If in heating mode, checked that the outdoor air damper goes to its		
-	minimum position (without completely closing) when the room		
	thermostat is set to 85°F		
3q.	If in cooling mode, checked that the outdoor air damper goes to its minimum		•
•	position (without completely closing) when the room thermostat is set		2
	to 60°F and mixed air thermostat is set to 45°F		Ω ΄
3r.	If the outdoor air damper does not move, confirmed the following items:		1
	• The damper actuator links to the damper shaft, and any linkage set		
	screws or bolts are tight		Q
	• Moving parts are free of impediments (e.g., rust, corrosion)		Q
	• Electrical wire or pneumatic tubing connects to the damper actuator		
	• The outside air thermostat(s) is functioning properly (e.g., in the right	,	-
	location, calibrated correctly)		
	iocation, canotatod controlif/ actionation action a	-	

Proceed to Activities 13–16 if the damper seems to be operating properly.

ACTIVITY 13: FREEZE STATS

3s.	Disconnected power to controls (for automatic reset only) to test continuity across terminals	ü	ø
OR			4
3t.	Confirmed (if applicable) that depressing the manual reset button (usually red) trips the freeze stat (clicking sound indicates freeze stat was		
	tripped)	Q	
3u.	Assessed the feasibility of replacing all manual reset freeze-stats with automatic reset freeze-stats	-	

NOTE: HVAC systems with water coils need protection from the cold. The freeze-stat may close the outdoor air damper and disconnect the supply air when tripped. The typical trip range is $35^{\circ}F$ to $42^{\circ}F$.

ACTIVITY 14: MIXED AIR THERMOSTATS

3v. Ensured that the mixed air stat for heating mode is set no higher than 65°F	
3w. Ensured that the mixed air stat for cooling mode is set no lower than the room thermostat setting	
ACTIVITY 15: ECONOMIZERS 3x. Confirmed proper economizer settings based on design specifications or local practices	
NOTE: The dry-bulb is typically set at 65°F or lower.	
 3y. Checked that sensor on the economizer is shielded from direct sunlight 3z. Ensured that dampers operate properly (for outside air, return air, 	ን ¤

NOTE: Economizers use varying amounts of cool outdoor air to assist with the cooling load of the room or rooms. There are two types of economizers, dry-bulb and enthalpy. Dry-bulb economizers vary the amount of outdoor air based on outdoor temperature, and enthalpy economizers vary the amount of outdoor air based on outdoor temperature and humidity level.

ACTIVITY 16: FANS

3aa. Ensured that all fans (supply fans and associated return or relief fans) that move outside air indoors continuously operate during occupied Yes NO N/A hours (even when room thermostat is satisfied)......

NOTE: If fan shuts off when the thermostat is satisfied, adjust control cycle as necessary to ensure sufficient outdoor air supply.

4. AIR DISTRIBUTION

ACTIVITY 17: AIR DISTRIBUTION

	a. Ensured that supply and return air pathways in the existing ventilation system perform as required		۵
41	b. Ensured that passive gravity relief ventilation systems and transfer grilles between rooms and corridors are functioning		
	OTE: If ventilation system is closed or blocked to meet current fire codes, consult rofessional engineer for remedies.	with a	!
	c. Made sure every occupied space has supply of outdoor air (mechanical system or operable windows)グ d. Ensured that supply and return vents are open and unblocked		
	OTE: If outlets have been blocked intentionally to correct drafts or discomfort, inv nd correct the cause of the discomfort and reopen the vents.	estiga	ıte
	e. Modified the HVAC system to supply outside air to areas without an outdoor air supply	œ	
41	f. Modified existing HVAC systems to incorporate any room or zone layout and population changes	D	
4	g. Moved all barriers (for example, room dividers, large free-standing blackboards or displays, bookshelves) that could block movement of air in the room, especially those blocking air vents		ø

ACTIVITY 18: PRESSURIZATION IN BUILDINGS

NOTE: To prevent infiltration of outdoor pollutants, the ventilation system is designed to maintain positive pressurization in the building. Therefore, ensure that the system, including any exhaust fans, is operating on the "occupied" cycle when doing this activity.

4j.	Ensured that air flows out of the building (using chemical smoke) through		,
	windows, doors, or other cracks and holes in exterior wall (for example,	/	/
	floor joints, pipe openings)	Ø	

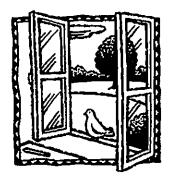
5. EXHAUST SYSTEMS

ACTIVITY 19: EXHAUST FAN OPERATION

5a. Checked (using chemical smoke) that air flows into exhaust fan grille(s) \Box

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- If fans are running but air is not flowing toward the exhaust intake, check for the following: • Inoperable dampers
 - Obstructed, leaky, or disconnected ductwork
 - Undersized or improperly installed fan
 - Broken fan belt





5. EXHAUST SYSTEMS (continued)

ACTIVITY 20: EXHAUST AIRFLOW

NOTE: Prevent migration of indoor contaminants from areas such as bathrooms, kitchens, and labs by keeping them under negative pressure (as compared to surrounding spaces).

Stand outside the room with the door slightly open while checking airflow high and low in the door opening (see "How to Measure Airflow").

ACTIVITY 21: EXHAUST DUCTWORK

5d. Checked that the exhaust ductwork downstream of the exhaust fan (which is under positive pressure) is sealed and in good condition.....

6. QUANTITY OF OUTDOOR AIR

ACTIVITY 22: OUTDOOR AIR MEASUREMENTS AND CALCULATIONS

NOTE: Refer to "How to Measure Airflow" for techniques.

6a. Measured the quantity of outdoor air supplied (22a) to each ventilation unit D 6b. Calculated the number of occupants served (22b) by the ventilation unit under consideration 6c. Divided outdoor air supply (22a) by the number of occupants (22b) to determine the existing quantity of outdoor air supply per person (22c) **ACTIVITY 23: ACCEPTABLE LEVELS OF OUTDOOR AIR QUANTITIES** 6d. Compared the existing outdoor air per person (22c) to the recommended levels in Table 1 6e. Corrected problems with ventilation units that supplied inadequate quantities of outdoor air to ensure that outdoor air quantities (22c) meet the recommended levels in Table 1.....

NOTES All HVAC units through the BAS have advanced ventilation control logic deployed associated with the spaces they serve. The system will modulate the outdoor air damper and return dampers to provide the proper amount of air as needed to maintain space CO2 levels. This type of control is called CO2 based Demand-Controlled Ventilation (DCV). DCV provides proper ventilation air quantities as well as energy savings by reducing the amount of required ventilation air based on the CO2 levels measured by the sensor. The CO2 levels in parts per million (PPM) is used as an indicator of the number of occupants in a room. When the room has less than design occupancy, the required volume of ventilation is reduced. The CO2 sensor allows the VFD to reduce the fan speed to deliver a reduced volume of outside air for ventilation during these periods. An increase in the CO2 level is an indication that more people are in the room, so the fan speed is increased to maintain the required volume of ventilation air under all occupancy conditions.

Active DCV control is an acceptable alternate method to determine if ventilation requirements are met and could supersede rooms that may fail otherwise using traditional measured data collection procedures prescribed by established ASHRAE guidelines.

The ideal supply of outside air to interior occupied spaces should be based upon the 2018 Connecticut Building Code, which is based on the most currently adopted 2015 International Mechanical Code and coincides with ASHRAE-62.1, (2010) guidelines

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Instructions

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- 2. Keep the Background Information and make a copy of this checklist for **each** ventilation unit in your school, as well as a copy for future reference.
- 3. Complete the Checklist.
 - Check the "yes," "no," or "not applicable" box beside each item. (A "no" response requires further attention.)
 - Make comments in the "Notes" section as necessary.
- Return the checklist portion of this document to the IAQ Coordinator.

Ventilation Checklist

Name:	Stephen	Marten				
Name.	<u> </u>	1 107 1011	<i>r</i> , ,			
School:	Amity	Middle	School	Olonge		
Unit Vent	ilator/AHU No:	110		£		
Room or .	Area: E	110	Date	Completed:	1-30	1-24
	110 /	145	and the second			
Signature	: A grander					

1. OUTDOOR AIR INTAKES

la.	Marked locations of all outdoor air intakes on a small floor plan (for example, a fire escape floor plan)			N/A
1b.	Ensured that the ventilation system was on and operating in "occupied" mode			۵
AC	TIVITY 1: OBSTRUCTIONS			
1c.	Ensured that outdoor air intakes are clear of obstructions, debris, clogs, or covers	C	C	
1d.	Installed corrective devices as necessary (e.g., if snowdrifts or leaves frequently block an intake)	7	1	D
AC	TIVITY 2: POLLUTANT SOURCES			
	Checked ground-level intakes for pollutant sources (dumpsters, loading docks, and bus-idling areas)	C	C	۵
1f.	Checked rooftop intakes for pollutant sources (plumbing vents; kitchen, toilet, or laboratory exhaust fans; puddles; and mist from air-conditioning cooling towers)	C	ב	D
1g.	Resolved any problems with pollutant sources located near outdoor air intakes (e.g., relocated dumpster or extended exhaust pipe)	~	ב	
AC	TIVITY 3: AIRFLOW			,
1h.	Obtained chemical smoke (or a small piece of tissue paper or light plastic) Confirmed that outdoor air is entering the intake appropriately			́ ם
2.	SYSTEM CLEANLINESS			
AC	TIVITY 4: AIR FILTERS			
	Replaced filters per maintenance schedule	C	ב	
2b.	Shut off ventilation system fans while replacing filters (prevents dirt from blowing downstream)	Г	C	m
2c.	Vacuumed filter areas before installing new filters		2	
	Confirmed proper fit of filters to prevent air from bypassing (flowing around) the air filter.		C	

2e. Confirmed proper installation of filters (correct direction for airflow)....... Δ \Box \Box

