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| Health service  HVAC COVID-19 readiness assessment  Health Technical Advice HTA 2021-002 |

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# Introduction

Heating, ventilation and air-conditioning (HVAC) systems can be effective in minimising airborne exposure to COVID-19 by reducing the number of infected droplets that gather indoors. Proper ventilation can help prevent aerosol transmission, when adopted alongside other risk-mitigating controls, by increasing the intake of outdoor air to optimise environmental conditions of facilities.

The purpose of this health technical advice (HTA) is to provide guidance to health agencies on the HVAC assessments required to understand the appropriateness of spaces and risk mitigation measures required to be deployed for the treatment and care of patients with COVID-19.

The Department of Health *Infection prevention control ventilation* policy (June 2021) [[1]](#footnote-1) and the Victorian Health Building Authority Health Technical Advice HTA-2020-001 *HVAC system strategies to airborne infectious outbreaks* [[2]](#footnote-2) are to be used as reference documents for this HVAC readiness assessment.

The table below defines the minimum expected values for room ventilation rates (ACH), outside air rate (ACH), airflow direction and filtration requirements for HVAC systems in an inpatient setting.

Table : Minimum expected values for room ventilation rates

|  |  |  |  |
| --- | --- | --- | --- |
| **Criteria** | **Below minimum recommendations** | **Minimum recommendations** | **Exceeds minimum recommendation** |
| **Room ventilation rate** | <6 ACH | 6-8 ACH | >8 ACH |
| **Outside air rate** | <2 ACH | 2 ACH | >2 ACH or 100% outside air |
| **Airflow direction** | Net Positive environment between patient zones and common area | Balanced or slight Negative air flows between patient zones and common areas | Net Negative environment between patient zones and common areas  (> -2.5Pa) |
| **Filtration (for recirculating HVAC systems)** | < MERV 13 (F7 or below) | MERV 13-16 (F8 or F9) | HEPA filters |

HVAC systems are to be assessed with the HVAC system parameters set to operate for treatment of COVID-19 patients, that is, set to pandemic mode.

## Health agency details

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Health agency:** |  | | | | |
| **Campus:** |  | | | | |
| **Building** |  | **Floor** |  | **Ward** |  |

|  |  |
| --- | --- |
| **Room type** | **Number** |
| No. of single patient bedrooms |  |
| No. of double patient bedrooms |  |
| No. of four patient bedrooms |  |
| No. of Class N rooms |  |
| No of Class S rooms |  |

## Section 1 – Only to be completed for areas where AECOM HVAC assessments undertaken

This section is to be completed for spaces where an AECOM HVAC assessment was undertaken.

|  |  |
| --- | --- |
| **Area** | **Response** |
| Is this space still proposed to be used for treating COVID-19 patients? | Yes / No |
| Have all the recommendations from the AECOM HVAC assessment report been implemented | Yes / No |
| List any Category 1 and/or Category 2 recommendations from the VHBA letter accompanying the AECOM HVAC assessment report that have not been implemented | List here |
| Provide details of any non-infrastructure controls implemented | Provide details here |

## Section 2 – To be completed for areas where AECOM HVAC assessments were not done/new capacity or wards

This section is to be completed for spaces that are being used, or are proposed to be used, for treating COVID-19 patients where an AECOM HVAC assessment was not undertaken.

Refer HVAC system checklist below. All areas being utilised for the treatment of COVID-19 patients should be considered within the assessment.

|  |  |  |  |
| --- | --- | --- | --- |
| **Outside air provision** | | | |
|  | Outside air rate | Calculated rate | #Value |
| Meets min recommendation of two outside air changes per hour | Yes / No |
| Capacity for 100% outside air | Able to meet recommendation all year round | Yes / No |
| Able to meet recommendation during ‘shoulder’ seasons only | Yes / No |

|  |  |  |
| --- | --- | --- |
| **Air pathway** | | |
|  | Dedicated return/spill air from ward area | Yes / No |
| Fully ducted return/spill air system from ward area | Yes / No |
| Fully ducted return/spill air system from patient rooms | Yes / No |
| Dedicated HVAC system to ward area | Yes / No |

