

# STANDARD OPERATING PROCEDURE ON VENTILATION IMPROVEMENT IN NON- RESIDENTIAL BUILDING OR SPACE DURING COVID-19 PANDEMIC



# Background

1. Current scientific evidences suggest that in addition to direct droplet transmission, COVID-19 viruses can be transmitted by aerosols suspended in the air and moved by air currents.
2. To reduce the risk of airborne transmission, we need to dilute the air and exchange the contaminated air with fresh air as frequently as possible.
3. This SOP is aimed to achieve optimal air dilution, air exchange and air filtration in all non-residential buildings in Sarawak to keep the risk of COVID-19 transmission to as low as possible among the occupants.
4. The SOP should be read together with other latest SOPs published by Sarawak Disaster Management Committee. It is a set of procedures in addition to existing key measures to reduce COVID-19 transmission, namely physical distancing, wearing of masks, frequent hand washing and regular disinfection of high-touch surfaces.
5. The SOP should also be practiced in conjunction with other related guidelines including the Industry Code of Practice on Indoor Air Quality 2010 and/or other relevant guidelines where applicable.
6. The SOP does not cover building / spaces which are categorised as “controlled environment” or “clean room”.

# Principles

- Current scientific evidence suggest that in addition to direct droplet transmission, COVID-19 viruses can be transmitted by aerosols suspended in the air and moved by air currents.
- To reduce the risk of airborne transmission, we need to **dilute the air** and **exchange the contaminated air with fresh / clean air** as frequently as possible.
- This Standard Operating Procedure is aimed to achieve optimal air dilution, air exchange and air filtration in all non-residential building in Sarawak to keep the risk of COVID-19 transmission to as low as possible among the occupants.
- Building typology based on mode of operation

- Government Buildings
- Private Buildings & Offices
- Commercial Buildings
- Industrial Building and Factories
- Land, sea and air transportation hub
- Community of faith,

- Educational institutions
- Laboratory
- Healthcare facilities
- Sport facilities



| SCOPE   |  | MINIMUM REQUIREMENT  |  |
|---|--|--|--|
| <b>1. Enclosed Building / Space with Centralised Air Conditioning System.</b><br>Examples: <ul style="list-style-type: none"><li>• Shopping mall, Cinema, Sports Facilities, Restaurant, Spa , Reflexology and Wellness Centre, Entertainment Outlets</li><li>• Government &amp; Non Governmental Offices and Workstation</li><li>• Hotels, Hostels, Homestay, Institutions</li></ul> |  | <b>Roles of Building Management/Business Owner/ Employer</b> |  |
| <b>PROHIBITED ACTIVITIES</b> <ul style="list-style-type: none"><li>• Any activities listed in negative list</li></ul>   |  | <b>Maintenance</b>   | <ol style="list-style-type: none"><li>1. Appoint a suitable person to be in charge of the implementation of this SOP.</li><li>2. The person shall perform inspection and checks on the ACMV system to ensure it is functioning as per design every day before the start of business hour</li><li>3. Keep a maintenance record of the ACMV system.</li><li>4. The maintenance is carried out according to manufacturer's recommendation or Industry Code of Practice on Indoor Air Quality 2010.</li></ol>  |
|   |  | <b>Air Dilution And Exchange</b>                             | <ol style="list-style-type: none"><li>1. Perform air flushing at least once, for a minimum duration of 2 hours each time, every day.</li><li>2. For premises with 24-hour business operation, perform the flushing during every shift change.</li><li>3. Perform air flushing by opening the outdoor air damper and/or exhaust air damper to 100% with the ACMV system running.</li><li>4. If the opening of outdoor air damper to 100% is not possible, perform air flushing by opening all windows and entrances to the building with the ACMV system running.</li><li>5. During the daily operation, the entrances to all partitioned spaces within the building must be fully opened at all times.</li></ol> |
| <b>MANDATORY REQUIREMENT</b> <ul style="list-style-type: none"><li>• Directives from the State Disaster Management Committee from time to time</li><li>• Act 342</li><li>• PPHO, 1999</li><li>• Terms and Conditions under the Local Authorities</li><li>• Ability to explain SOP during Snap Checks by Enforcement Team</li></ul>  |  | <b>Optional Additional Improvement</b>                       |  |
|   |  | <b>Air filtration</b>  | <ol style="list-style-type: none"><li>1. Install air filter with MERV13 and above to the ACMV system.</li><li>2. If the installation of MERV13 to the ACMV system is not possible, install portable air cleaners with HEPA grade H13 and above.</li><li>3. The required CADR of the portable air cleaner should be at least 4 times of the total room volume per hour.</li><li>4. Install UVGI into the existing ACMV system.</li></ol>  |