2. SYSTEM CLEANLINESS (continued)

ACTIVITY 5: DRAIN PANS

ACTIVITY 5: DRAIN PANS		
2f. Ensured that drain pans slant toward the drain (to prevent water from Yes	j, No	D N/A
accumulating)	j o	
2g. Cleaned drain pans	. 0	
2h. Checked drain pans for mold and mildew	Ö	
,		
ACTIVITY 6: COILS	,	
2i. Ensured that heating and cooling coils are clean	´ ם	
ACTIVITY 7: AIR-HANDLING UNITS, UNIT VENTILATORS		
2i. Ensured that the interior of air-handling unit(s) or unit ventilator	,	
(air-mixing chamber and fan blades) is clean	, o	
(air-mixing chamber and fan blades) is clean		
/		
ACTIVITY 8: MECHANICAL ROOMS		
21. Checked mechanical room for unsanitary conditions, leaks, and spills		
2m. Ensured that mechanical rooms and air-mixing chambers are free of trash, chemical products, and supplies		
	_	_
3. CONTROLS FOR OUTDOOR AIR SUPPLY		
3. CONTROLS FOR COTDOOR AIR SOFFLE		,
3a. Ensured that air dampers are at least partially open (minimum position) \Box		, д
3b. Ensured that minimum position provides adequate outdoor air		· /
for occupants		⊥ j zí –
·		- (
ACTIVITY 9: CONTROLS INFORMATION		
3c. Obtained and reviewed all design inside/outside temperature and humidity		
requirements, controls specifications, as-built mechanical drawings,		
and controls operations manuals (often uniquely designed)		
ACTIVITY 10: CLOCKS, TIMERS, SWITCHES		
3d. Turned summer-winter switches to the correct position		
3e. Set time clocks appropriately		₽
3f. Ensured that settings fit the actual schedule of building use (including		•
night/weekend use)		
·		
ACTIVITY 11: CONTROL COMPONENTS		
3g. Ensured appropriate system pressure by testing line pressure at both the		_
occupied (day) setting and the unoccupied (night) setting		<u>کر</u>
3h. Checked that the line dryer prevents moisture buildup \Box		A
3i. Replaced control system filters at the compressor inlet based on the		
compressor manufacturer's recommendation (for example, when you		•
blow down the tank)		Г
3j. Set the line pressure at each thermostat and damper actuator at the proper		~
level (no leakage or obstructions)		Þ.
ACTIVITY 12: OUTDOOR AIR DAMPERS		
3k. Ensured that the outdoor air damper is visible for inspection		
31. Ensured that the recirculating relief and/or exhaust dampers are visible		
for inspection		
3m. Ensured that air temperature in the indoor area(s) served by each		
outdoor air damper is within the normal operating range	Q	
NOTE. It is necessary to ensure that the damner is operating properly and within the	0 110	rmat

NOTE: It is necessary to ensure that the damper is operating properly and within the normal range to continue.





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3. CONTROLS FOR OUTDOOR AIR SUPPLY (continued)

3n.	Checked that the outdoor air damper fully closes within a few minutes Yes No of shutting off appropriate air handler	N/A
30.	Checked that the outdoor air damper opens (at least partially with no delay) when the air handler is turned on	Q
3p.	If in heating mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 85°F	Ŕ
	If in cooling mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 60°F and mixed air thermostat is set to 45°F	9⁄
3r.	If the outdoor air damper does not move, confirmed the following items:	4
	• The damper actuator links to the damper shaft, and any linkage set screws or bolts are tight	Q
	• Moving parts are free of impediments (e.g., rust, corrosion)	Q
	• Electrical wire or pneumatic tubing connects to the damper actuator D	
	• The outside air thermostat(s) is functioning properly (e.g., in the right location, calibrated correctly)	

Proceed to Activities 13-16 if the damper seems to be operating properly.

ACTIVITY 13: FREEZE STATS

3s.	Disconnected power to controls (for automatic reset only) to test continuity across terminals	۵	ø
OR			1
3t.	Confirmed (if applicable) that depressing the manual reset button (usually red) trips the freeze stat (clicking sound indicates freeze stat was		
	tripped)		
3u.	Assessed the feasibility of replacing all manual reset freeze-stats with automatic reset freeze-stats		

NOTE: HVAC systems with water coils need protection from the cold. The freeze-stat may close the outdoor air damper and disconnect the supply air when tripped. The typical trip range is 35°F to 42°F.

ACTIVITY 14: MIXED AIR THERMOSTATS

3v.	Ensured that the mixed air stat for heating mode is set no higher than 65°F.	
3w,	Ensured that the mixed air stat for cooling mode is set no lower than the room thermostat setting	
AC	TIVITY 15: ECONOMIZERS	
3x.	Confirmed proper economizer settings based on design specifications or local practices	Q
NO	TE: The dry-bulb is typically set at 65°F or lower.	
Зу.	Checked that sensor on the economizer is shielded from direct sunlight	ū
3z.	Ensured that dampers operate properly (for outside air, return air, exhaust/relief air, and recirculated air), per the design specifications	

NOTE: Economizers use varying amounts of cool outdoor air to assist with the cooling load of the room or rooms. There are two types of economizers, dry-bulb and enthalpy. Dry-bulb economizers vary the amount of outdoor air based on outdoor temperature, and enthalpy economizers vary the amount of outdoor air based on outdoor temperature and humidity level.

ACTIVITY 16: FANS

NOTE: If fan shuts off when the thermostat is satisfied, adjust control cycle as necessary to ensure sufficient outdoor air supply.

4. AIR DISTRIBUTION

ACTIVITY 17: AIR DISTRIBUTION

ACTIVITY 18: PRESSURIZATION IN BUILDINGS

NOTE: To prevent infiltration of outdoor pollutants, the ventilation system is designed to maintain positive pressurization in the building. Therefore, ensure that the system, including any exhaust fans, is operating on the "occupied" cycle when doing this activity.

4j.	Ensured that air flows out of the building (using chemical smoke) through		,
	windows, doors, or other cracks and holes in exterior wall (for example,	/	
	floor joints, pipe openings)	ত্র	

5. EXHAUST SYSTEMS

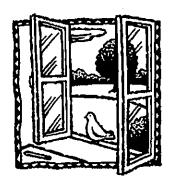
ACTIVITY 19: EXHAUST FAN OPERATION

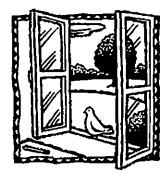
5a. Checked (using chemical smoke) that air flows into exhaust fan grille(s)

Ø

If fans are running but air is not flowing toward the exhaust intake, check for the following: • Inoperable dampers

- · Obstructed, leaky, or disconnected ductwork
- Undersized or improperly installed fan
- Broken fan belt





5. EXHAUST SYSTEMS (continued)

ACTIVITY 20: EXHAUST AIRFLOW

NOTE: Prevent migration of indoor contaminants from areas such as bathrooms, kitchens, and labs by keeping them under negative pressure (as compared to surrounding spaces).

6. QUANTITY OF OUTDOOR AIR

ACTIVITY 22: OUTDOOR AIR MEASUREMENTS AND CALCULATIONS

NOTE: Refer to "How to Measure Airflow" for techniques.

6a. Measured the quantity of outdoor air supplied (22a) to each ventilation 6b. Calculated the number of occupants served (22b) by the ventilation unit Ш 6c. Divided outdoor air supply (22a) by the number of occupants (22b) to determine the existing quantity of outdoor air supply per person (22c) ACTIVITY 23: ACCEPTABLE LEVELS OF OUTDOOR AIR QUANTITIES 6d. Compared the existing outdoor air per person (22c) to the recommended levels in Table 1 6e. Corrected problems with ventilation units that supplied inadequate quantities of outdoor air to ensure that outdoor air quantities (22c) meet the recommended levels in Table 1.....

NOTES All HVAC units through the BAS have advanced ventilation control logic deployed associated with the spaces they serve. The system will modulate the outdoor air damper and return dampers to provide the proper amount of air as needed to maintain space CO2 levels. This type of control is called CO2 based Demand-Controlled Ventilation (DCV). DCV provides proper ventilation air quantities as well as energy savings by reducing the amount of required ventilation air based on the CO2 levels measured by the sensor. The CO2 levels in parts per million (PPM) is used as an indicator of the number of occupants in a room. When the room has less than design occupancy, the required volume of ventilation is reduced. The CO2 sensor allows the VFD to reduce the fan speed to deliver a reduced volume of outside air for ventilation during these periods. An increase in the CO2 level is an indication that more people are in the room, so the fan speed is increased to maintain the required volume of ventilation air under all occupancy conditions.

Active DCV control is an acceptable alternate method to determine if ventilation requirements are met and could supersede rooms that may fail otherwise using traditional measured data collection procedures prescribed by established ASHRAE guidelines.

The ideal supply of outside air to interior occupied spaces should be based upon the 2018 Connecticut Building Code, which is based on the most currently adopted 2015 International Mechanical Code and coincides with ASHRAE-62.1, (2010) guidelines

5 of 5

BAS: Building Automation System VFD: Variable Frequency Drive (Controls the speed of the fan motor) ASHRAE: American Society of Heating, Refrigerating and Air Conditioning Engineers

 \bigcirc



Instructions

- 1. Read the *IAQ Backgrounder* and the Background Information for this checklist.
- 2. Keep the Background Information and make a copy of this checklist for each ventilation unit in your school, as well as a copy for future reference.
- 3. Complete the Checklist.
 - Check the "yes," "no," or "not applicable" box beside each item. (A "no" response requires further attention.)
 - Make comments in the "Notes" section as necessary.
- Return the checklist portion of this document to the IAQ Coordinator.

