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Start up and Operation of Air conditioning and Ventilation systems during Pandemic in Commercial and Industrial Workspaces

*Refer to ISHRAE COVID-19 Guidance Document for Guidance for Service Technicians and for Residence and Healthcare Facilities –

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Indian Society of Heating, Refrigerating & Air Conditioning Engineers

About ISHRAE

The Indian Society of Heating, Refrigerating and Air Conditioning Engineers (ISHRAE), was founded in 1981 at New Delhi by a group of eminent HVAC&R professionals. ISHRAE today has over 30,000 HVAC & R professionals and Student -members. ISHRAE operates from 43 Chapters and sub Chapters spread across India with its Head Quarters in Delhi. ISHRAE is led by a team of elected officers, who are members of the Society, working on a voluntary basis, and collectively called the Board of Governors.

Preface

Concerns have been raised about the likelihood of the spread of the COVID 19 Virus through operation of Air-conditioning and Ventilation Systems. Infectious diseases can spread by several different routes including transmission through air. The questions being asked are whether their spread can be accelerated or controlled by heating, ventilating, air-conditioning and refrigeration (HVACR) systems, depending on how the system is designed and operated.

To put a comprehensive guideline together, a COVID-19 Task Force was set up by ISHRAE's Technical Committee. This Guideline has been prepared after a detailed study and analysis of information and literature available till date.

ISHRAE recommends that all facilities operated with air conditioning and ventilation, on the Indian Sub Continent, follow this guideline.

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Chair – COVID 19 Task Force &
ISHRAE Technical Committee
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April 21, 2020

Please refer to our **"COVID-19 Guidance Document for Air Conditioning and Ventilation"** for more details on :

- Guidance for Healthcare applications
- Guidance for Residences
- Guidance for portable air cleaners
- Do's and Don'ts for service technicians

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Recommended Indoor Environment Conditions:

The COVID-19 pandemic, commonly known as CORONA has engulfed the world and India is no exception. The COVID-19 virus belongs to the CORONA family to which SARS and MERS also belong. As the COVID-19 virus is still not fully understood, the behavior of SARS and MERS is considered as a reference to the extent they do not contradict the present observations. The COVID-19 virus affects the respiratory track and starts with symptoms similar to the common flu. This virus is a mutated strain and as of today no vaccine is available.

1. TEMPERATURE

Set Room Temperature between 24°C and 30°C (In humid Climates set temperature closer to 24°C for de-humidification and in Dry Climates closer to or at 30°C. Use Fans to increase air movement .

2. RELATIVE HUMIDITY

Maintain Relative Humidity relative humidity between 40% - 70% . This band of humidity is the recommended suitable environment for humans & reduces the impact from pathogens.

3. VENTILATION (FRESH AIR & EXHAUST)

Fresh air must preferably be provided by an inlet duct and fan.

A minimum fresh air volume of 8.5 cum/hour per person and 1.1 cum per hour per sqm (5 cfm per person and 0.06 cfm per sq ft) must be provided . The recommendation is to maximize supply of outside air within the limits of the system.

Add a TFA (treated fresh air) unit if recommended Fresh Air intake impacts cooling performance.

In exceptional cases of very small commercial spaces without provision of mechanical ventilation systems actively use operable windows.

Commercial and Industrial Facilities:

Commercial Establishments and Industrial Facilities have multiple occupancy as well as transient visitors. It is this aspect that necessitates precaution in operating their Air conditioning Systems.

For the purpose of Guidance for operation during a Pandemic like COVID-19, Air Conditioning is Categorized based on the **types of Indoor Units installed as well as Outdoor Units and Systems**

Indoor Units may be connected via refrigerant or chilled water pipes to DX Outdoor Units , VRF Outdoor Units or a Chiller)

Outdoor Units and Equipment are described by Type – Condensing Units, Chillers, Cooling Towers, Pumps , Fans

General Start-up Guidance (Indoor Units):

Most Commercial establishments have remained closed during the lockdown. These establishments will need maintenance for both Engineering and Health safety. The air-conditioned spaces of establishments under prolonged lockdown will pose health hazards due to fungus and molds in the ducts and open spaces depending on the humidity and temperature prevailing within. Further there may be bird droppings, and excreta of rodents as well increased level of insects.

