

COVID-19 Recommendations

How buildings can support the fight against coronavirus

Introduction

Can buildings really help in the battle against the current coronavirus crisis to better protect people who use the premises by using building equipment and systems like HVAC and Building Management Systems? At Siemens, we believe that they can.

The main precaution and safety measures firmly rely on each individual by way of social distancing, washing hands, and following all the rules and recommendations specified by local governments and health authorities. However, buildings, when operated and monitored correctly, can further support individual efforts.

Although many commercial buildings are currently “closed”, there are still a lot of facilities that must be kept working, regardless of or especially because of this crisis. Many of these buildings run at least on average or above average capacity with a high number of occupants, while there are also buildings that are fully operational but almost empty.

Using HVAC and other Building Management System functions, these buildings must be operated in the best possible way. Today, this often means a temporary shift from energy efficiency to operational efficiency to help protect the people inside these buildings, to the best possible extent. Additionally, these “closed” buildings cannot be left without attention. Despite being a second priority, they need accurate control and monitoring. This ensures that they are healthy and safe places to return to after the crisis – and that assets are protected while empty.

This document contains proposals which can be considered and adapted according to the respective local and site-relevant situation. These proposals are based on recommendations of renowned industry associations (REHVA and ASHRAE) as well as on our own Siemens HVAC industry experience.

Please note that the attached proposals are not dependent on offerings from Siemens. They can easily be implemented by any reputable HVAC system supplier. Before making any modifications to the HVAC and Building Management Systems, always remember to discuss and agree with the building/facility managers and owners first.

The purpose of this document is to share the knowledge currently available on how buildings and building infrastructure can play a role in helping to fight the current coronavirus crisis.

It aims to support solution and service providers (Siemens and 3rd parties), any building owner, facility manager, or service personnel to evaluate actions to take.

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Possible immediate actions to be considered at low additional costs

1. Close all air circulation dampers

Objective

Prevention of contaminated air circulating back to the fresh air side.

Reason

In some cases, during normal times, some of the extracted air is recirculated back to the fresh air side to save energy. In today's situation, it must be ensured that there will be no access for "used air" on the fresh air side to prevent the airborne virus extracted from one area being returned to the rest of the building.

Check

Check whether air circulation is possible or not in the ventilation system.

Consider

Consider closing the circulation damper with manual override control command using a sufficiently high command priority level in the HVAC control system.

Consider physically closing the damper on site.

2. Operation of Heat Recovery Wheel (HRW)

Objective

Prevention of contaminated air circulating or leaking back to the fresh air side.

Reason

There does not seem to be consensus on whether or not the HRW should be kept on or stopped. Various factors from equipment quality and plant setup to maintenance may affect the optimum decision. In most cases, stopping or bypassing the wheel with controlled leakage might be the preferred choice.

Check

Check that the duct pressure on the exhaust side is not greater than the pressure on the fresh air side.

Consider

Consider switching off the heat recovery wheel.

Consider opening the HRW bypass damper if one exists.

Consider adjusting the system so that the exhaust side does not have a higher pressure than the fresh air side.



3. Higher than normal ventilation levels

Objective

Dilution, extraction of viral particles from the air.

Reason

Research shows that viral particles are light and stay airborne for some time after sneezing, coughing, or even loud speaking. The fewer viral particles are in the air, the lower the risk of other people getting infected. With additional fresh air, the relative number of viral particles in the air volume is reduced, and contaminated air is removed more efficiently from the area.

Check

Verify first that ventilation levels are at least as specified – during years of operation this may have been adjusted many times by "gut-feeling" or other reasons such as repair work, modifications, malfunctions, etc.

Check if the ventilation is running at a low level (e.g., low fan speed control signals).

Consider

Consider increasing the level of ventilation if possible (higher fan speeds, higher airflow setpoint).

Consider disabling demand-controlled ventilation functions (disabling function or setting the setpoints high/low enough to avoid their unwanted interference).

Consider disabling air flow-relevant user room operation options where feasible.