Ventilation Checklist

Name:	Stephen	Martoni			
School:	Amity	Middle s	School	orange	
	ilator/AHU No:	111	******		1 20.211
Room or A	110	45	Date	Completed:	1-30-29
Signature	: Alf f	AND -			

1. OUTDOOR AIR INTAKES

1a.	Marked locations of all outdoor air intakes on a small floor plan (for example, a fire escape floor plan)			N/A
1b.	Ensured that the ventilation system was on and operating in "occupied" mode	,	D	
AC	TIVITY 1: OBSTRUCTIONS			
lc.	Ensured that outdoor air intakes are clear of obstructions, debris, clogs, or covers	⊿		
1d.	Installed corrective devices as necessary (e.g., if snowdrifts or leaves frequently block an intake)	D	ø	
AC	TIVITY 2: POLLUTANT SOURCES			
	Checked ground-level intakes for pollutant sources (dumpsters, loading docks, and bus-idling areas)	Zi		
1f.	Checked rooftop intakes for pollutant sources (plumbing vents; kitchen, toilet, or laboratory exhaust fans; puddles; and mist from air-conditioning cooling towers)	X		
1g.	Resolved any problems with pollutant sources located near outdoor air intakes (e.g., relocated dumpster or extended exhaust pipe)	/		
10	TIVITY 3: AIRFLOW			
1h.	Obtained chemical smoke (or a small piece of tissue paper or light plastic) Confirmed that outdoor air is entering the intake appropriately			
2.	SYSTEM CLEANLINESS			
AC	TIVITY 4: AIR FILTERS			
	Replaced filters per maintenance schedule	Z		
2b.	Shut off ventilation system fans while replacing filters (prevents dirt from blowing downstream)	Z.		
2c.	Vacuumed filter areas before installing new filters			
2d.	Confirmed proper fit of filters to prevent air from bypassing (flowing			

2. SYSTEM CLEANLINESS (continued)

ACTIVITY 5: DRAIN PANS

.

ACTIVITY 5: DRAIN PAINS		
accumulating)		N/A
2g. Cleaned drain pans		Q
2h. Checked drain pans for mold and mildew		Q
ACTIVITY 6: COILS		
2i. Ensured that heating and cooling coils are clean	D	
ACTIVITY 7: AIR-HANDLING UNITS, UNIT VENTILATORS		
2j. Ensured that the interior of air-handling unit(s) or unit ventilator	_	_
(air-mixing chamber and fan blades) is clean	<u> </u>	
2k. Ensured that ducts are clean	L	
ACTIVITY 8: MECHANICAL ROOMS		
21. Checked mechanical room for unsanitary conditions, leaks, and spills		
2m. Ensured that mechanical rooms and air-mixing chambers are free of trash.		
chemical products, and supplies	ū	
3. CONTROLS FOR OUTDOOR AIR SUPPLY		
	_	
3a. Ensured that air dampers are at least partially open (minimum position) \Box		P
3b. Ensured that minimum position provides adequate outdoor air	_	_
for occupants		μ
ACTIVITY 9: CONTROLS INFORMATION		
3c. Obtained and reviewed all design inside/outside temperature and humidity		
requirements, controls specifications, as-built mechanical drawings,		
and controls operations manuals (often uniquely designed)		
ACTIVITY 10: CLOCKS, TIMERS, SWITCHES		
3d. Turned summer-winter switches to the correct position		
3e. Set time clocks appropriately		ø
3f. Ensured that settings fit the actual schedule of building use (including		•
night/weekend use)		
ACTIVITY 11: CONTROL COMPONENTS		
3g. Ensured appropriate system pressure by testing line pressure at both the		~
occupied (day) setting and the unoccupied (night) setting		4
3h. Checked that the line dryer prevents moisture buildup		71
3i. Replaced control system filters at the compressor inlet based on the		•
compressor manufacturer's recommendation (for example, when you blow down the tank) \Box		ZĨ
3j. Set the line pressure at each thermostat and damper actuator at the proper		y i
level (no leakage or obstructions)		Z
	-	-
ACTIVITY 12: OUTDOOR AIR DAMPERS		
3k. Ensured that the outdoor air damper is visible for inspection		
31. Ensured that the recirculating relief and/or exhaust dampers are visible	_	_
for inspection		
3m. Ensured that air temperature in the indoor area(s) served by each	-	-
outdoor air damper is within the normal operating range	Ч	

NOTE: It is necessary to ensure that the damper is operating properly and within the normal range to continue.





3n.	Checked that the outdoor air damper fully closes within a few minutes of shutting off appropriate air handler	Yes Q	No	N/A
30.	Checked that the outdoor air damper opens (at least partially with no delay) when the air handler is turned on	ø	D	
3p.	If in heating mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 85°F		a	۶,
3q.	If in cooling mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 60°F and mixed air thermostat is set to 45°F	n D	D	
3r.	If the outdoor air damper does not move, confirmed the following items:			1
	• The damper actuator links to the damper shaft, and any linkage set screws or bolts are tight	ď		
	Moving parts are free of impediments (e.g., rust, corrosion)	2		D,
	• Electrical wire or pneumatic tubing connects to the damper actuator	0⁄		
	• The outside air thermostat(s) is functioning properly (e.g., in the right location, calibrated correctly)	2		

Proceed to Activities 13-16 if the damper seems to be operating properly.

ACTIVITY 13: FREEZE STATS

3s.	Disconnected power to controls (for automatic reset only) to test continuity across terminals	۵	ø
OR			1
3t.	Confirmed (if applicable) that depressing the manual reset button (usually red) trips the freeze stat (clicking sound indicates freeze stat was		
	tripped)	Q	
3u.	Assessed the feasibility of replacing all manual reset freeze-stats with automatic reset freeze-stats	ø	

NOTE: HVAC systems with water coils need protection from the cold. The freeze-stat may close the outdoor air damper and disconnect the supply air when tripped. The typical trip range is 35°F to 42°F.

ACTIVITY 14: MIXED AIR THERMOSTATS

3v. Ensured that the mixed air stat for heating mode is set no higher than 65°F		
3w. Ensured that the mixed air stat for cooling mode is set no lower than the room thermostat setting	¢	٦
ACTIVITY 15: ECONOMIZERS		

3x. Confirmed proper economizer settings based on design specifications or local practices

NOTE: The dry-bulb is typically set at 65°F or lower.

- 3y. Checked that sensor on the economizer is shielded from direct sunlight \square
- 3z. Ensured that dampers operate properly (for outside air, return air,
- exhaust/relief air, and recirculated air), per the design specifications

NOTE: Economizers use varying amounts of cool outdoor air to assist with the cooling load of the room or rooms. There are two types of economizers, dry-bulb and enthalpy. Dry-bulb economizers vary the amount of outdoor air based on outdoor temperature, and enthalpy economizers vary the amount of outdoor air based on outdoor temperature and humidity level.

ACTIVITY 16: FANS

3aa. Ensured that all fans (supply fans and associated return or relief fans) that move outside air indoors continuously operate during occupied hours (even when room thermostat is satisfied)......

NOTE: If fan shuts off when the thermostat is satisfied, adjust control cycle as necessary to ensure sufficient outdoor air supply.

4. AIR DISTRIBUTION

ACTIVITY 17: AIR DISTRIBUTION

4a. Ensured that supply and return air pathways in the existing ventilation system perform as required	נ
4b. Ensured that passive gravity relief ventilation systems and transfer grilles between rooms and corridors are functioning	1
NOTE: If ventilation system is closed or blocked to meet current fire codes, consult with a professional engineer for remedies.	
4c. Made sure every occupied space has supply of outdoor air (mechanical system or operable windows)	נ
4d. Ensured that supply and return vents are open and unblocked]
NOTE: If outlets have been blocked intentionally to correct drafts or discomfort, investigate and correct the cause of the discomfort and reopen the vents.	
4e. Modified the HVAC system to supply outside air to areas without an outdoor	า

4 e .	air supply	ď	Ē
4f.	Modified existing HVAC systems to incorporate any room or zone layout and population changes		
4g.	Moved all barriers (for example, room dividers, large free-standing blackboards or displays, bookshelves) that could block movement of air in the room, especially those blocking air vents	D	⊿
4h.	Ensured that unit ventilators are quiet enough to accommodate classroom activities		
4i.	Ensured that classrooms are free of uncomfortable drafts produced by air from supply terminals	, Q.	

ACTIVITY 18: PRESSURIZATION IN BUILDINGS

NOTE: To prevent infiltration of outdoor pollutants, the ventilation system is designed to maintain positive pressurization in the building. Therefore, ensure that the system, including any exhaust fans, is operating on the "occupied" cycle when doing this activity.

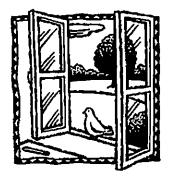
4j.	Ensured that air flows out of the building (using chemical smoke) through		1
	windows, doors, or other cracks and holes in exterior wall (for example,	/	
	floor joints, pipe openings)	ত্র	Θ

5. EXHAUST SYSTEMS

ACTIVITY 19: EXHAUST FAN OPERATION

5a. Checked (using chemical smoke) that air flows into exhaust fan grille(s) $\Box = Z$

- If fans are running but air is not flowing toward the exhaust intake, check for the following:
 - Inoperable dampers
 - Obstructed, leaky, or disconnected ductwork
 - Undersized or improperly installed fan
 - Broken fan belt





ACTIVITY 20: EXHAUST AIRFLOW

NOTE: Prevent migration of indoor contaminants from areas such as bathrooms, kitchens, and labs by keeping them under negative pressure (as compared to surrounding spaces).

5b. Checked (using chemical smoke) that air is drawn into the room from Yes. No N/A adjacent spaces

Stand outside the room with the door slightly open while checking airflow high and low in the door opening (see "How to Measure Airflow").

ACTIVITY 21: EXHAUST DUCTWORK

5d. Checked that the exhaust ductwork downstream of the exhaust fan (which is under positive pressure) is sealed and in good condition......

6. QUANTITY OF OUTDOOR AIR

ACTIVITY 22: OUTDOOR AIR MEASUREMENTS AND CALCULATIONS

NOTE: Refer to "How to Measure Airflow" for techniques.

6a. Measured the quantity of outdoor air supplied (22a) to each ventilation unit 📮 6b. Calculated the number of occupants served (22b) by the ventilation unit under consideration 6c. Divided outdoor air supply (22a) by the number of occupants (22b) to determine the existing quantity of outdoor air supply per person (22c) **ACTIVITY 23: ACCEPTABLE LEVELS OF OUTDOOR AIR QUANTITIES** 6d. Compared the existing outdoor air per person (22c) to the recommended levels in Table 1 6e. Corrected problems with ventilation units that supplied inadequate quantities of outdoor air to ensure that outdoor air quantities (22c) meet the recommended levels in Table 1.....

