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EQ-10 Air Distribution System

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POINTS AVAILABLE

AIM OF CREDIT

To encourage and recognise the design and maintenance of air distribution systems that minimise the risk of particulate and microbial contamination to the internal air supply.

CREDIT CRITERIA

One point is awarded where a minimum of 50% improvement in outside air rates has been achieved, and:

• The mechanically air-conditioned ventilation system actively controls humidity to be no more than 60% relative humidity in the space and no more than 80% relative humidity in the supply ductwork.

OR

- The following two conditions are met:
 - All new and existing ductwork has access provided to both sides of all moisture- and debris-generating components including cooling coils, heating coils, humidifiers and filters for maintenance (see Figure IEQ-10.1); and
 - All new and existing ductwork is clean, or has been cleaned in accordance with the AIRAH HVAC Hygiene Best Practice Guideline 2010 or the National Air Duct Cleaners Association ACR 2006 Standard.

Where the space is 'Naturally Ventilated' as per IEQ-1 'Ventilation Rates', this credit is 'Not Applicable' and is excluded from the points available used to calculate the Indoor Environment Quality Category score.

COMPLIANCE REQUIREMENTS

Naturally Ventilated Spaces

For a space to be considered naturally ventilated, this must have been designed to meet the requirements of AS1668.2-2002.

Mechanically Ventilated Spaces

Humidity sensors must be provided in the ductwork and linked to the BMS to ensure that humidity control can be maintained both during and after commissioning.

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Where construction management processes are in place to ensure that all new ductwork remains free of moisture and debris until occupation, the new ductwork can be considered to be clean. All other ductwork (existing and new) must be cleaned in accordance with the relevant standard.



Figure IEQ-10.1: Example of an air handling system with typical access points identified.

DOCUMENTATION - DESIGN RATING

Submit all the evidence and ensure it readily confirms compliance.

- □ Short report
- □ Tender drawing(s)
- □ Extract(s) from the specification(s)

Where the credit is claimed as 'Not Applicable':

□ Short report

Short report prepared by a suitable professional that describes how the Credit Criteria have been met by:

- Referencing the extent of new and existing ductwork, cross-referencing drawings and specifications, confirming that adequate access is provided to all moisture- and debris-generating HVAC components. The report should include a table of all moisture- and debris-generating HVAC components and clearly identify that both sides of the components are provided with adequate access for cleaning;
- Referencing the clauses in the specification where cleaning of the existing and new ductwork is required prior to occupation;
- Where humidity controls are present, describing the active humidity control system; and
- Where the credit is not applicable, describing the naturally ventilated spaces, and how they comply with AS1668.2-2002.

Tender drawing(s) showing:

- The locations of the access panels on all new and existing ductwork, clearly indicating adequate maintenance access to both sides of moisture- and debris-generating components; and
- Where relevant, showing humidity sensors installed in the ductwork.

Extract(s) from the specification(s) outlining:

- Where humidity controls are present, the system design parameters in terms of design conditions, humidity and temperature, and humidity control parameters are stipulated;
- That all new and existing ductwork has adequate maintenance access and complies with the Credit Criteria;

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and

- That cleaning of all existing ductwork (e.g. removal of dust, dirt and mould), in accordance with the relevant standard, is to be undertaken after all major fitout works and prior to occupancy; or
- The construction management processes that will ensure that all new ductwork remains free of moisture and debris until occupation.

DOCUMENTATION - AS BUILT RATING

Submit all the evidence and ensure it readily confirms compliance.

□ Short report

□ As-built drawing(s)

Where the point for humidity control is claimed, the following additional information is required:

□ Extract(s) from the Commissioning Report

Where the credit is claimed as 'Not Applicable'

□ Short report

Short report prepared by a suitable professional that describes how the Credit Criteria have been met by:

- Referencing the extent of new and existing ductwork, cross-referencing drawings and specifications, confirming that adequate access is provided to all moisture- and debris-generating HVAC components. The report should include a table of all moisture- and debris-generating HVAC components and clearly identify that both sides of the components are provided with adequate access for cleaning;
- Referencing the clauses in the specification where cleaning of the existing and new ductwork is required prior to occupation;
- Where humidity controls are present, describing the active humidity control system; and
- Where the credit is not applicable, describing the naturally ventilated spaces, and how they comply with AS1668.2-2002.

As-built drawing(s) of the ventilation system equipment and ductwork showing:

• The locations of the access panels in all ductwork, clearly indicating adequate maintenance access to both sides of moisture- and debris-generating components.

Extract(s) from the Commissioning Report showing:

- The humidity levels in the ducts and in the occupied space for all modes of operation; and
- That the testing occurred using the range stated in the control system and demonstrate that all valves, dampers, fans, and the rest of the equipment, work as intended.

ADDITIONAL GUIDANCE

ASHRAE Standard 62-2001 recommends maintaining indoor relative humidity levels between 30% and 60%. Humidity levels less than 30% trigger respiratory discomfort in some people while humidity levels over 70% near surfaces for extended periods of time promote the growth of some forms of mould and fungi.