The following steps are recommended for the start-up of air conditioning system.

1. The user or the owner should get the area sanitized
2. Study the fresh air and exhaust system adequacy as per the guidelines and modify the system if possible.
3. Carry the preventive maintenance on all the units as per manufacturer's guidelines. This should include disinfecting and cleaning of :
    a. **Filters, grilles, diffusers & internal surfaces:** it is recommended to use 5% Cresol solution (containing 50% Cresol and 50% Liquid soap solution). Mix 1 liter of this solution in 9 liters of water. The surface shall besprayed with this solution, left for 10 minutes and then washed / wiped clean with water / cloth. (the above methodology is only for washable filters).
    b. **Condensate drain pan:** Disinfecting / treatment of condensate drain pan is suggested using UV treatment or 1% sodium hypochlorite solution.
    c. **Coils:** Follow standard recommendations of coil cleaning using the same protocol as that of the filters specified above.
4. In case the area has ducted air distribution, it is advisable to clean the ducts by an appropriate method that may include santization.
5. The following process is recommended at start-up :
    a. Open all the doors and windows of the space.
    b. Ensure that all cleaning protocols as advised above are complete
    c. Run the fresh air system at the maximum intake of air setting.
    d. Start and run the exhaust systems if available.
    e. Start the air conditioning system in fan mode only, and run it for minimum of two to four hours with doors open and exhaust system operational.
    f. Install the clean & sanitized filters
    g. Start the AC in normal mode and run for two hours with doors open and then close the doors and windows.
6. The fresh air and ventilation system should be kept on throughout the off cycle and on the weekend and holidays in air circulation mode.

General Start-up Guidance (Outdoor Units & Systems):

Follow standard practice for start up and operation of all installed Condensing Units , Chillers , Cooling Towers , Pumps , Fans that shall include inspection, strainer cleaning if applicable and check water quality where exposed to environment especially in Cooling Tower sumps.

SPECIFIC START UP & OPERATION GUIDANCE :

I) Cassette Units: Check and replace or clean Filters, wipe and disinfect all air contact surfaces, check and disinfect Drain pan, clean the coils, check and secure Fresh Air connectors to Cassette Unit.

ii) Hi Wall Units: Check and replace or clean Filters, wipe and disinfect all air contact surfaces, check and disinfect Drain pan, clean the coils

iii) Tower Units: Follow same guidance as for Hi Wall Units - as given in ii). above

iv) Ducted Units: Check and replace or clean filters, check and disinfect drain pan, clean the coils. It is recommended to install UVGI (Ultraviolet germicidal irradiation) in Larger Ducted Units, to keep Coils clean.

Add a TFA (treated fresh air) unit if required Fresh Air quantity impacts cooling performance.

v) Room Fan Coil Units: Check and replace or clean filters, check and disinfect drain pan, clean the coils. Check Functioning of Toilet Exhaust system adjoining Room.

vi) Air Handling Units: Fresh air must preferably be provided by an inlet duct and fan. It is advisable to provide a MERV 13 or higher filter fitted on the Air Handling Unit. If a filter of higher filtering capability is retrofitted into an existing system, care shall be taken to ensure that the fan and motor capacities are adequate to handle the higher pressure drop.

Add a TFA (treated fresh air) unit if required Fresh Air quantity impacts cooling performance.

Install UVGI (Ultraviolet germicidal irradiation) for AHUs to keep Coils continuously clean and disinfected. It is advisable to inspect the AHUs and ducts for Air tightness and low leakage.

vii) **Heat Recovery Wheels (HRW):** It is advisable to keep this wheel in off mode to reduce cross contamination. Upon restarting, the wheel must first be sanitized.

viii) **Air Purifiers :** Portable Room Air Cleaners

Some of the technologies used are Ionization, Bi-polar ionization, PCO, ESP and ozone generators. The efficacy of some of these is not yet clearly proven and in fact some of these technologies may have contra-indications. UVGI, if deployed correctly has proven to be useful in inactivating bio-aerosols. .