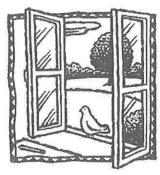
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- 4. Return the checklist portion of this document to the IAQ Coordinator.

Ventilation Checklist

Name:	Stephen	Martoni				
School:	Amity	Middle	School	0 Tungé	2	
Unit Ven	tilator/AHU No:	<u> </u>	1			
Room or	1101	- 117	Date	Completed:	1-31-2	4
Signature	e: And the					

1. OUTDOOR AIR INTAKES

1a.	Marked locations of all outdoor air intakes on a small floor plan (for Y example, a fire escape floor plan)			N/A
1b.	Ensured that the ventilation system was on and operating in "occupied" mode	1	D	٦
AC	TIVITY 1: OBSTRUCTIONS			
1c.	Ensured that outdoor air intakes are clear of obstructions, debris, clogs, or covers	6		D
1d.	Installed corrective devices as necessary (e.g., if snowdrifts or leaves frequently block an intake)		ø	٦
AC	TIVITY 2: POLLUTANT SOURCES			
	Checked ground-level intakes for pollutant sources (dumpsters, loading docks, and bus-idling areas)	Z	D	D
1f.	Checked rooftop intakes for pollutant sources (plumbing vents; kitchen, toilet, or laboratory exhaust fans; puddles; and mist from			
	air-conditioning cooling towers)	Z		
1g.	Resolved any problems with pollutant sources located near outdoor air intakes (e.g., relocated dumpster or extended exhaust pipe)	6	۵	
AC	TIVITY 3: AIRFLOW			1
	Obtained chemical smoke (or a small piece of tissue paper or light plastic)			
1i.	Confirmed that outdoor air is entering the intake appropriately	2	0	
2.	SYSTEM CLEANLINESS			
	TIVITY 4: AIR FILTERS			
	Replaced filters per maintenance schedule	Z	0	
	Shut off ventilation system fans while replacing filters (prevents dirt from	1		
20	blowing downstream) Vacuumed filter areas before installing new filters	7		
	Confirmed proper fit of filters to prevent air from bypassing (flowing	find	had	-
- 1 .	around) the air filter	Z		

2e. Confirmed proper installation of filters (correct direction for airflow)....... \square

2. SYSTEM CLEANLINESS (continued)

ACTIVITY 5: DRAIN PANS 2f. Ensured that drain pans slant toward the drain (to prevent water from Yes No N/A accumulating) 2g. Cleaned drain pans 2h. Checked drain pans for mold and mildew **ACTIVITY 6: COILS ACTIVITY 7: AIR-HANDLING UNITS, UNIT VENTILATORS** 2j. Ensured that the interior of air-handling unit(s) or unit ventilator (air-mixing chamber and fan blades) is clean 2k. Ensured that ducts are clean ACTIVITY 8: MECHANICAL ROOMS 21. Checked mechanical room for unsanitary conditions, leaks, and spills 2m. Ensured that mechanical rooms and air-mixing chambers are free of trash, chemical products, and supplies 3. CONTROLS FOR OUTDOOR AIR SUPPLY 3a. Ensured that air dampers are at least partially open (minimum position) 🗆 🛛 3b. Ensured that minimum position provides adequate outdoor air for occupants **ACTIVITY 9: CONTROLS INFORMATION** 3c. Obtained and reviewed all design inside/outside temperature and humidity requirements, controls specifications, as-built mechanical drawings, and controls operations manuals (often uniquely designed)...... **ACTIVITY 10: CLOCKS, TIMERS, SWITCHES** 3d. Turned summer-winter switches to the correct position 3e. Set time clocks appropriately Ø 3f. Ensured that settings fit the actual schedule of building use (including night/weekend use) ACTIVITY 11: CONTROL COMPONENTS 3g. Ensured appropriate system pressure by testing line pressure at both the ል occupied (day) setting and the unoccupied (night) setting 3h. Checked that the line dryer prevents moisture buildup 3i. Replaced control system filters at the compressor inlet based on the compressor manufacturer's recommendation (for example, when you blow down the tank)..... Z 3j. Set the line pressure at each thermostat and damper actuator at the proper level (no leakage or obstructions) **ACTIVITY 12: OUTDOOR AIR DAMPERS** 31. Ensured that the recirculating relief and/or exhaust dampers are visible for inspection 3m. Ensured that air temperature in the indoor area(s) served by each

NOTE: It is necessary to ensure that the damper is operating properly and within the normal range to continue.

2 of 5



3n.	Checked that the outdoor air damper fully closes within a few minutes Yes of shutting off appropriate air handler	No U	N/A
3o.	Checked that the outdoor air damper opens (at least partially with no delay) when the air handler is turned on	Ē	Q
3р.	If in heating mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 85°F	a	ø
3q.	If in cooling mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 60°F and mixed air thermostat is set to 45°F	ū	, ,
3r.	If the outdoor air damper does not move, confirmed the following items:		1
	 The damper actuator links to the damper shaft, and any linkage set screws or bolts are tight	_	
	• Moving parts are free of impediments (e.g., rust, corrosion)		Q
	• Electrical wire or pneumatic tubing connects to the damper actuator		
	 The outside air thermostat(s) is functioning properly (e.g., in the right location, calibrated correctly) 		D

Proceed to Activities 13-16 if the damper seems to be operating properly.

ACTIVITY 13: FREEZE STATS

3s.	Disconnected power to controls (for automatic reset only) to test continuity across terminals		ø
OR			,
3t.	Confirmed (if applicable) that depressing the manual reset button (usually red) trips the freeze stat (clicking sound indicates freeze stat was		
	tripped)	Q	D
3u.	Assessed the feasibility of replacing all manual reset freeze-stats with automatic reset freeze-stats	_	D

NOTE: HVAC systems with water coils need protection from the cold. The freeze-stat may close the outdoor air damper and disconnect the supply air when tripped. The typical trip range is 35°F to 42°F.

ACTIVITY 14: MIXED AIR THERMOSTATS

3v.	Ensured that the mixed air stat for heating mode is set no higher than 65°F.	
3w.	Ensured that the mixed air stat for cooling mode is set no lower than the room thermostat setting	
AC	TIVITY 15: ECONOMIZERS	
3x.	Confirmed proper economizer settings based on design specifications or local practices	D
NO	TE: The dry-bulb is typically set at 65°F or lower.	
Зу.	Checked that sensor on the economizer is shielded from direct sunlight \square	Q
3z.	TE: The dry-bulb is typically set at 65°F or lower: Checked that sensor on the economizer is shielded from direct sunlight	۵
MO	TE: Economizers use verying amounts of cool outdoor gir to assist with the cooling	

NOTE: Economizers use varying amounts of cool outdoor air to assist with the cooling load of the room or rooms. There are two types of economizers, dry-bulb and enthalpy. Dry-bulb economizers vary the amount of outdoor air based on outdoor temperature, and enthalpy economizers vary the amount of outdoor air based on outdoor temperature and humidity level.

ACTIVITY 16: FANS

3aa. Ensured that all fans (supply fans and associated return or relief fans) that move outside air indoors continuously operate during occupied Yes No N/A

NOTE: If fan shuts off when the thermostat is satisfied, adjust control cycle as necessary to ensure sufficient outdoor air supply.

4. AIR DISTRIBUTION

ACTIVITY 17: AIR DISTRIBUTION

 4a. Ensured that supply and return air pathways in the existing ventilation system perform as required 4b. Ensured that passive gravity relief ventilation systems and transfer grilles between rooms and corridors are functioning
NOTE: If ventilation system is closed or blocked to meet current fire codes, consult with a professional engineer for remedies.
 4c. Made sure every occupied space has supply of outdoor air (mechanical system or operable windows) 4d. Ensured that supply and return vents are open and unblocked
NOTE: If outlets have been blocked intentionally to correct drafts or discomfort, investigate and correct the cause of the discomfort and reopen the vents.
4e. Modified the HVAC system to supply outside air to areas without an outdoor air supply
4f. Modified existing HVAC systems to incorporate any room or zone layout and population changes
4g. Moved all barriers (for example, room dividers, large free-standing blackboards or displays, bookshelves) that could block movement of
air in the room, especially those blocking air vents

ACTIVITY 18: PRESSURIZATION IN BUILDINGS

NOTE: To prevent infiltration of outdoor pollutants, the ventilation system is designed to maintain positive pressurization in the building. Therefore, ensure that the system, including any exhaust fans, is operating on the "occupied" cycle when doing this activity.

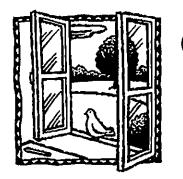
4j.	Ensured that air flows out of the building (using chemical smoke) through		,
	windows, doors, or other cracks and holes in exterior wall (for example,	/	
	floor joints, pipe openings)	ত্র	Ω

5. EXHAUST SYSTEMS

ACTIVITY 19: EXHAUST FAN OPERATION

5a. Checked (using chemical smoke) that air flows into exhaust fan grille(s)

- If fans are running but air is not flowing toward the exhaust intake, check for the following:
 - Inoperable dampers
 - Obstructed, leaky, or disconnected ductwork
 - · Undersized or improperly installed fan
 - Broken fan belt





ACTIVITY 20: EXHAUST AIRFLOW

NOTE: Prevent migration of indoor contaminants from areas such as bathrooms, kitchens, and labs by keeping them under negative pressure (as compared to surrounding spaces).