|  |  |  |  |
| --- | --- | --- | --- |
| **Air change rates** | | | |
|  | Air change rate | Calculated rate air changes per hour | #Value |
| Meets min recommendation of six air change per hour | Yes / No |

|  |  |  |  |
| --- | --- | --- | --- |
| **Air balance** | | | |
|  | Air flow direction | Net positive environment between proposed hot zone and warm/cold zone | Yes / No |
| Balanced to slight net negative air flows between hot zone and warm/cold zone | Yes / No |
| Net negative environment between hot zone and warm/cold zone. Greater than -2.5Pa | Yes / No |

|  |  |  |
| --- | --- | --- |
| **Air filtration** | | |
|  | Type of filters installed within AHU on supply air side | #Value |
| Meets min recommendation of MERV 13-16 (F8 or F9) | Yes / No |
| Type of filters installed within AHU on return/spill air side | #Value |
| Type of Filters installed within exhaust systems | #Value |

|  |  |  |
| --- | --- | --- |
| **HVAC system criteria** | | |
|  | Duty/standby system or essential power/generator back-up | Yes / No |
| Dedicated exhaust to the ward | Yes / No |
| HEPA filtered exhaust or minimum 10 m/s discharge velocity | Yes / No |
| Dedicated spill system for the ward | Yes / No |
| Fully ducted spill system from patient areas to the risers | Yes / No |
| Fully enclosed rooms for one-bed and two-bed wards | Yes / No |

Please provide details of any non-infrastructure controls implemented to address gaps or limitations in the HVAC systems:

|  |
| --- |
|  |

## Section 3 – All spaces to be used for treating COVID-19 patients

This is to be completed for all spaces that are being used or are proposed to be used for treating COVID-19 patients.

|  |  |
| --- | --- |
| Area |  |
| Date of last AHU/coil clean | #Date |
| Date of last AHU/duct inspection | #Date |
| Maintenance for scheduled services performed by | #Value |
| Overall ward tier rating (see next page) | #Value |

Certification must be completed by an appropriately authorised person on behalf of the health service, endorsing the assessment and statements made within this assessment are true and correct, and understands the operation and limitations of the HVAC system, and has appropriate control measures in place to prevent COVID-19 transmission aligned to the hierarchy of controls.[[3]](#footnote-3)

|  |  |  |  |
| --- | --- | --- | --- |
| HVAC ward assessment completed by | | | |
| Name |  | | |
| Position |  | | |
| Signature |  | Date |  |

|  |  |  |  |
| --- | --- | --- | --- |
| Health agency executive certification | | | |
| Name |  | | |
| Position |  | | |
| Signature |  | Date |  |

Table : Tier rating assessment

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Tier 1.1** | **Tier 1.2** | **Tier 2.1** | **Tier 2.2** | **Tier 3** |
| **Air change rates** | 8 ACH | 8 ACH | 6 ACH | 6 ACH | < 6 ACH |
| **Outside air supply** | 100% | 100% | 100% | Min. 2 ACH | < 2 ACH |
| **Duty/standby system or essential power/generator back-up (single point of failure)** | Yes | Yes | Yes | No | No |
| **Dedicated exhaust to the ward** | Yes | Yes | Yes | No | No |
| **HEPA filtered exhaust or minimum 10 m/s discharge velocity** | Yes | No | No | No | No |
| **Dedicated spill system for the ward** | Yes | No | No | No | No |
| **Fully ducted spill system from patient areas to the risers** | Yes | Yes | No | No | No |
| **Fully enclosed rooms for one-bed and two-bed wards** | Yes | Yes | No | No | No |
| **Comments - works required to improve tier rating** | Meets all criteria recommended for pandemic patient wards. | Meets outside air and air change requirements but requires:   1. minor upgrades to exhaust systems 2. minor upgrades to spill systems. | Meets outside air and air change requirements but requires:   1. upgrade works to exhaust systems 2. upgrade works to spill air systems 3. segregation building works. | Meets supply air change requirements but requires:   1. an increase to outside air system provisions 2. upgrades to exhaust systems 3. upgrades to spill air systems 4. segregation building works. | Requires major ventilation upgrade and segregation works for compliance with pandemic patient ward recommendations. |