| SCOPE   | MINIMUM REQUIREMENT                                   |   |
|---|---|---|
| <b>2. Enclosed Building / Space with Openable Windows and Split Air Conditioning System.</b><br>Example : <ul style="list-style-type: none"> <li>• Government and Non Government Offices</li> <li>• Eateries – Restaurant, Bistro,</li> <li>• Shoplots and Retails, Entertainment Outlet</li> <li>• Sport Facilities,</li> <li>• Institutions, Hotels, Hostels, Homestay</li> </ul> | Roles of Building Management/Business Owner/ Employer |   |
|   | <b>Maintenance</b>                                    | <ol style="list-style-type: none"> <li>1. Appoint a suitable person to be in charge of the implementation of this SOP.</li> <li>2. The person shall perform inspection and checks on air conditioning system to ensure it is functioning as per design every day before the start of business hour.</li> <li>3. Keep a maintenance record of the air-conditioning system.</li> <li>4. The maintenance must be carried out according to manufacturer's recommendation or Industry Code of Practice on Indoor Air Quality 2010.</li> </ol>  |
|   | <b>Air Dilution And Exchange</b>                      | <ol style="list-style-type: none"> <li>1. Perform air flushing 3 times (before the start, mid-day, and prior to closure of business hour), for a minimum duration of 1 hour each time, per day.</li> <li>2. For premises with 24-hour business operation, perform the flushing during every shift change.</li> <li>3. Perform air flushing by opening all windows and entrances to the building with the air-conditioning system running.</li> <li>4. During the daily operation, the entrances to all partitioned spaces within the building must be fully opened at all times.</li> <li>5. Existing exhaust fans shall be operated continuously during business operation hours.</li> </ol> |
| PROHIBITED ACTIVITIES   |   |   |
| <ul style="list-style-type: none"> <li>• Any activities listed in negative list</li> </ul>  |   |   |
| MANDATORY REQUIREMENT   |   |   |
| <ul style="list-style-type: none"> <li>• Directives from the State Disaster Management Committee from time to time</li> <li>• Act 342</li> <li>• PPHO, 1999</li> <li>• Terms and Conditions under the Local Authorities</li> <li>• Ability to explain SOP during Snap Checks by Enforcement Team</li> </ul>   | Optional Additional Improvement                       |   |
|   | <b>Air filtration</b>                                 | <ol style="list-style-type: none"> <li>1. Install portable air cleaners with HEPA grade H13 and above.</li> <li>2. The required CADR of the portable air cleaner must be at least 6 times of the total room volume per hour.</li> </ol>   |