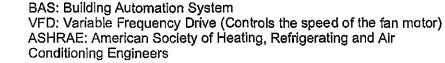
5b.	Checked (using chemical smoke) that air is drawn into the room from adjacent spaces	∕es. ⊠	No	N// D
the	nd outside the room with the door slightly open while checking airflow high a door opening (see "How to Measure Airflow").			
5c.	Ensured that air is flowing toward the exhaust intake	Ø		۵
	TIVITY 21: EXHAUST DUCTWORK			
5d.	Checked that the exhaust ductwork downstream of the exhaust fan (which is under positive pressure) is sealed and in good condition			
6.	QUANTITY OF OUTDOOR AIR			
	QUANTITY OF OUTDOOR AIR TIVITY 22: OUTDOOR AIR MEASUREMENTS AND CALCULATION	15		
AC		15		
AC NO	TIVITY 22: OUTDOOR AIR MEASUREMENTS AND CALCULATION		٥	
АС <i>NО</i> : ба.	TIVITY 22: OUTDOOR AIR MEASUREMENTS AND CALCULATION <i>TE: Refer to "How to Measure Airflow" for techniques.</i> Measured the quantity of outdoor air supplied (22a) to each ventilation	۵		

6d. Compared the existing outdoor air per person (22c) to the recommended levels in Table 1 6e. Corrected problems with ventilation units that supplied inadequate quantities of outdoor air to ensure that outdoor air quantities (22c) meet the recommended levels in Table 1.....

NOTES All HVAC units through the BAS have advanced ventilation control logic deployed associated with the spaces they serve. The system will modulate the outdoor air damper and return dampers to provide the proper amount of air as needed to maintain space CO2 levels. This type of control is called CO2 based Demand-Controlled Ventilation (DCV). DCV provides proper ventilation air quantities as well as energy savings by reducing the amount of required ventilation air based on the CO2 levels measured by the sensor. The CO2 levels in parts per million (PPM) is used as an indicator of the number of occupants in a room. When the room has less than design occupancy, the required volume of ventilation is reduced. The CO2 sensor allows the VFD to reduce the fan speed to deliver a reduced volume of outside air for ventilation during these periods. An increase in the CO2 level is an indication that more people are in the room, so the fan speed is increased to maintain the required volume of ventilation air under all occupancy conditions.

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С



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- 3. Complete the Checklist.
 - Check the "yes," "no," or "not applicable" box beside each item. (A "no" response requires further attention.)
 - Make comments in the "Notes" section as necessary.
- Return the checklist portion of this document to the IAQ Coordinator.

Ventilation Checklist

	CLON	Maria				
Name:	signen	1 lov ton	<i>A</i> 3			
School:	Amity	Middle	School	OTONGE		
Unit Vent	ilator/AHU No:	39				
Room or .		39B	Date	Completed:	1-31-20	1
	lin 1	1	L'ale	completed.		
Signature	: AN f					
	(

1. OUTDOOR AIR INTAKES

1a.	Marked locations of all outdoor air intakes on a small floor plan (for example, a fire escape floor plan)		-	N/A	
1b.	Ensured that the ventilation system was on and operating in "occupied" mode	,	D		
AC	TIVITY 1: OBSTRUCTIONS				
1c.	Ensured that outdoor air intakes are clear of obstructions, debris, clogs,		<i>~~</i>	parents.	
1.1	or covers		0		
10.	Installed corrective devices as necessary (e.g., if snowdrifts or leaves frequently block an intake)		А		
AC	TIVITY 2: POLLUTANT SOURCES				
1e.	Checked ground-level intakes for pollutant sources (dumpsters, loading docks, and bus-idling areas)		D	۵	
1f.	toilet, or laboratory exhaust fans; puddles; and mist from				
200220	air-conditioning cooling towers)				
1g.	Resolved any problems with pollutant sources located near outdoor air intakes (e.g., relocated dumpster or extended exhaust pipe)	-			
AC	TIVITY 3: AIRFLOW			1	
1h.	Obtained chemical smoke (or a small piece of tissue paper or light plastic).		a		
li.	Confirmed that outdoor air is entering the intake appropriately	_			
2.	SYSTEM CLEANLINESS				
	TIVITY 4: AIR FILTERS				
2a.	Replaced filters per maintenance schedule				
	Shut off ventilation system fans while replacing filters (prevents dirt from				
20	blowing downstream)	1			
2d.	Confirmed proper fit of filters to prevent air from bypassing (flowing		Youl	Tenne'	
	around) the air filter				

2. SYSTEM CLEANLINESS (continued)

ACTIVITY 5: DRAIN PANS

ACTIVITY 5: DRAIN PAN	S			
accumulating)	lant toward the drain (to prevent water from	Ø		N/A
2g. Cleaned drain pans		ପ୍		Q
2h. Checked drain pans for m	nold and mildew	¤		
ACTIVITY 6: COILS	cooling coils are clean	4	D	
21. Ensured that heating and	cooling coils are clean		ч	Ч
	ING UNITS, UNIT VENTILATORS			
2j. Ensured that the interior	of air-handling unit(s) or unit ventilator	1		
(air-mixing chamber and	fan blades) is clean	¤,		
2k. Ensured that ducts are cle	an	p		
ACTIVITY 8: MECHANIC	AL ROOMS			
21. Checked mechanical roor	n for unsanitary conditions, leaks, and spills	. Z		
2m. Ensured that mechanical	rooms and air-mixing chambers are free of trash.			
chemical products, and su	applies	,⊿		
3. CONTROLS FOR O	UTDOOR AIR SUPPLY			
3a. Ensured that air dampers	are at least partially open (minimum position)	ם		ď
3b Ensured that minimum no	neition provides adequate outdoor air			<i>(</i>
for occupants		🗖		ø
-				1
ACTIVITY 9: CONTROLS	INFORMATION			
	l design inside/outside temperature and humidity			
requirements, controls sp	ecifications, as-built mechanical drawings,	_	_	_
and controls operations n	nanuals (often uniquely designed)	µ		
ACTIVITY 10: CLOCKS, T	IMERS, SWITCHES			
3d. Turned summer-winter sv	vitches to the correct position	⊿		
3e. Set time clocks appropria	tely	🗖		Ø
3f. Ensured that settings fit t	he actual schedule of building use (including			•
night/weekend use)		µ		
ACTIVITY 11: CONTROL	COMPONENTS			
	m pressure by testing line pressure at both the			
	d the unoccupied (night) setting			2
	er prevents moisture buildup			7
	filters at the compressor inlet based on the		-	/-
	's recommendation (for example, when you			•
	······································	🗆		ø
	ch thermostat and damper actuator at the proper			•
	uctions)	🗆		A
ACTIVITY 12: OUTDOOR		1	-	
3k. Ensured that the outdoor	air damper is visible for inspection	. Д		
31. Ensured that the recircula	ting relief and/or exhaust dampers are visible	4	_	-
Ior inspection		🖊		a
outdoor air damner is wit	ure in the indoor area(s) served by each hin the normal operating range	Z		
	re that the damner is operating properly and with		-	—
IN THE THIS HEREESSING IN DUSI	τε τους στε οποιρεί τι ορωνατίκα ριστργία άνα νατά			



NOTE: It is necessary to ensure that the damper is operating properly and within the normal range to continue.



(

3. CONTROLS FOR OUTDOOR AIR SUPPLY (continued)

3n.	Checked that the outdoor air damper fully closes within a few minutes of shutting off appropriate air handler	′es G	No D	N/A
30.	Checked that the outdoor air damper opens (at least partially with no delay) when the air handler is turned on	ø		D
3p.	If in heating mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 85°F	a	D	۶,
3q.	If in cooling mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 60°F and mixed air thermostat is set to 45°F		D	, 7
3r.	If the outdoor air damper does not move, confirmed the following items:			1
	• The damper actuator links to the damper shaft, and any linkage set screws or bolts are tight	e _		
	• Moving parts are free of impediments (e.g., rust, corrosion)	2	٩	D
	• Electrical wire or pneumatic tubing connects to the damper actuator	G⁄	D	D
	• The outside air thermostat(s) is functioning properly (e.g., in the right location, calibrated correctly)	9		D

Proceed to Activities 13-16 if the damper seems to be operating properly.

ACTIVITY 13: FREEZE STATS

3s.	Disconnected power to controls (for automatic reset only) to test continuity across terminals	۵	A
OR			7
3t.	Confirmed (if applicable) that depressing the manual reset button (usually red) trips the freeze stat (clicking sound indicates freeze stat was		
	tripped)	Q	D
3u.	Assessed the feasibility of replacing all manual reset freeze-stats with automatic reset freeze-stats	_	a

NOTE: HVAC systems with water coils need protection from the cold. The freeze-stat may close the outdoor air damper and disconnect the supply air when tripped. The typical trip range is $35^{\circ}F$ to $42^{\circ}F$.

ACTIVITY 14: MIXED AIR THERMOSTATS

3v.	Ensured that the mixed air stat for heating mode is set no higher than 65°F.	a
3w.	Ensured that the mixed air stat for cooling mode is set no lower than the room thermostat setting	
AC	TIVITY 15: ECONOMIZERS	
3x.	Confirmed proper economizer settings based on design specifications or local practices	Q
NO	TE: The dry-bulb is typically set at 65°F or lower.	
3y.	Checked that sensor on the economizer is shielded from direct sunlight	Q
52.	exhaust/relief air, and recirculated air), per the design specifications	
	TE: Economizers use varying amounts of cool outdoor air to assist with the cooling	

load of the room or rooms. There are two types of economizers, dry-bulb and enthalpy. Dry-bulb economizers vary the amount of outdoor air based on outdoor temperature, and enthalpy economizers vary the amount of outdoor air based on outdoor temperature and humidity level.

ACTIVITY 16: FANS

3aa. Ensured that all fans (supply fans and associated return or relief fans) that move outside air indoors continuously operate during occupied Yes No N/A hours (even when room thermostat is satisfied)......

NOTE: If fan shuts off when the thermostat is satisfied, adjust control cycle as necessary to ensure sufficient outdoor air supply.

