

COVID-19 SCHOOL BUILDING HVAC CHECKLIST

2015 Michigan Mechanical Code, ASHRAE Standards 55 & 62.1, and ASHRAE COVID-19 Guidelines

INTRODUCTION

Covid-19 has been identified by the CDC as an airborne virus. For that reason, ASHRAE (American Society of Heating, Refrigerating, and Air-Conditioning Engineers) has created an epidemic task force to develop guidance on the operation of HVAC (Heating, Ventilating, Air-Conditioning) to help try to mitigate the spread of the virus. To review all the recommendations, please refer to the **ASHRAE Epidemic Task Force Schools & Universities** 41-page document that is updated as needed to reflect current understanding of the pandemic. The list of items on this checklist are all comprised from the ASHRAE recommendations and from the EGLE (Environment, Great Lakes, and Energy) indoor air quality (IAQ) checklist. This is intended to provide guidance on how existing systems may be adjusted and operated during the pandemic as well as providing an assessment of additional items and strategies that may be adopted in the future to improve HVAC systems in K-12 schools in the State of Michigan, even after the pandemic is contained.

GENERAL OBSERVATIONS

When the HVAC specialist arrives on site, they should take note of the listed items to identify any outside issues that negatively impact the building's operation. By surveying the building and interviewing the building occupants, current conditions can be confirmed that may give an indication of general areas to focus on. (Example: confirming the location where outside air enters the building and observing that it is unobstructed).

MECHANICAL ROOM

An HVAC specialist can gather a lot of information about the main HVAC systems by studying a mechanical room. The list of questions are related to general observations to identify potential issues related to the maintenance, repair, and functional operation of HVAC systems.

BUILDING CONTROL SETTINGS

ASHRAE provides standards for how to operate building systems for occupants' comfort (Standard 55) and has expanded recommendations in an effort to help mitigate the spread of COVID-19 among building occupants to the extent possible by altering, adjusting, and upgrading HVAC systems and their operational parameters. The checklist items identify that the systems are set to optimum standards. The Pandemic Task Force has added further specific recommendations for airborne viruses that are reflected in this section. (Example: Running the air handling systems for 2 hours before and after occupancy will "Flush" the air within the spaces with outside air to reduce concentration of any potential contaminants.)

AIR HANDLING UNITS

This section will capture the most information directly related to HVAC systems operation that may impact building occupants. It is designed to address operational issues with customized recommendations for upgrading any deficient items through use of the attachments and cost range information in the last section of the document, "Recommended Action Items & Estimated Cost". Although not directly located in the occupied spaces, the systems and components reviewed here typically have the most direct impact on IAQ, which is paramount to the well-being of all occupants and will remain so even after the pandemic is contained.

LOCAL HVAC UNITS (Mini Splits, VRF, Unit Ventilators, etc.)

Similar to the Air Handling Units section, this section will include specific HVAC systems operation items for the units that are located directly within the occupied spaces, such as mini split air conditioners, fan coil units for VRF systems, and unit ventilators. It also has similar direct influence on IAQ for occupants during and after the pandemic.

SPACE CONDITIONS

More observations on the HVAC system IAQ and air delivery to spaces and issues related to the actual occupied space configuration are included in this section. This may have the most direct influence on mitigating person-to-person transmission of any airborne or direct contact contaminant.

NEXT STEP/RECOMMENDATIONS

In this section, the HVAC specialist concludes the School Building HVAC checklist by identifying and recommending if any deficiencies may need additional specialists to help further identify, confirm, and fix issues based on what was observed during the systems review process. Confirmation that Action Items have been documented with estimated cost is noted. If any recommendations from the checklist are implemented, it is critical that facility operators are notified and are properly trained on the item for the best results.

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Customer Name: _____ Date: _____

Building Name: _____

This checklist is intended for use by a licensed mechanical contractor to review the HVAC systems in K-12 schools in the State of Michigan. Once completed, the list will provide a record of the current status towards having the listed items in place and functioning correctly to school officials along with estimated cost for any items on the checklist that do not meet the ASHRAE recommendations. For each item that indicates improper operation or notes something that requires attention (“No” or “N/A” response to item), the contractor is to provide a brief description of what needs to be done to bring the item up to recommended levels along with an indication of whether the item is considered low, medium, or high priority, in the contractor’s opinion based on site conditions observed, and the estimated budget cost, all recorded in space provided at the end of this document.