HVAC system checklist

HVAC system checklist to be used to assist and inform ‘Section 2’ of the assessment

## Design criteria

|  |  |  |
| --- | --- | --- |
| **Air handling unit** | | |
| AHU location: |  | |
| Capacity |  | m³/s |
| Pre-filter |  | grade |
| Main filter |  | grade |
| Return air |  | m³/s or % |
| Outside air |  | m³/s or % |
| Spill air |  | m³/s or % |
| Cooling coil capacity |  | kW |
| Heating coil capacity |  | kW |
| Fan static |  | Pa |
| VSD speed (if applicable) |  | Hz |

|  |  |  |
| --- | --- | --- |
| **Extract fan** | | |
| Capacity |  | m³/s |
| Fan static |  | Pa |
| VSD speed (if applicable) |  | Hz |

|  |  |  |
| --- | --- | --- |
| **Return air fan** | | |
| Capacity |  | m³/s |
| Fan static |  | Pa |
| VSD speed (if applicable) |  | Hz |

|  |  |  |
| --- | --- | --- |
| **Psychrometric check** | | |
| External condition limitations when operating in 100% o.a mode | | |
| Mode | Dry bulb C | Wet bulb C |
| Heating |  |  |
| Cooling |  |  |

|  |  |  |
| --- | --- | --- |
| **Floor distribution** | | |
| Return air volume as a % of supply air |  | % |
| Dedicated extract to |  |  |

|  |  |
| --- | --- |
| **Fire mode** | |
| Current HVAC fire alarm response in zone |  |
| Current HVAC fire alarm response in adjacent zone |  |

## General criteria

|  |  |  |
| --- | --- | --- |
| Air handling unit | | |
| Humidifier | Yes | No |
| AS1668 separation from discharge louvres? | Yes | No |
| BMS controlled | Yes | No |
| Room in AHU to blank return air path | Yes | No |
| Return air damper capable of tight shut off? | Yes | No |
| Economy cycle available | Yes | No |
| Mixing Box | Yes | No |
| Power | Essential | Non-essential |

|  |  |  |
| --- | --- | --- |
| Extract fan | | |
| Power | Essential | Non-essential |
| BMS controlled | Yes | No |