| SCOPE  |  | MINIMUM REQUIREMENT  |   |
|--|--|--|---|
| <b>3. Enclosed Building / Space with Openable Windows and without Air Conditioning System</b><br>Example: <ul style="list-style-type: none"><li>• Eateries</li><li>• Shoplots and Retails</li><li>• Factories and Industrial premises</li><li>• Sports facilities,</li><li>• Hostels</li></ul>                                     |  | <b>Roles of Building Management/Business Owner/ Employer</b> |   |
| <b>PROHIBITED ACTIVITIES</b> <ul style="list-style-type: none"><li>• Any activities listed in negative list</li></ul>  |  | <b>Maintenance</b>   | <ol style="list-style-type: none"><li>1. Appoint a suitable person to be in charge of the implementation of this SOP.</li><li>2. The person shall perform inspection and checks on air conditioning system to ensure it is functioning as per design every day before the start of business hour.</li><li>3. Keep a maintenance record of the air-conditioning system.</li><li>4. The maintenance must be carried out according to manufacturer's recommendation or Industry Code of Practice on Indoor Air Quality 2010.</li></ol>   |
|  |  | <b>Air Dilution And Exchange</b>                             | <ol style="list-style-type: none"><li>1. Perform air flushing 3 times (before the start, mid-day, and prior to closure of business hour), for a minimum duration of 1 hour each time, per day.</li><li>2. For premises with 24-hour business operation, perform the flushing during every shift change.</li><li>3. Perform air flushing by opening all windows and entrances to the building with the air-conditioning system running.</li><li>4. During the daily operation, the entrances to all partitioned spaces within the building must be fully opened at all times.</li><li>5. Existing exhaust fans shall be operated continuously during business operation hours.</li></ol> |
| <b>MANDATORY REQUIREMENT</b> <ul style="list-style-type: none"><li>• Directives from the State Disaster Management Committee from time to time</li><li>• Act 342</li><li>• PPHO, 1999</li><li>• Terms and Conditions under the Local Authorities</li><li>• Ability to explain SOP during Snap Checks by Enforcement Team</li></ul> |  | <b>Optional Additional Improvement</b>                       |   |
|  |  | <b>Air filtration</b>  | <ol style="list-style-type: none"><li>1. Install portable air cleaners with HEPA grade H13 and above.</li><li>2. The required CADR of the portable air cleaner must be at least 6 times of the total room volume per hour.</li></ol>  |





| SCOPE   |  | MINIMUM REQUIREMENT  |  |
|---|--|--|--|
| <b>4. Enclosed Building / Space without Windows or where Windows Opening is Not Possible and without Centralised Air Conditioning System</b><br>Example: <ul style="list-style-type: none"><li>• Eateries</li><li>• Shoplots and Retails</li><li>• Sports facilities,</li><li>• Factories, Industrial premises</li></ul>  |  | <b>Roles of Building Management/Business Owner/ Employer</b> |  |
| <b>PROHIBITED ACTIVITIES</b> <ul style="list-style-type: none"><li>• Any activities listed in negative list</li></ul><br><b>MANDATORY REQUIREMENT</b> <ul style="list-style-type: none"><li>• Directives from the State Disaster Management Committee from time to time</li><li>• Act 342</li><li>• PPHO, 1999</li><li>• Terms and Conditions under the Local Authorities</li><li>• Ability to explain SOP during Snap Checks by Enforcement Team</li></ul> |  | <b>Maintenance</b>   | 1. Appoint a suitable person to be in charge of the implementation of this SOP.  |
|   |  | <b>Air Dilution And Exchange</b>                             | 1. Install both fresh air supply fan and exhaust fan on opposite walls. The exhaust fan must not be installed above the entrance.<br>2. Perform air flushing continuously throughout the operation hours of the premises.<br>3. Perform air flushing by opening all entrances to the building with both fresh air supply fan and exhaust fan running.<br>4. If the enclosed space is within a building, outdoor air must be introduced into the space through the building by necessary means, for example, using the building duct system.<br>5. When the installations of fresh air supply fan and exhaust fan are not possible due to the building structure, perform air flushing by opening all entrances to the building with the air-conditioning system / ceiling fans / portable fans facing the entrance running at all times.<br>6. If the above improvement cannot be implemented due to the nature of business, the space / room cannot be used for permanent occupancy and the following Additional Improvement MUST be implemented before business activities can be carried out in the space / room. |
|   |  | <b>Optional Additional Improvement</b>                       |  |
|   |  | <b>Air filtration</b>  | 1. Install portable air cleaners with HEPA grade H13 and above.<br>2. The required CADR of the portable air cleaner must be at least 6 times of the total room volume per hour.  |



| SCOPE   |  | MINIMUM REQUIREMENT  |  |
|---|--|--|--|
| <b>5. Building / Space with Wide Front and Back Entrance Openings</b><br>Example : <ul style="list-style-type: none"><li>• Eateries</li><li>• Shoplots and Retails</li><li>• Factories and Industrial premises</li></ul>  |  | <b>Roles of Building Management/Business Owner/ Employer</b> |  |
|   |  | <b>Maintenance</b>   | 1. Appoint a suitable person to be in charge of the implementation of this SOP.  |
|   |  | <b>Air Dilution And Exchange</b>                             | 1. Allow natural ventilation as usual through all windows and openings at all times.<br>2. Operate ceiling fans (if any) at all times.<br>3. Direct wall fans / portable fans (if any) towards openings (windows, doors, etc.).<br>4. The wall fans / portable fans should not blow towards the occupants. |
| <b>PROHIBITED ACTIVITIES</b>  |  |  |  |
| <ul style="list-style-type: none"><li>• Any activities listed in negative list</li></ul>  |  |  |  |
| <b>MANDATORY REQUIREMENT</b>  |  |  |  |
| <ul style="list-style-type: none"><li>• Directives from the State Disaster Management Committee from time to time</li><li>• Act 342</li><li>• PPHO, 1999</li><li>• Terms and Conditions under the Local Authorities</li><li>• Ability to explain SOP during Snap Checks by Enforcement Team</li></ul> |  |  |  |