Review each of the following line items and check Yes, No, or N/A (not applicable) for each item to reflect actual onsite conditions for the subject building.

HVAC INVENTORY

Air Handling Units

- Rooftop Units Qty _____
- Airside Economizers Qty _____
- Packaged Terminal Units _____
- Unit Ventilators Qty _____
- Fan Coil Units Qty _____
- Furnaces Qty _____
- Window Air Conditioners Qty _____

Boilers

- Hydronic Qty _____
- Steam Qty _____

Pumps

- Pumps Qty _____

Fans (freestanding)

- Fans Qty _____

Chillers

- Air-Cooled Qty _____
- Water-Cooled Qty _____

Cooling Towers Qty _____

Building Automation System

Brand _____

Model _____

Software Version _____

GENERAL OBSERVATIONS

Yes No N/A Check this box if additional information and estimated cost is attached.

- 1) Reviewed status of building complaints and addressed deficiencies identified if possible?
- 2) Reviewed existing system design for compliance with this guidance?
- 3) Completed general inspection of spaces to identify if any water leaks or mold growth visible?
- 4) Verified separation between outdoor air intakes and exhaust discharge outlets (min 10’)?
- 5) Verified bird screens in place and unobstructed?
- 6) Reviewed if any nearby contaminant sources negatively impacting outside air?

MECHANICAL ROOM

Yes No N/A Check this box if additional information and estimated cost is attached.

- 7) Room is clean and dry?
- 8) Chemicals are not stored in the room?
- 9) Mechanical systems do not show any evidence of improper operation?
- 10) Control systems do not show evidence of improper operation?
- 11) Pumps and associated electrical components do not show evidence of improper operation?

BUILDING CONTROL SETTINGS

Yes No N/A Check this box if additional information and estimated cost is attached.

- 12) Building has building automation system (BAS)?
- 13) BAS software is up to date?
- 14) Winter indoor air temp set at 72°F and 40-50% relative humidity? (Reduce RH if window condensing issue)
- 15) Summer indoor air temp set at 75°F and 50-60% relative humidity? (Set for max of 60% allowed)
- 16) Control sequences maintain required ventilation, temperature, and humidity conditions to occupied areas? Comment on ventilation min OA setting adequacy _____
- 17) Ventilation system operate 2 hours before and after occupancy?

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- 18) DOAS systems operate 2 hours before and after occupancy?
- 19) Exhaust fans turn on when DOAS is running during occupancy?
- 20) Control sequences in VAV systems avoid outdoor air flow/minimum OA air flow shortage?
- 21) Outside air economizer switchover point set to 70°F or higher outside air temperature for systems that allow integrated economizer mode (sufficient DX partial load controls, etc.)?
- 22) Unusual observations documented that are not recorded by the control system?

AIR HANDLING UNITS

Yes No N/A Check this box if additional information and estimated cost is attached.

- 23) Any evidence of improper operation on the control system and devices?
- 24) Any drive belts need to be repaired or properly tensioned?
- 25) Drain pans clean and have the proper slope?
- 26) Evidence of biological growth on the coils?
- 27) Air filters installed correctly and filter rack is in good condition?
- 28) Air filters sealed to rack and spacers, if present?
- 29) Air filters in good condition? Date installed _____ MERV rating of filter _____
- 30) System can accommodate higher-rated filter than current? (attach recommendation)
- 31) System has pressure gage to assist in determining filter change frequency?
- 32) Unit has humidifier? (if not recommend a unit)
- 33) Humidifier is in good working order?
- 34) Unit has ultraviolet lamps, and they are in good working order?
- 35) Unit has bipolar ionization, and it is in good working order?
- 36) System does not have disinfection feature but can accommodate one, such as UV-C or bipolar ionization? Recommendation (see attached also) _____
- 37) Control dampers are operating properly?
- 38) AHU is bringing in outdoor air and removing exhaust air as intended?
- 39) Unit has Energy Recovery System?
- 40) Energy Recovery System allows exhaust airstream to transfer to the supply airstream?
- 41) Without adversely impacting system operation, outside air can be set to maximum practical amount?
- 42) Demand Control Ventilation disabled for full outside air?
- 43) Economizer dampers cleared and functioning?
- 44) Airflow rates meet the ASHRAE Standard 62.1 or current state code requirements?
- 45) Unit discharge air temperatures are adequate to maintain desired indoor conditions?
- 46) Sensors have been calibrated within the last three years? Date of last calibration _____

LOCAL HVAC UNITS (Mini Splits, VRF, Unit Ventilators, etc.)

