

GUIDANCE NOTE ON VENTILATION AND INDOOR AIR QUALITY (IAQ) FOR RESIDENTIAL SETTING DURING COVID-19 PANDEMIC

1.0 Introduction

- 1.1 COVID-19 is a respiratory illness caused by the SARS-CoV-2 virus. It spreads from a person who is infected to others through respiratory droplets and aerosols created when an infected person breathes, coughs, sneezes, sings or talks. It can also be spread through virus aerosols in the air under certain settings, such as poorly ventilated enclosed environment. Hence, it is important to reduce this risk by improving ventilation and air quality in indoor environments.
- 1.2 This guidance will provide important information about measures to reduce the risk of transmission through the air of virus COVID-19 into the residential settings, where air-conditioning is used intermittently or continuously, as well as to naturally ventilated homes.
- 1.3 A building should be regarded as residential building when more than half of the floor area is used for dwelling purposes. There are two types of residential settings that can be distinguished as follows:
 - a) Houses (landed properties): comprising all types of houses (detached, semi-detached, terraced houses, houses built in a row, etc.) each dwelling of which has its own entrance directly from the ground;
 - b) Other residential settings - comprising of all residential settings other than landed properties (low/high rise apartments, condominiums etc.)

Both residential settings can be divided into two (2) types of ventilation as follows:

- a) Enclosed air conditioned residential settings without mechanical ventilation provision (e.g. air cooled split units or Fan Coil Units without fresh air supply)
 - b) Naturally ventilated residential settings (e.g. without air conditioners)
- 1.4 Ensuring proper ventilation with outside air can help reduce indoor airborne contaminants, including COVID-19. However, increasing ventilation by itself is not enough to protect people from exposure to the virus that causes COVID-19 but it should be done simultaneously with Standard Operating Procedures (SOPs) recommended by Ministry of Health (MOH).

Note:

Mechanical Ventilation Air-Conditioning (MVAC) system is also known as Air Conditioning and Mechanical Ventilation (ACMV) system.

- 1.5 Objective of this guidance is to guide public on improving ventilation and indoor air quality at the **residential setting** to reduce the risk of airborne transmission. It should be accompanied with the latest Standard Operating Procedures (SOP) established by *Majlis Keselamatan Negara (MKN)* and other key measures to reduce disease transmission, such as requiring building occupants to practice physical distancing, wearing masks, frequently washing hand, and carrying out regular disinfection of high-touch points within the building.
- 1.6 This guidance is developed based on Industry Code of Practice (ICOP) on Indoor Air Quality 2010 published by Department of Occupational Safety and Health (DOSH) and other established documents published by respective international organization and other countries on ventilation and indoor air quality during COVID-19 pandemic.
- 1.7 This guidance applies to premises which have mechanical ventilating and air conditioning (MVAC) system, air conditioning systems without fresh air supply and natural ventilation. This guidance is one of the best practices to be implemented by those who are involved in reducing the transmission of COVID-19 virus through airborne.

2.0 Carrying out a Risk Assessment

It is known that the load of the COVID-19 virus potentially released in any building depends on the activities performed inside, the number of occupants and whether or not the occupants are wearing mask. It is of importance that a risk assessment be carried out to facilitate the implementation of relevant countermeasures and to assess the minimum ventilation rate per person. If it is not possible to improve the ventilation, then action must be taken to adjust the maximum building occupancy.

3.0 Enclosed air conditioned residential settings without mechanical ventilation provision.

3.1 General guidance applicable to all homes (Landed Properties, Low/High Rise Apartments)

- a) The most effective ways to improve your home indoor air are to reduce or remove the sources of pollutants and to ventilate room spaces with clean outdoor air. The objective of ventilation in dwellings is to ensure that air in the dwelling is not stale and is healthy for breathing.
- b) Recommended indoor thermal conditions are in the range of 23-26 °C and 40-70% relative humidity (RH) and ensure air filters are clean.
- c) Electric fans such as ceiling fans or other fans available should be used to increase room air motion to enhance thermal comfort. Such improved air movement will reduce the over reliance on the use of air-conditioners.