Consider ensuring that the ventilation is “on” 24/7, and at least at reduced speed when areas are not in use for longer periods of time.

Consider extending the comfort ventilation operating times by at least 2 hours from both sides.

Note

Double-check that enabled automatic functions (time switch programs etc.) or manual operations do not interfere with possible adjustments made.

Make sure to increase both supply and exhaust appropriately, keeping the desired pressure difference.

4. Correct pressure difference

Objective

Prevention of contaminated air moving or leaking to wrong areas/rooms/places.

Reason

In rooms with controlled lower air pressure, and where viruses and bacteria exist, the air contamination of neighboring areas can be prevented more effectively. With controlled overpressure, the room can be protected from external air contamination entering the room. Also, the buildings are generally often set to a small pressure difference to keep them healthy in normal situations.

Check

Check the ventilation system where pressure difference control exists and verify that current setpoints are according to the specifications.

Consider

Consider adjusting the setpoints in case they are not as specified.

Note

Increasing overall ventilation levels must not alter the pressure difference control.

5. Separate extraction from toilets always on

Objective

Prevention of contaminated air moving outside the toilet areas.

Reason

Toilet areas may be equipped with separate extractor fans or dampers which are activated when lights are switched on. To ensure the correct airflow direction and to prevent virus spread via toilet-based aerosol transfer, the air extraction should be constant.

Check

Check the ventilation system if toilet areas have control equipment for ventilation.

Consider

Consider ensuring that constant underpressure is created in toilet areas 24/7.

6. Switch Fan Coil and Air-Con off when possible (local FCUs, ACs)

Objective

Prevention of contaminated air circulating within room/areas and staying airborne.

Reason

FCU and AC equipment in rooms often does not have a sufficient filtration level to stop virus and bacteria particles on the filters. Thus, they may end up circulating infectious particles around the area more efficiently than airborne particles would normally move.

Consider

Consider switching off the FCU and AC units if possible.

Consider keeping fans constantly “on” if switching off is not possible.

Note

This becomes increasingly important the more people are using the same area, or the higher the occupant exchange rate within the area.

7. Avoid dry air in the area if possible (low relative Humidity / r.H. %)

Objective

Increased droplet size when sneezing or coughing, better nasal mucus protection.

Reason

According to current understanding, temperature and r.H. cannot be used effectively to fight the coronavirus directly. Some indirect possibilities may still have a small impact. Higher relative air humidity may increase the droplet size after sneezing and coughing, so that fewer viral particles would drop faster and be less harmful, instead of light nucleus types being airborne. Additionally, natural nasal mucus protection in humans works better when the air is not too dry. Dry air allows easier access of viruses and bacteria into our systems, from dryness inside the nose etc.

Check

Check the r.H levels if such measuring sensors are in use.

Verify that r.H. levels are at least as specified – during years of operation, this may have been adjusted many times by “gut-feeling” or other reasons such as repair work, modifications, malfunctions, etc.

Consider

Consider increasing the r.H. level to at least 30% r.H. if possible. Humidity levels significantly below 30% are less optimal for the nasal mucus system.

Note

Make sure that attempts to increase r.H. do not compromise increased ventilation levels – which is a much more effective measure against coronavirus.

8. Limit building access after infection

Objective

Ensuring that people who are or were sick are not able to enter the premises before the recommended self-quarantine time has elapsed.

Reason

During the coronavirus crisis in particular, any kind of “basic flu” symptoms should be taken seriously. Sickness or symptoms may be noticed and reported by the individuals themselves, or information could be received from a building’s entry checkpoints etc. Local self-isolation regulations can be supported by means of modern access-control systems.

Check

Check if the security system allows activation of temporary /time-limited access restrictions. Time-limited restrictions would ease work when the time limitation has elapsed.

Verify local governmental and corporate regulations for the duration of self-isolation after sickness. The longer duration should be applied.

Consider

Consider limiting entry by any person reported to be carrying a highly infectious disease.

Note

Verify data privacy issues potentially related to access limitations.