4. AIR DISTRIBUTION

ACTIVITY 17: AIR DISTRIBUTION

4a.	Ensured that supply and return air pathways in the existing ventilation system perform as required.	
4b.	Ensured that passive gravity relief ventilation systems and transfer grilles between rooms and corridors are functioning	
	DTE: If ventilation system is closed or blocked to meet current fire codes, consult with a offessional engineer for remedies.	2
4c.	Made sure every occupied space has supply of outdoor air (mechanical	

ΨŲ,	Made sure every occupied space has supply of outdoor all (incentation	/	
	system or operable windows)	<u>/</u> a	ū
4d.	Ensured that supply and return vents are open and unblocked	D	Ū

NOTE: If outlets have been blocked intentionally to correct drafts or discomfort, investigate and correct the cause of the discomfort and reopen the vents.

4e.	Modified the HVAC system to supply outside air to areas without an outdoor air supply		
4f.	Modified existing HVAC systems to incorporate any room or zone layout and population changes	Q	
4g.	Moved all barriers (for example, room dividers, large free-standing blackboards or displays, bookshelves) that could block movement of air in the room, especially those blocking air vents	0	⊿
4h.	Ensured that unit ventilators are quiet enough to accommodate classroom activities		
4i.	Ensured that classrooms are free of uncomfortable drafts produced by air from supply terminals	, Q.	

ACTIVITY 18: PRESSURIZATION IN BUILDINGS

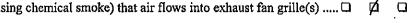
NOTE: To prevent infiltration of outdoor pollutants, the ventilation system is designed to maintain positive pressurization in the building. Therefore, ensure that the system, including any exhaust fans, is operating on the "occupied" cycle when doing this activity.

4j.	Ensured that air flows out of the building (using chemical smoke) through		,
	windows, doors, or other cracks and holes in exterior wall (for example,	/	
	floor joints, pipe openings)	đ	O

5. EXHAUST SYSTEMS

ACTIVITY 19: EXHAUST FAN OPERATION

5a. Checked (using chemical smoke) that air flows into exhaust fan grille(s) D



- If fans are running but air is not flowing toward the exhaust intake, check for the following:
 - Inoperable dampers
 - Obstructed, leaky, or disconnected ductwork
 - · Undersized or improperly installed fan
 - Broken fan belt





ACTIVITY 20: EXHAUST AIRFLOW

NOTE: Prevent migration of indoor contaminants from areas such as bathrooms, kitchens, and labs by keeping them under negative pressure (as compared to surrounding spaces).

56.	Checked (using chemical smoke) that air is drawn into the room from Adjacent spaces	es.	No D	N/ C
the	nd outside the room with the door slightly open while checking airflow high ar door opening (see "How to Measure Airflow").			
5c.	Ensured that air is flowing toward the exhaust intake	Z		C
AC	TIVITY 21: EXHAUST DUCTWORK			
5d.	Checked that the exhaust ductwork downstream of the exhaust fan (which is under positive pressure) is sealed and in good condition			Ç
6.	QUANTITY OF OUTDOOR AIR			
AC	TIVITY 22: OUTDOOR AIR MEASUREMENTS AND CALCULATION	S		
NO	TE: Refer to "How to Measure Airflow" for techniques.			
	Measured the quantity of outdoor air supplied (22a) to each ventilation			
ба.	unit	ב	۵	Ç
6 b .				

6d. Compared the existing outdoor air per person (22c) to the recommended levels in Table 1 6e. Corrected problems with ventilation units that supplied inadequate quantities of outdoor air to ensure that outdoor air quantities (22c) meet the recommended levels in Table 1

NOTES All HVAC units through the BAS have advanced ventilation control logic deployed associated with the spaces they serve. The system will modulate the outdoor air damper and return dampers to provide the proper amount of air as needed to maintain space CO2 levels. This type of control is called CO2 based Demand-Controlled Ventilation (DCV). DCV provides proper ventilation air quantities as well as energy savings by reducing the amount of required ventilation air based on the CO2 levels measured by the sensor. The CO2 levels in parts per million (PPM) is used as an indicator of the number of occupants in a room. When the room has less than design occupancy, the required volume of ventilation is reduced. The CO2 sensor allows the VFD to reduce the fan speed to deliver a reduced volume of outside air for ventilation during these periods. An increase in the CO2 level is an indication that more people are in the room, so the fan speed is increased to maintain the required volume of ventilation air under all occupancy conditions.

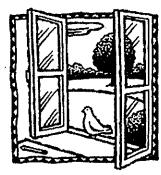
Active DCV control is an acceptable alternate method to determine if ventilation requirements are met and could supersede rooms that may fail otherwise using traditional measured data collection procedures prescribed by established ASHRAE guidelines.

The ideal supply of outside air to interior occupied spaces should be based upon the 2018 Connecticut Building Code, which is based on the most currently adopted 2015 International Mechanical Code and coincides with ASHRAE-62.1, (2010) guidelines

> **BAS: Building Automation System** VFD: Variable Frequency Drive (Controls the speed of the fan motor) ASHRAE: American Society of Heating, Refrigerating and Air **Conditioning Engineers**

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Instructions

- 1. Read the *IAQ Backgrounder* and the Background Information for this checklist.
- 2. Keep the Background Information and make a copy of this checklist for each ventilation unit in your school, as well as a copy for future reference.
- 3. Complete the Checklist.
 - Check the "yes," "no," or "not applicable" box beside each item. (A "no" response requires further attention.)
 - Make comments in the "Notes" section as necessary.
- 4. Return the checklist portion of this document to the IAQ Coordinator.

Ventilation Checklist

Name: _	Stephen	Mayton;				
School:	Amity	Middle	School	OTUNGE	<u> </u>	
Unit Venti	lator/AHU No:					
Room or A	Area: /	11 -	Date	Completed:		
Signature:	Sy f	45				

1. OUTDOOR AIR INTAKES

la.	Marked locations of all outdoor air intakes on a small floor plan (for example, a fire escape floor plan)			N/A
1b.	Ensured that the ventilation system was on and operating in "occupied" mode	,	۵	٦
AC	TIVITY 1: OBSTRUCTIONS			
1c.	Ensured that outdoor air intakes are clear of obstructions, debris, clogs, or covers	Zî	Q	
ld.	Installed corrective devices as necessary (e.g., if snowdrifts or leaves frequently block an intake)			a
AC	TIVITY 2: POLLUTANT SOURCES			
le.	Checked ground-level intakes for pollutant sources (dumpsters, loading docks, and bus-idling areas)	ø	a	
1f.	Checked rooftop intakes for pollutant sources (plumbing vents; kitchen, toilet, or laboratory exhaust fans; puddles; and mist from air-conditioning cooling towers)	Z	D	
1g.	Resolved any problems with pollutant sources located near outdoor air intakes (e.g., relocated dumpster or extended exhaust pipe)			
AC	TIVITY 3: AIRFLOW			,
lh.	Obtained chemical smoke (or a small piece of tissue paper or light plastic Confirmed that outdoor air is entering the intake appropriately)¤ ¤∕	2/ 10	
2.	SYSTEM CLEANLINESS			
	TIVITY 4: AIR FILTERS			
	Replaced filters per maintenance schedule	*	۵	
2b.	Shut off ventilation system fans while replacing filters (prevents dirt from blowing downstream)	, Z ,		a
2c.	blowing downstream)	Ø		
2d.	Confirmed proper fit of filters to prevent air from bypassing (flowing around) the air filter	Z		D

2. SYSTEM CLEANLINESS (continued)

.

			N/A
accumulating)	.Ø		
2g. Cleaned drain pans	.0	Q	
2h. Checked drain pans for mold and mildew	Ø	۵	
ACTIVITY 6: COILS	,		
2i. Ensured that heating and cooling coils are clean	_		
ACTIVITY 7: AIR-HANDLING UNITS, UNIT VENTILATORS			
2j. Ensured that the interior of air-handling unit(s) or unit ventilator	,		
(air-mixing chamber and fan blades) is clean	.ø,		
(air-mixing chamber and fan blades) is clean	.⊿		
ACTIVITY 8: MECHANICAL ROOMS			
21. Checked mechanical room for unsanitary conditions, leaks, and spills	Ø		
2m. Ensured that mechanical rooms and air-mixing chambers are free of trash, chemical products, and supplies	Z	o	
	~	-	
3. CONTROLS FOR OUTDOOR AIR SUPPLY			-
3a. Ensured that air dampers are at least partially open (minimum position)	.α		A
3b. Ensured that minimum position provides adequate outdoor air			1
for occupants			Ø
ACTIVITY 9: CONTROLS INFORMATION			
3c. Obtained and reviewed all design inside/outside temperature and humidity			
requirements, controls specifications, as-built mechanical drawings,			
and controls operations manuals (often uniquely designed)	Ø		
ACTIVITY 10: CLOCKS, TIMERS, SWITCHES			
3d. Turned summer-winter switches to the correct position	Ø		
3e. Set time clocks appropriately			ø
3f. Ensured that settings fit the actual schedule of building use (including			•
night/weekend use)	Ø		
ACTIVITY 11: CONTROL COMPONENTS			
3g. Ensured appropriate system pressure by testing line pressure at both the			•
occupied (day) setting and the unoccupied (night) setting			Σ.
3h. Checked that the line dryer prevents moisture buildup			A
3i. Replaced control system filters at the compressor inlet based on the			
compressor manufacturer's recommendation (for example, when you blow down the tank)			ø
3j. Set the line pressure at each thermostat and damper actuator at the proper	9	9	y 4
level (no leakage or obstructions)			Ø
ACTIVITY 12: OUTDOOR AIR DAMPERS	4		
3k. Ensured that the outdoor air damper is visible for inspection	μ		4
for inspection	⊿		Q
3m. Ensured that air temperature in the indoor area(s) served by each		_	
outdoor air damper is within the normal operating range	ø	Q	

NOTE: It is necessary to ensure that the damper is operating properly and within the normal range to continue.