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- d) The use of split-unit air-conditioners in residential homes in Malaysia is common. This may give a false sense of freshness as they do not have ventilation provisions and their filtration systems are inadequate to filter or inactivate airborne virus particles. Ventilation is necessary to improve indoor air quality as part of the risk mitigation measures. It can be achieved by the following methods:
- i. When air-conditioners are not being used, open as many windows and doors, where practical, as possible to ventilate your dwellings, especially in the morning and evening when outdoor air is relatively cooler.
 - ii. Operate the air-conditioners as recommended in 3.1b and 3.1c above.
 - iii. Small opening in windows is recommended to allow ventilation, provided the opening in windows do not cause excessive infiltration of air.
 - iv. Consider installing air ionizer that is capable of deactivating viruses in suitable air-conditioning system.
- e) There may be concern in opening windows and doors due to mosquitoes and insects. Mesh screens can be fitted to address such concern.
- f) Operate exhaust fans in bathrooms and toilets whenever they are being used. Toilet lids should normally remain closed, especially prior to flushing. If possible, exhaust fan should be operated intermittently when toilet is not in use.

3.2 Guidance applicable to Low/high rise apartments.

- a) Take extra care to reduce the risk of infection in one apartment unit from spreading to another.
- b) Minimise the use of open windows, especially windows adjacent to neighbouring units, in order to limit the potential transfer of infective air from nearby apartment units unless it is necessary to maintain acceptable indoor temperature and humidity levels.
- c) Avoid using the balcony in an apartment unit, which maybe in close proximity with neighbouring units.
- d) Building management should provide adequate ventilation in common areas such as the apartment lobby area.
- e) Building management should use combinations of filters and air cleaners that achieve MERV 13 or better levels of performance air recirculated by centralised air-conditioning system if the common areas are air-conditioned.

4.0 Naturally ventilated residential settings

4.1 Natural ventilation can be increased as follows:

- a) Open more than one window/door, if possible, unless outdoor air quality is poor or the weather condition does not allow.
- b) Increase cross-ventilation by opening windows/doors at opposite site of a home and keeping internal doors open.

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- c) Open all windows in a home at a same time (especially on different floors) to increase ventilation.
- d) Occupants of residential homes may improve home ventilation by opening doors and windows, especially when hosting non-household guests. Electric fans can be used to promote air circulation when needed.

4.2 Increase natural ventilation by using electric fans

- a) Open more than one window/door, if possible, unless outdoor air quality is poor or the weather condition does not allow.
- b) Position fans at windows to blow air outwards and increase air exchange. To reduce risks of airborne transmission, direct the air flow of the fan so that it does not flow directly from one person to another.
- c) Operate exhaust fans (e.g. toilet, kitchen) at full capacity to exhaust air from the indoor space. Keep windows or other openings (e.g. back door) around exhaust fans closed to avoid short-circuiting of air flow.
- d) Window mounted exhaust fans can be considered for installation to enhance air ventilation in a poorly ventilated space.

4.3 For low/high rise apartments extra care shall be taken to reduce the risk of infection in one dwelling unit from spreading to another:

a) **Ensure Water is in the Plumbing Traps**

The U-shaped trap in all plumbing drains shall not be allowed to go dry. The easiest action to take is to make sure every sink, shower, bathtub and floor drain is used at least once a day. 30 seconds of flow is sufficient.

b) **Maintain pressurization**

Use of exhaust fan systems is recommended to keep the home below the pressure of any adjacent common space, such as a corridor. Open windows should be minimized unless it's necessary to meet minimum ventilation requirements or maintain acceptable indoor temperature and humidity levels.

c) **Seal any openings between residence units**

Any large openings that might allow air to flow to the residence unit shall be sealed with caulk, foam, plastic or similar materials. Example of such openings includes plumbing or other utility penetrations.

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4.4 Creating an Isolation Space for Sick, Suspected or infected household members.

Additional precautions are required in order to reduce the risk to other household members.

- a) Select an isolation space that has the least-frequented occupant traffic. The isolation space should have its own bathroom facilities, without sharing with an adjacent room.
- b) If you need to share bathroom, make sure the room has good air flow by opening windows and turning on exhaust fan.
- c) If the bathroom in the isolation space has an exhaust fan, that fan should run continuously. By running this fan, the potential for aerosols to escape from the isolated space into the corridor can be reduced. If speed selection of the exhaust fan is available, select high speed for the operation of this fan. Windows adjacent to the exhaust fan should be closed to avoid short-circuiting of air flow.
- d) Exhaust fans in the main part of the home should be operated only on as-needed basis.
- e) Air-conditioner in isolation room should not be used. Windows should be opened instead for natural ventilation.
- f) Install air barriers between the isolation space and the common space. Seal any openings connecting the isolation space to the rest of the home.

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