**SCOPE****6. Kitchen within the Building**

Example:

- Eateries
- Cinema
- Hotels , Hostels, Homestay

**PROHIBITED ACTIVITIES**

- Any activities listed in negative list

**MANDATORY REQUIREMENT**

- Directives from the State Disaster Management Committee from time to time
- Act 342
- PPHO, 1999
- Terms and Conditions under the Local Authorities
- Ability to explain SOP during Snap Checks by Enforcement Team

**MINIMUM REQUIREMENT****Roles of Building Management/Business Owner/ Employer****Maintenance**

1. Appoint a suitable person to be in charge of the implementation of this SOP.

**Air Dilution And Exchange**

1. Ensure the exhaust fan is clean and functioning as per design every day before the start of business hour.
2. Operate exhaust fans continuously during operation hours and make sure all dampers (if applicable) are fully open
3. If the exhaust fan is not available, install the exhaust fan to direct air flow out of the building.
4. All windows and openings in the kitchen facing the external side of the building (if any) must be opened at all times during the operation hours.
5. If the above improvement cannot be carried out, the kitchen must not be used.

**Sanitary System**

1. Check water seals to prevent any leaking.
2. Prohibit the use of hand dryer.



| SCOPE   |  | MINIMUM REQUIREMENT   |  |
|---|--|---|--|
| <b>7. Toilet and Shower Room within the Building</b><br><br>Example: <ul style="list-style-type: none"><li>• Eateries</li><li>• Shopping mall</li><li>• Shoplots and Retails</li><li>• Hotels, Hostels, Spa, Reflexology &amp; Wellness</li><li>• Sports facilities, Swimming pool</li></ul>          | <b>Roles of Building Management/Business Owner/ Employer</b> |   |  |
|   | <b>Maintenance</b>   | 1. Appoint a suitable person to be in charge of the implementation of this SOP.   |  |
|   | <b>Air Dilution And Exchange</b>                             | 1. Ensure the exhaust fan is clean and functioning as per design every day before the start of business hour.<br>2. Operate exhaust fans continuously during operation hours and make sure all dampers (if applicable) are fully open<br>3. If the exhaust fan is not available, install the exhaust fan to direct air flow out of the building.<br>4. If the shower room is not fully walled up and has a wide upper wall opening to outdoor directly, the installation of exhaust fan is not necessary.<br>5. If the above improvement cannot be carried out, the toilet or shower room must not be used. |  |
|   | <b>Sanitary System</b>                                       | 1. Check water seals to prevent any leaking.<br>2. Prohibit the use of hand dryer.<br>3. Put notices to advice closure of toilet cover before flushing  |  |
| <b>PROHIBITED ACTIVITIES</b>  |  |   |  |
| <ul style="list-style-type: none"><li>• Any activities listed in negative list</li></ul>  |  |   |  |
| <b>MANDATORY REQUIREMENT</b>  |  |   |  |
| <ul style="list-style-type: none"><li>• Directives from the State Disaster Management Committee from time to time</li><li>• Act 342</li><li>• PPHO, 1999</li><li>• Terms and Conditions under the Local Authorities</li><li>• Ability to explain SOP during Snap Checks by Enforcement Team</li></ul> |  |   |  |

## **Abbreviations:**

1. ACMV – Air conditioning and mechanical ventilation
2. CADR – Clean air delivery rate
3. HEPA – High efficiency particulate air filter
4. MERV – Minimum efficiency reporting value
5. SOP – Standard Operating Procedure
6. UVGI – Ultraviolet germicidal irradiation