This can be achieved through specific HVAC system design and by including dehumidifying components such as desiccants.

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AVAILABLE

Controlling indoor moisture levels is one way to control propagation of fungi and dust mites inside buildings: in the carpets, wall coverings, and furnishings, as well as within the HVAC system itself.

For the purposes of this credit, 'adequate maintenance access' is considered to be where entry can be gained to both sides of all moisture- and debris-generating components in the interior of the air distribution system, as outlined in Figure IEQ-10.1.

AIRAH HVAC Hygiene Best Practice Guidelines 2010

The AIRAH HVAC Hygiene Best Practice Guidelines provide information on the different types of HVAC systems, special uses, and how they should perform in accordance with the different BCA classes. The design, construction and commissioning of the ducting must comply with the guidelines in their entirety.

NADCA Assessment, Cleaning and Restoration of HVAC Systems 2006

The ACR 2006 Standard applies to the majority of HVAC systems, regardless of the type of duct construction. Service openings created in any type of system component must meet or exceed the requirements defined within ACR 2006.

Shell and Core Spaces

Where no mechanical ventilation systems have been installed in a space, and the space does not meet the natural ventilation requirements for this credit, this space will be considered as noncompliant. Where the non-compliant space is more than 5% of the nominated area, no points will be awarded for this credit. Where a mix of spaces, some compliant and some not compliant, the non-compliant space can be excluded if it is not more than 5% of the nominated area.

Multiple Buildings Single Rating guidance

For points to be awarded, all buildings must comply with the relevant criteria.

Where a group of buildings can be represented by a typical building (e.g. buildings with similar construction, geometrical shape and size), documentation for the typical building can be submitted to demonstrate compliance for the entire group of buildings.

Where documentation is submitted for a typical building, representing a group of buildings, it must be:

- Indicated which buildings the documentation applies to; and ٠
- Justified that all buildings in the group have equal or better performance than the typical building.

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POINTS AVAILABLE

If no typical buildings exist, documentation must be submitted for each building in the project scope.

Table IEQ-10.1: Multiple Buildings Single Rating guidance

Rating	Guidance
Design	The documentation submitted at this stage must be submitted for each building in the project scope. Where typical buildings exist, the project team must indicate which buildings the documentation applies to.
As Built	The documentation submitted at this stage must be submitted for each building in the project scope. Where typical buildings exist, the project team must indicate which buildings the documentation applies to.

BACKGROUND

Maintaining clean heating, ventilation and air-conditioning (HVAC) systems is important for sustaining acceptable levels of indoor air quality. Properly performed system cleaning services should take place in order to reduce or eliminate the introduction of contaminants by HVAC systems.

Contaminants in HVAC systems may take many forms. Typical indoor air contaminants include dust particles, bioaerosols, low level volatile organic compounds, formaldehyde and the accumulation of carbon dioxide among others (Witorsch & Spagnolo, 1994).

HVAC systems frequently contain contaminants such as insulation materials and mould (US EPA, n.d.). In fact, particle deposition on component surfaces may even begin to take place before HVAC systems are installed. Airborne particles in factory assembly areas are likely to settle on air handling units and fibre glass insulation, as well as adhere to the surface of metal components.

The installation process during construction may also subject the HVAC system to further contamination. Construction sites generate high levels of dust from concrete, cement, wood, stone and silica (Sustainable Build UK, n.d.). These particles often settle on or within the HVAC system during construction.

HVAC systems have been shown to act as a collection source for a variety of contaminants and the particulate accumulation process continues throughout the life of the system. Poor design, installation and maintenance practices, low-efficiency air filtration, airflow bypass, inadequate or infrequent preventative maintenance practices, humid conditions, and many other factors can result in contaminated HVAC systems. GREEN STAR - DESIGN & AS BUILT

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Particles in the air can cause or aggravate a number of health problems and have been linked to illnesses and deaths from heart or lung diseases (US EPA, 2003). Those at higher risk of particle pollution are those with already compromised or weak autoimmune systems as is typically the case with healthcare facility patients.

REFERENCES & FURTHER INFORMATION

- Australian Institute of Refrigeration, Air Conditioning and Heating, AIRAH HVAC *Hygiene Best Practice Guidelines 2010*, Australia, 2010.
- National Air Duct Cleaners Association, ACR 2006, Assessment, Cleaning, and Restoration of HVAC systems, United States, 2006.
- Sustainable Build UK, *Pollution from Construction,* www.sustainablebuild.co.uk/PollutionFromConstruction.html
- United States Environmental Protection Agency (US EPA) (no date), *Heating, Ventilation and HVAC Systems*, www.epa.gov/iaq/schooldesign/hvac.html.
- United States Environmental Protection Agency (US EPA) (2003), Air Quality Guide for Particle Pollution, Office of Air and Radiation (630I A) EPA 452/F-03-002, www.epa.gov/region1/airquality/pdfs/airqualityguideparticles.pdf
- Witorsch, P. and Spagnolo, S.V. (1994), *Air Pollution and Lung Disease in Adults,* CRC Press, London, p.4.