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ASHRAE Headquarters

Building Readiness Plan for SARS-CoV-2

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The ASHRAE Epidemic Task Force (ETF) has quickly created a number of useful guidance documents for operating buildings during an epidemic, which are posted on ASHRAE's COVID-19 website pages (www.ashrae.org/covid19). Many of these documents would also apply after the epidemic has passed. Since the existing ASHRAE Headquarters (HQ) was observing shelter-in-place orders to help flatten the transmission of the SARS-CoV-2 virus that causes COVID-19, the building was unoccupied for several weeks. The ETF believed, and ASHRAE leadership agreed, that the ASHRAE HQ should be evaluated using the same analysis approaches it is suggesting for its members and their clients.

Members of the Building Readiness Team that is part of the ETF performed the analysis on the current ASHRAE HQ to determine which mitigation strategies should be implemented prior to staff returning to the building. This team also looked at the new ASHRAE HQ under construction to determine if any engineering controls could be added to improve its ability to mitigate virus transmission in alignment with the Building Readiness Guide (<https://tinyurl.com/y5r92ohs>).

For the existing HQ building, a team of individuals was formed to perform the analysis that consisted of ETF members, the commissioning provider for the last renovation to the building and the building operations team for ASHRAE. (See "Analysis Team" on the facing page.)

The intent of the analysis was to review the HVAC

systems and to identify potential improvements to the system and potential failure points that could be checked by the building's maintenance contractor. The team used the existing building automation system (BAS) graphics, as-built floor plans and BAS trend data to conduct this effort. The building has a dedicated outdoor air system (DOAS) that delivers all the outdoor air to the spaces. Local cooling and heating is provided using different terminal equipment on each floor: the first floor is conditioned using ground source heat pumps; and, the second floor is conditioned using variable refrigerant flow fan coil units. Each of the terminal units has a filter box to provide increased filtration capability in addition to the filtration incorporated into

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the DOAS unit. There is only one exhaust system for the building, and that is via the DOAS unit through the energy recovery wheel that is located on the roof.

The first step in this effort was to identify potential issues for the HVAC systems maintenance contractor to check on their next visit to the building. Then the team tried to identify improvements that might need to be implemented. ASHRAE staff wanted a list of things for the maintenance contractor to check in addition to the normal quarterly checkup.

The first issue identified was to confirm the status of the filters in the DOAS and at each of the filter mixing boxes at the terminal equipment in the spaces. ASHRAE staff was able to confirm that the interior electrostatic filters had been replaced around the time of the 2019 Winter Conference in Atlanta and were still within useful life. These electrostatic filters allow the terminal equipment to achieve MERV 13 filter performance.

There are two sets of filters in the DOAS. One set of supply filters is installed after the return bypass and energy wheel that are MERV 13 equivalent, which reduced concern over potential wheel crossover or return path leakage. To be safe, it was suggested that the maintenance team disconnect or disable the return damper and seal that pathway to further mitigate potential transmission by having the unit function with 100% outdoor air and 100% exhaust air.

The second set of filters was on the building return/relief to the unit prior to the energy wheel. These filters need to be confirmed to be MERV 8 as originally required in the design, which was based on having MERV 13 filters before the air is supplied to the space.

There was an extended discussion on the operation of the DOAS unit and its capacity to bring in outdoor air during the occupied times as well as provide for pre- and postoccupancy flush cycles. The team agreed to a sequence to keep the unit at its maximum outdoor airflow setpoint during occupied modes and then to perform the analysis recommended in the Building Readiness Guide to determine the number of hours required for these flush cycles. The Building Readiness Guide suggests three air changes of outdoor air to flush the building of approximately 95% of its contaminants. Quick calculations showed that this would require three hours of flushing and was noted that this should be added to the BAS schedule programming.

To maximize the ventilation airflow to the space

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during occupied hours, the demand controlled ventilation was to be “disabled” for the system. The team agreed

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that changing the space CO₂ setpoint to 300 ppm would effectively “disable” the demand control ventilation (DCV) sequence and allow for minimal programming time now and when it is time to re-enable this energy savings strategy post pandemic.

The BAS also monitors building pressure via sensors located throughout the building. The team agreed it was appropriate to have the maintenance contractor’s testing, adjusting and balancing (TAB) personnel check the calibration of these sensors to verify the system was working properly.

Other strategies HQ will be using that are not HVAC related include staggering employees’ workdays and areas to create separation and reduce occupancy, improved cleaning processes and frequency, minimizing elevator use and limiting conference room occupancy and use.

For the new ASHRAE HQ under construction, the team met with the project oversight committee lead, Ginger Scoggins, P.E., Fellow ASHRAE, to review the systems’ design and capabilities. This building will also be using a DOAS system equipped with MERV 14 filters, ultraviolet

germicidal irradiation (UVGI) sized at a lamp intensity to provide for a kill strength using a single pass and energy wheels located relative to the fans to minimize any cross contamination.

The contract documents require a pressure profile be completed during TAB to verify compliance with the performance levels outlined in ASHRAE’s “Practical Guidance for Epidemic Operation of Energy Recovery Ventilation Systems” (<https://tinyurl.com/y2wyth7o>). Zone/space airflow is controlled via air terminal equipment that will use the same space CO₂ ppm adjustment discussed for the existing HQ to temporarily disable the DCV strategy. The team analyzing the systems felt that the design of the new facility had incorporated many of suggested mitigation strategies and did not need further alterations to align with the ETF guidance.

Thanks to the ASHRAE Epidemic Task Force for creating the guidance, as well to as the individuals that led the effort to analyze the existing and new ASHRAE buildings. ■



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