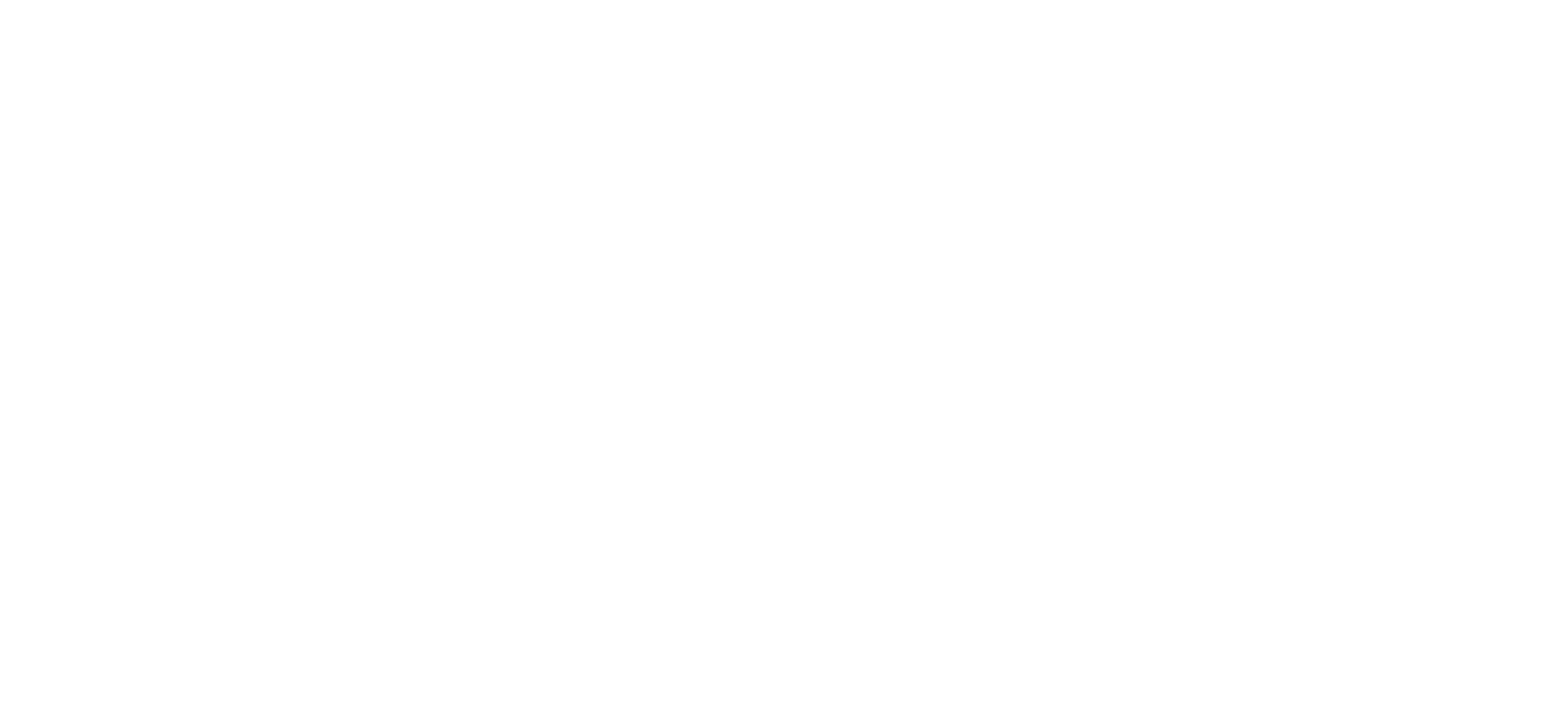
|  |  |  |
| --- | --- | --- |
| Return air fan | | |
| Power | Essential | Non-essential |

|  |  |  |
| --- | --- | --- |
| Psychrometric check | | |
| Supplemental cooling / heating required in zone | Yes | No |

|  |  |  |
| --- | --- | --- |
| Fire mode | | |
| Does response need to be adjusted for pandemic mode? | Yes | No |

|  |  |  |
| --- | --- | --- |
| Floor distribution | | |
| Supply air diffusers to all areas | Yes | No |
| Toilets (exhaust) | Yes | No |
| Showers (exhaust) | Yes | No |
| Dirty utility (exhaust) | Yes | No |
| Current air balance checked | Yes | No |
| Can system be easily re-balanced to achieve new air flow patterns | Yes | No |
| Does proposed area match fire zones | Yes | No |
| Does proposed area match HVAC zones | Yes | No |
| Return air path | Fully ducted from patient room | Ceiling plenum or corridor return |

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1. Department of Health [*Infection prevention control ventilation policy (June 2021)*](https://www.dhhs.vic.gov.au/infection-prevention-control-resources-covid-19) <https://www.dhhs.vic.gov.au/infection-prevention-control-resources-covid-19> [↑](#footnote-ref-1)
2. Victorian Health Building Authority Health Technical Advice HTA-2020-001 [*HVAC system strategies to airborne infectious outbreaks*](https://www.vhba.vic.gov.au/aerosol-study-within-healthcare-environments-health-technical-advice) <https://www.vhba.vic.gov.au/aerosol-study-within-healthcare-environments-health-technical-advice> [↑](#footnote-ref-2)
3. Department of Health [*Infection prevention control resources – Covid-19*](https://www.dhhs.vic.gov.au/infection-prevention-control-resources-covid-19) <https://www.dhhs.vic.gov.au/infection-prevention-control-resources-covid-19> [↑](#footnote-ref-3)