Ensure that the person being denied access to the building knows and understands why such measures have been taken.

9. Automatic limitation of number of occupants in same area

Objective

Allowing every building occupant to work/stay in the building within safe distances from each other.

Reason

Coronavirus is known to be highly infectious, even days before the infected virus carrier realizes anything out-of-the-ordinary with their health. Additionally, some individuals do not develop any symptoms during the entire infection time, so the risk is always in a crowd situation. That’s why it is important to keep a safe distance during this crisis; even from people who currently seem to be in good health.

Check

Check if the security system allows restrictions to be set for each individual access zone.

Evaluate how many persons can enter so that they can keep the required social distance.

Consider

Consider creating such a function if it is not already available. Many modern access control systems have integrated options to configure user-specific functions by the administrative experts. Support from the supplier may be required.

Consider defining “day access passes” per person on a first-come-first-served basis. In this way, access is not suddenly blocked when somebody leaves for lunch, meetings, etc.

Note

Additional guidance should be organized for people who cannot enter the area.

This solution works best if credentials are needed to enter and exit an area. Risks to circumvent the automatic system will increase slightly with normal door entrances and when exit credentials are not needed. These risks could be mitigated with correct and clear communication and cooperation with the other occupants.

10. Infection spread control based on badge history – Plan B

Objective

Informing and isolating people who have been in the same area as / proximity of a person who has developed symptoms of coronavirus.

Reason

Since infected people are contagious themselves even days before they develop any symptoms, and since some individuals don’t show any symptoms while still being contagious, this backup plan is necessary in case infection within crowds is suspected. By tracing entrance histories and their overlap, risks can be analyzed and affected persons duly informed, educated, supported, and isolated.

Consider

Consider creating an internal process on how to handle such situations. Automating the process could be an option but might be too complex for immediate implementation.

The process could include finding the required entry history data, understanding data structures and how to correlate them to find all people who have potentially been in same area as the person “x” within the past “y” days (for the duration of “z”). Preparation may significantly reduce processing time and thus enable more efficient transmission control and health guidance for occupants at the time when Plan B is in effect.

Possible immediate actions to be considered at moderate additional costs

1. Enable remote connectivity

Objective

Avoiding physical presence at locations while having full 24/7 control of the building's HVAC systems.

Reason

Most of the monitoring, supervising, and adjusting modern HVAC systems can be achieved safely and efficiently from remote locations without physical presence. This helps to reduce the risk of service and maintenance staff getting infected.

Consider

In the ideal case, remote operation just requires Internet connectivity to the controller and some minor remote configuration. In other cases, some additional connectivity enabling devices or IT infrastructure settings are required so that remote connectivity is possible.

Note

Older control systems may not support remote connectivity, not even using additional connectivity devices. They must be updated first in order to enable remote access. This may be possible with firmware updates or hardware upgrades as necessary. In this case, enabling remote connectivity is recommended after the crisis has ended.

2. Professional remote service and maintenance contract

Objective

Having full 24/7 control and monitoring of the building's HVAC systems even without your own personnel available or dedicated to the task.



Reason

If your own maintenance personnel is not available or does not exist for such activities, these tasks can often be efficiently outsourced to experts offering remote HVAC service and maintenance. In this way, the building owner and facility manager can quickly achieve an understanding of and control over the facilities without the need to hire and train personnel first.

Consider

In the ideal case, this just requires Internet connectivity to the controller and some minor additional remote configuration.

Note

Remote connectivity as described under "Enable remote connectivity" is needed before remote service contracts can be considered.

References

Federation of European Heating, Ventilation and Air Conditioning Associations (REHVA), REHVA COVID-19 guidance document, April 3, 2020. For latest updates, visit <https://www.rehva.eu/activities/covid-19-guidance>

ASHRAE resources on <https://www.ashrae.org/technical-resources/resources> including ASHRAE Position Document on Airborne Infectious Diseases (Approved by ASHRAE Board of Directors January 19, 2014, Reaffirmed by Technology Council February 5, 2020, Expires August 5, 2020)

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