Passive technologies include HEPA filtration that can remove particles down to 0.1 micrometers or even smaller particles. A Certified H13 certified or equivalent HEPA filter should be installed, to remove viruses that pass through the cleaner.

It is recommended to select air cleaners with about 3-4 air changes per hour. The higher the air changes, the better the efficiency of cleaning. Hence, one must select the machine with the right Air Flow, based on room size and fan speed, to ensure proper filtration and comfort , that includes a desired level of quietness.

Additional Recommendations for Industrial Facilities

Minimum air changes of around 10-15 ACHP (Air Changes per Hour, of the Volume of the Space) is advised . The mechanical exhaust air shall be 70% to 80% of fresh air quantity to maintain necessary positive pressure in the space. In cases of evaporative cooling / air washers it is advisable to

a) Disinfect the water using UVGI or Ionization or chemical dosing.

b) Run the system in fan only mode for 30-60 minutes every day to dry the cooling pads.

c) Operate only the pumps for water circulation without fans in operation for 30 minutes, to wash out any bacterial growth.

d) Finally flush the water from the tanks and re-start the system with fresh water.

e) In case of re-circulating system, it is recommended to limit return air circulation. The return air system could be converted to an exhaust system.

The same process must be followed in case evaporative cooling is used for a commercial facility.

Additional Recommendations for Commercial Kitchens

a. Clean the Baffle filters and grease / oil traps

b. Wipe and disinfect the hood

c. Clean the ducts and extract fans

d. Clean the scrubber (if installed) as per manufacturer protocol

e. Start the extract system without filters in the hoods

f. Start the kitchen fresh air in fan mode only, and run it for minimum of two to four hours

g. Install the clean & sanitized filters

Guidelines on
How to operate **air conditioning and ventilation systems** to control spread of **coronavirus disease** (COVID-19) in **Residences, Workspaces and Healthcare Facilities.**

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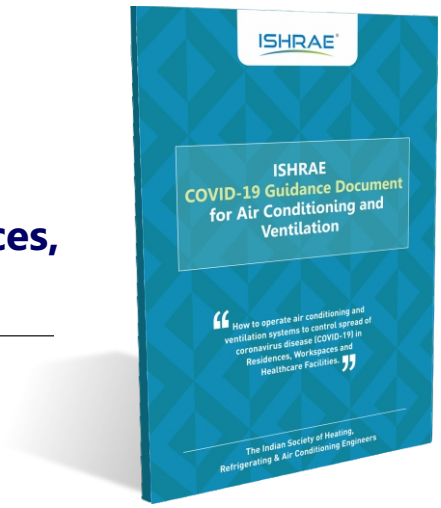

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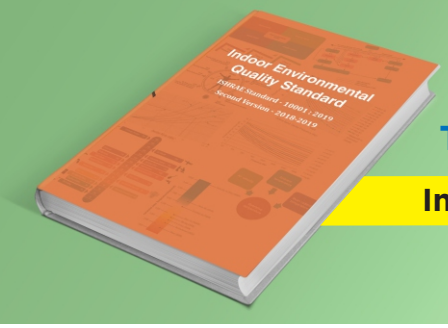

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ISHRAE Standard - 10001 : 2019
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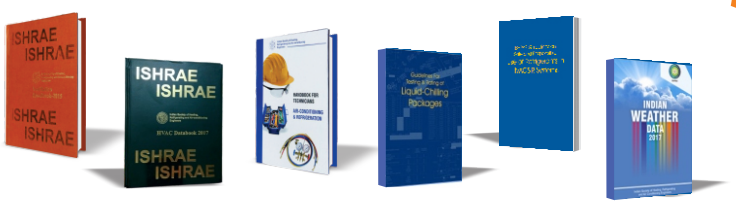

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