3n.	Checked that the outdoor air damper fully closes within a few minutes of shutting off appropriate air handler	es Y	No D	N/A
30.	Checked that the outdoor air damper opens (at least partially with no delay) when the air handler is turned on	ſ		a
3p.	If in heating mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 85°F	נ	a	Ģ∕
3q.	If in cooling mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 60°F and mixed air thermostat is set to 45°F	נ	a	, ,
3r.	If the outdoor air damper does not move, confirmed the following items:			1
	• The damper actuator links to the damper shaft, and any linkage set screws or bolts are tight	1		۵
	Moving parts are free of impediments (e.g., rust, corrosion)	r	٩	Q
	Electrical wire or pneumatic tubing connects to the damper actuator			D
	 The outside air thermostat(s) is functioning properly (e.g., in the right location, calibrated correctly) 	r	, D	D
Pro	ceed to Activities 13–16 if the damper seems to be operating properly.			

ACTIVITY 13: FREEZE STATS

3s.	Disconnected power to controls (for automatic reset only) to test continuity across terminals	۵	ø
OR			1
3t.	Confirmed (if applicable) that depressing the manual reset button (usually red) trips the freeze stat (clicking sound indicates freeze stat was		
	tripped)	Q	
3u.	Assessed the feasibility of replacing all manual reset freeze-stats with automatic reset freeze-stats	_	

NOTE: HVAC systems with water coils need protection from the cold. The freeze-stat may close the outdoor air damper and disconnect the supply air when tripped. The typical trip range is 35°F to 42°F.

ACTIVITY 14: MIXED AIR THERMOSTATS

3v. Ensured that the mixed air stat for heating mode is set no higher than 65°F	
3w. Ensured that the mixed air stat for cooling mode is set no lower than the room thermostat setting	

ACTIVITY 15: ECONOMIZERS

Confirmed proper economizer settings based on design specifications or		
local practices	Q	D

NOTE: The dry-bulb is typically set at 65°F or lower.

- 3y. Checked that sensor on the economizer is shielded from direct sunlight $\Box \qquad \Box$
- 3z. Ensured that dampers operate properly (for outside air, return air, exhaust/relief air, and recirculated air), per the design specifications

NOTE: Economizers use varying amounts of cool outdoor air to assist with the cooling load of the room or rooms. There are two types of economizers, dry-bulb and enthalpy. Dry-bulb economizers vary the amount of outdoor air based on outdoor temperature, and enthalpy economizers vary the amount of outdoor air based on outdoor temperature and humidity level.

ACTIVITY 16: FANS

3aa. Ensured that all fans (supply fans and associated return or relief fans) that move outside air indoors continuously operate during occupied Yes No N/A hours (even when room thermostat is satisfied)......

NOTE: If fan shuts off when the thermostat is satisfied, adjust control cycle as necessary to ensure sufficient outdoor air supply.

4. AIR DISTRIBUTION

ACTIVITY 17: AIR DISTRIBUTION

4a. Ensured that supply and return air pathways in the existing ventilation system perform as required	i
4b. Ensured that passive gravity relief ventilation systems and transfer grilles between rooms and corridors are functioning	
NOTE: If ventilation system is closed or blocked to meet current fire codes, consult with a professional engineer for remedies.	
 4c. Made sure every occupied space has supply of outdoor air (mechanical system or operable windows)	
NOTE: If outlets have been blocked intentionally to correct drafts or discomfort, investigate and correct the cause of the discomfort and reopen the vents.	
4e. Modified the HVAC system to supply outside air to areas without an outdoor air supply	1
4f. Modified existing HVAC systems to incorporate any room or zone layout and population changes	l
4g. Moved all barriers (for example, room dividers, large free-standing blackboards or displays, bookshelves) that could block movement of air in the room, especially those blocking air vents	/

activities п 4i. Ensured that classrooms are free of uncomfortable drafts produced by air **D**. **D** from supply terminals

4h. Ensured that unit ventilators are quiet enough to accommodate classroom

ACTIVITY 18: PRESSURIZATION IN BUILDINGS

NOTE: To prevent infiltration of outdoor pollutants, the ventilation system is designed to maintain positive pressurization in the building. Therefore, ensure that the system, including any exhaust fans, is operating on the "occupied" cycle when doing this activity.

4j.	Ensured that air flows out of the building (using chemical smoke) through		,
	windows, doors, or other cracks and holes in exterior wall (for example,	/	/
	floor joints, pipe openings)	Ø	Ξ

5. EXHAUST SYSTEMS

ACTIVITY 19: EXHAUST FAN OPERATION 5a. Checked (using chemical smoke) that air flows into exhaust fan grille(s) 🛛

If fans are running but air is not flowing toward the exhaust intake, check for the following:

- Inoperable dampers
- Obstructed, leaky, or disconnected ductwork
- · Undersized or improperly installed fan
- Broken fan belt





ACTIVITY 20: EXHAUST AIRFLOW

NOTE: Prevent migration of indoor contaminants from areas such as bathrooms, kitchens, and labs by keeping them under negative pressure (as compared to surrounding spaces).

Stand outside the room with the door slightly open while checking airflow high and low in the door opening (see "How to Measure Airflow").

ACTIVITY 21: EXHAUST DUCTWORK

5d. Checked that the exhaust ductwork downstream of the exhaust fan (which is under positive pressure) is sealed and in good condition......

6. QUANTITY OF OUTDOOR AIR

ACTIVITY 22: OUTDOOR AIR MEASUREMENTS AND CALCULATIONS

NOTE: Refer to "How to Measure Airflow" for techniques.

6a. Measured the quantity of outdoor air supplied (22a) to each ventilation unit 6b. Calculated the number of occupants served (22b) by the ventilation unit under consideration 6c. Divided outdoor air supply (22a) by the number of occupants (22b) to determine the existing quantity of outdoor air supply per person (22c) **ACTIVITY 23: ACCEPTABLE LEVELS OF OUTDOOR AIR QUANTITIES** 6d. Compared the existing outdoor air per person (22c) to the recommended levels in Table 1 6e. Corrected problems with ventilation units that supplied inadequate quantities of outdoor air to ensure that outdoor air quantities (22c) meet the recommended levels in Table 1

NOTES All HVAC units through the BAS have advanced ventilation control logic deployed associated with the spaces they serve. The system will modulate the outdoor air damper and return dampers to provide the proper amount of air as needed to maintain space CO2 levels. This type of control is called CO2 based Demand-Controlled Ventilation (DCV). DCV provides proper ventilation air quantities as well as energy savings by reducing the amount of required ventilation air based on the CO2 levels measured by the sensor. The CO2 levels in parts per million (PPM) is used as an indicator of the number of occupants in a room. When the room has less than design occupancy, the required volume of ventilation is reduced. The CO2 sensor allows the VFD to reduce the fan speed to deliver a reduced volume of outside air for ventilation during these periods. An increase in the CO2 level is an indication that more people are in the room, so the fan speed is increased to maintain the required volume of ventilation air under all occupancy conditions.

Active DCV control is an acceptable alternate method to determine if ventilation requirements are met and could supersede rooms that may fail otherwise using traditional measured data collection procedures prescribed by established ASHRAE guidelines.

The ideal supply of outside air to interior occupied spaces should be based upon the 2018 Connecticut Building Code, which is based on the most currently adopted 2015 International Mechanical Code and coincides with ASHRAE-62.1, (2010) guidelines

BAS: Building Automation System

VFD: Variable Frequency Drive (Controls the speed of the fan motor) ASHRAE: American Society of Heating, Refrigerating and Air Conditioning Engineers

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- 3. Complete the Checklist.
 - Check the "yes," "no," or "not applicable" box beside each item. (A "no" response requires further attention.)
 - Make comments in the "Notes" section as necessary.
- Return the checklist portion of this document to the IAQ Coordinator.

Ventilation Checklist

Name:	Stephan	Mortoni		
School:	Amity	Middle	School Orange	2
Unit Vent	ilator/AHU No:	36		
Room or a	Area: /	36 B	Date Completed:	1-31.24
Signature	. In la	15		

1. OUTDOOR AIR INTAKES

la.	Marked locations of all outdoor air intakes on a small floor plan (for example, a fire escape floor plan)			N/A
1b.	Ensured that the ventilation system was on and operating in "occupied" mode	,	D	D
AC	TIVITY 1: OBSTRUCTIONS			
	Ensured that outdoor air intakes are clear of obstructions, debris, clogs, or covers	ſ		
1d.	Installed corrective devices as necessary (e.g., if snowdrifts or leaves frequently block an intake)	2	ø	D
AC	TIVITY 2: POLLUTANT SOURCES			
	Checked ground-level intakes for pollutant sources (dumpsters, loading docks, and bus-idling areas)	ſ	D	
1f.	Checked rooftop intakes for pollutant sources (plumbing vents; kitchen, toilet, or laboratory exhaust fans; puddles; and mist from air-conditioning cooling towers)	イ		
1g.	Resolved any problems with pollutant sources located near outdoor air intakes (e.g., relocated dumpster or extended exhaust pipe)	and the second s		
AC	TIVITY 3: AIRFLOW			
lh.	Obtained chemical smoke (or a small piece of tissue paper or light plastic) Confirmed that outdoor air is entering the intake appropriately			
2.	SYSTEM CLEANLINESS			
AC	TIVITY 4: AIR FILTERS			
	Replaced filters per maintenance schedule	1		
2b.	Shut off ventilation system fans while replacing filters (prevents dirt from blowing downstream)	1,	D	
2c.	Vacuumed filter areas before installing new filters			
2d.	Confirmed proper fit of filters to prevent air from bypassing (flowing			

2e. Confirmed proper installation of filters (correct direction for airflow).......