Yes No N/A Check this box if additional information and estimated cost is attached.

- 47) Air filters installed correctly?
- 48) Air filters in good condition? Date installed _____ Type of filter _____
- 49) System can accommodate higher-rated filter than current? Suggested MERV rating _____
- 50) Unit allows for proper amounts of outside air and operation?
- 51) Unit air recirculation minimized in zones to reduce cross contamination where using common ductwork?
- 52) Space has humidifier? (If not recommend a unit)
- 53) Humidifier is in good working order?
- 54) System does not have disinfection feature but can accommodate one, such as UV-C or bipolar ionization? Recommendation (see attached also) _____

SPACE CONDITIONS

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Yes No N/A Check this box if additional information and estimated cost is attached.

- 55) Airflow patterns in spaces are adjusted to minimize occupant exposure to particles from others?
- 56) Space is using ceiling fans, personal fans, or space heaters with internal fans? (should not be used)
- 57) Ducts are dry and clean?
- 58) Adverse air distribution conditions observed? (covered diffusers, blocked return grills, short cycling...)

NEXT STEPS/RECOMMENDATIONS

Yes No N/A Check this box if additional information and estimated cost is attached.

- 59) Should HVAC systems and controls be fully retro-commissioned by a commissioning specialist?
- 60) Should local engineer be consulted to review/update design of the system?
- 61) Should Testing, Adjusting and Balancing (TAB) contractor measure/balance the building?
- 62) Are all recommended operating protocols from this checklist documented with estimated cost information? (review Recommended Action Items & Cost Estimates section of report)
- 63) Has management personnel been notified of any changes so the facility operators can be trained?

For additional guidance, visit the ASHRAE COVID-19 Resources page located at <https://www.ashrae.org/technical-resources/resources> and reference the appropriate edition of these documents:

- ASHRAE Reopening Schools and Universities C19 Guidance – has a section for nurse’s office and filtration upgrades
- ASHRAE Practical Guidance for Epidemic Operation of Energy Recovery Ventilation Systems
- ASHRAE Position Document on Airborne Infectious Aerosols
- ASHRAE Standard 180: Standard Practice for Inspection and Maintenance of Commercial Building HVAC Systems
- ASHRAE Standard 62.1: Ventilation for Acceptable Indoor Air Quality
- ASHRAE Standard 55: Thermal Environmental Conditions for Human Occupancy
- ASHRAE Guideline 29: Guideline for the Risk Management of Public Health and Safety in Buildings
- “Developing a Water Management Program to Reduce Legionella Growth & Spread in Buildings” by the U.S. CDC
- For assistance, consult your local engineer specializing in HVAC and water systems and water treatment specialist.

Any information provided as part of this document is for general information purposes only and should not be construed as medical advice or opinion. Please consult a licensed healthcare professional for medical advice. This document does not guarantee or verify that operating in accordance with these recommendations will be free from risk.

Because of the constantly changing nature of the information associated with the COVID-19 virus and the differing information obtained from different sources, EGLE excludes all liability and disclaims all warranties, express or implied, as to the accuracy and completeness of this document.

Checklist Completed by (company name): _____

Mich. LARA License # _____ Employee’s Name: _____

Signature: _____ Date: _____

Building Representative Name (print): _____

Signature: _____ Date: _____

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RECOMMENDED ACTION ITEMS & ESTIMATED COST

Line Item #	Level Import	Description (use more than one line for individual items as needed)	Estimated Cost Range

Level of importance: **Low** = Nice to have / **Med** = Include in future planning / **High** = Consider addressing ASAP