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2. SYSTEM CLEANLINESS (continued)

ACTIVITY 5: DRAIN PANS

ACTIVITY 5: DRAIN PANS			
2f. Ensured that drain pans slant toward the drain (to prevent water from accumulating)	'es Z	No	N/A
accumulating) 2g. Cleaned drain pans	7		ū
2h. Checked drain pans for mold and mildew	7		
			-
ACTIVITY 6: COILS	7		
2i. Ensured that heating and cooling coils are clean	,∡	Q	Q
,			
ACTIVITY 7: AIR-HANDLING UNITS, UNIT VENTILATORS			
2j. Ensured that the interior of air-handling unit(s) or unit ventilator	1		
(air-mixing chamber and fan blades) is clean	Z)		
(air-mixing chamber and fan blades) is clean	Ź		
ACTIVITY 8: MECHANICAL ROOMS	,		
21. Checked mechanical room for unsanitary conditions, leaks, and spills	Z		
2m. Ensured that mechanical rooms and air-mixing chambers are free of trash, chemical products, and supplies	,		
chemical products, and supplies	Z		
3. CONTROLS FOR OUTDOOR AIR SUPPLY			
3a. Ensured that air dampers are at least partially open (minimum position)	n	п	
3b. Ensured that minimum position provides adequate outdoor air		-	<i>(</i> ,
for occupants	m –		
		-	
ACTIVITY 9: CONTROLS INFORMATION			
3c. Obtained and reviewed all design inside/outside temperature and humidity			
requirements, controls specifications, as-built mechanical drawings,			
and controls operations manuals (often uniquely designed)	∡		
· · · · · · · · · · · · · · · · · · ·			
ACTIVITY 10: CLOCKS, TIMERS, SWITCHES			
3d. Turned summer-winter switches to the correct position	2		
3e. Set time clocks appropriately			ø
3f. Ensured that settings fit the actual schedule of building use (including			r
night/weekend use)	Z		
ACTIVITY 11: CONTROL COMPONENTS			
3g. Ensured appropriate system pressure by testing line pressure at both the			•
occupied (day) setting and the unoccupied (night) setting			ДĨ
3h. Checked that the line dryer prevents moisture buildup			<u>A</u>
3i. Replaced control system filters at the compressor inlet based on the			
compressor manufacturer's recommendation (for example, when you			
blow down the tank)			ø
3j. Set the line pressure at each thermostat and damper actuator at the proper	-	_	
level (no leakage or obstructions)	4		р
ACTIVITY 12: OUTDOOR AIR DAMPERS		~	
3k. Ensured that the outdoor air damper is visible for inspection	Д		
31. Ensured that the recirculating relief and/or exhaust dampers are visible	⊀	-	
for inspection	4		
3m. Ensured that air temperature in the indoor area(s) served by each	1		
outdoor air damper is within the normal operating range	تصا	Ч	
NOTE. It is necessary to ensure that the damner is operating properly and within	the	יימוו	nat



NOTE: It is necessary to ensure that the damper is operating properly and within the normal range to continue.



3n.	Checked that the outdoor air damper fully closes within a few minutes of shutting off appropriate air handler	'es 3	00 0	N/A
30.	Checked that the outdoor air damper opens (at least partially with no delay) when the air handler is turned on	Z	a	Q
3р.	If in heating mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 85°F		Q	۶ź
•	If in cooling mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 60°F and mixed air thermostat is set to 45°F	_]	D . '	9
3r.	If the outdoor air damper does not move, confirmed the following items:The damper actuator links to the damper shaft, and any linkage set			2
	screws or bolts are tight	Э	ם ַ	D
	• Moving parts are free of impediments (e.g., rust, corrosion)	3	العر	Q
	• Electrical wire or pneumatic tubing connects to the damper actuator	Э⁄	ίΩ.	D
	• The outside air thermostat(s) is functioning properly (e.g., in the right location, calibrated correctly)	æ		a

Proceed to Activities 13-16 if the damper seems to be operating properly.

ACTIVITY 13: FREEZE STATS

3s.	Disconnected power to controls (for automatic reset only) to test continuity across terminals	۵	ø
OR			'
3t.	Confirmed (if applicable) that depressing the manual reset button (usually red) trips the freeze stat (clicking sound indicates freeze stat was		
	tripped)	Q	
3u.	Assessed the feasibility of replacing all manual reset freeze-stats with automatic reset freeze-stats	_	
		1	

NOTE: HVAC systems with water coils need protection from the cold. The freeze-stat may close the outdoor air damper and disconnect the supply air when tripped. The typical trip range is $35^{\circ}F$ to $42^{\circ}F$.

ACTIVITY 14: MIXED AIR THERMOSTATS

3v.	Ensured that the mixed air stat for heating mode is set no higher than 65°F		D
3w.	Ensured that the mixed air stat for cooling mode is set no lower than the room thermostat setting	· ,	Q

ACTIVITY 15: ECONOMIZERS

Confirmed proper economizer settings based on design specifications or		
local practices	Q	Q

NOTE: The dry-bulb is typically set at 65°F or lower.

- 3y. Checked that sensor on the economizer is shielded from direct sunlight \square

NOTE: Economizers use varying amounts of cool outdoor air to assist with the cooling load of the room or rooms. There are two types of economizers, dry-bulb and enthalpy. Dry-bulb economizers vary the amount of outdoor air based on outdoor temperature, and enthalpy economizers vary the amount of outdoor air based on outdoor temperature and humidity level.

ACTIVITY 16: FANS

3aa. Ensured that all fans (supply fans and associated return or relief fans) that move outside air indoors continuously operate during occupied Yes No N/A hours (even when room thermostat is satisfied)......

NOTE: If fan shuts off when the thermostat is satisfied, adjust control cycle as necessary to ensure sufficient outdoor air supply.

4. AIR DISTRIBUTION

ACTIVITY 17: AIR DISTRIBUTION

4a.	Ensured that supply and return air pathways in the existing ventilation system perform as required		a
4b.	Ensured that passive gravity relief ventilation systems and transfer grilles between rooms and corridors are functioning		
	TE: If ventilation system is closed or blocked to meet current fire codes, consult w fessional engineer for remedies.	vith a	
4c.	Made sure every occupied space has supply of outdoor air (mechanical system or operable windows)	/	Q
4d.	Ensured that supply and return vents are open and unblocked		D
	TE: If outlets have been blocked intentionally to correct drafts or discomfort, inve l correct the cause of the discomfort and reopen the vents.	stigat	te
4e.	Modified the HVAC system to supply outside air to areas without an outdoor air supply		
4f.	Modified existing HVAC systems to incorporate any room or zone layout and population changes	D	
4g.	Moved all barriers (for example, room dividers, large free-standing blackboards or displays, bookshelves) that could block movement of air in the room, especially those blocking air vents		⊿
4h.	Ensured that unit ventilators are quiet enough to accommodate classroom activities		
4i.	Ensured that classrooms are free of uncomfortable drafts produced by air	, _	_

ACTIVITY 18: PRESSURIZATION IN BUILDINGS

NOTE: To prevent infiltration of outdoor pollutants, the ventilation system is designed to maintain positive pressurization in the building. Therefore, ensure that the system, including any exhaust fans, is operating on the "occupied" cycle when doing this activity.

4j.	Ensured that air flows out of the building (using chemical smoke) through		,
	windows, doors, or other cracks and holes in exterior wall (for example,	/	
	floor joints, pipe openings)	ত্র	•

5. EXHAUST SYSTEMS

ACTIVITY 19: EXHAUST FAN OPERATION

5a. Checked (using chemical smoke) that air flows into exhaust fan grille(s) D

- If fans are running but air is not flowing toward the exhaust intake, check for the following:
 - Inoperable dampers
 - Obstructed, leaky, or disconnected ductwork
 - · Undersized or improperly installed fan
 - Broken fan belt





ACTIVITY 20: EXHAUST AIRFLOW

NOTE: Prevent migration of indoor contaminants from areas such as bathrooms, kitchens, and labs by keeping them under negative pressure (as compared to surrounding spaces).

5b. Checked (using chemical smoke) that air is drawn into the room from Yes. No N adjacent spaces	/A _
Stand outside the room with the door slightly open while checking airflow high and low in the door opening (see "How to Measure Airflow").	
5c. Ensured that air is flowing toward the exhaust intake	ב
ACTIVITY 21: EXHAUST DUCTWORK	
5d. Checked that the exhaust ductwork downstream of the exhaust fan (which is under positive pressure) is sealed and in good condition	ב

6. QUANTITY OF OUTDOOR AIR

ACTIVITY 22: OUTDOOR AIR MEASUREMENTS AND CALCULATIONS

NOTE: Refer to "How to Measure Airflow" for techniques.

ба.	Measured the quantity of outdoor air supplied (22a) to each ventilation unit		
6b.	Calculated the number of occupants served (22b) by the ventilation unit under consideration		
бс.	Divided outdoor air supply (22a) by the number of occupants (22b) to determine the existing quantity of outdoor air supply per person (22c)		D
AC	TIVITY 23: ACCEPTABLE LEVELS OF OUTDOOR AIR QUANTITIES		
	TIVITY 23: ACCEPTABLE LEVELS OF OUTDOOR AIR QUANTITIES Compared the existing outdoor air per person (22c) to the recommended levels in Table 1	G	G
6d.	Compared the existing outdoor air per person (22c) to the recommended	G	0

NOTES All HVAC units through the BAS have advanced ventilation control logic deployed associated with the spaces they serve. The system will modulate the outdoor air damper and return dampers to provide the proper amount of air as needed to maintain space CO2 levels. This type of control is called CO2 based Demand-Controlled Ventilation (DCV). DCV provides proper ventilation air quantities as well as energy savings by reducing the amount of required ventilation air based on the CO2 levels measured by the sensor. The CO2 levels in parts per million (PPM) is used as an indicator of the number of occupants in a room. When the room has less than design occupancy, the required volume of ventilation is reduced. The CO2 sensor allows the VFD to reduce the fan speed to deliver a reduced volume of outside air for ventilation during these periods. An increase in the CO2 level is an indication that more people are in the room, so the fan speed is increased to maintain the required volume of ventilation air under all occupancy conditions.

Active DCV control is an acceptable alternate method to determine if ventilation requirements are met and could supersede rooms that may fail otherwise using traditional measured data collection procedures prescribed by established ASHRAE guidelines.

The ideal supply of outside air to interior occupied spaces should be based upon the 2018 Connecticut Building Code, which is based on the most currently adopted 2015 International Mechanical Code and coincides with ASHRAE-62.1, (2010) guidelines

BAS: Building Automation System VFD: Variable Frequency Drive (Controls the speed of the fan motor) ASHRAE: American Society of Heating, Refrigerating and Air Conditioning Engineers

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