Thermal Comfort and Amenity Spaces

Healthy

Credit: 14

Points: 2

Outcome

The building provides a high level of thermal comfort and internal amenities that improve occupant experience of using the building.

Criteria

Minimum Expectation	**Nil**	• A high degree of thermal comfort is provided to occupants in the space, equivalent to 80% of all occupants being satisfied in the space.
Credit Achievement	**1 point**	• The building has dedicated amenity rooms to act as a parent room, relaxation room, or an exercise room. Or • A high degree of thermal comfort is provided to occupants in the space, equivalent to 90% of all occupants being satisfied in the space.
Exceptional Performance	**1 point**	• Where both items in the credit achievement have been met.

Additional information

Stage implementation

Strategy	Brief	Concept	Design	Tender	Construction	Handover	Use

Synergies with other credits

- Design for Inclusion
- Acoustic Comfort
- Light Quality
- Clean Air

Sustainable Development Goals

- Goal 3 (Good Health and Wellbeing)

Relevant reporting initiatives

- None

Requirements

Minimum Expectation

Thermal Comfort

The project teams demonstrate that, for 95% of the regularly occupied areas and 98% of the year, a high degree of thermal comfort is provided. There are a number of options for demonstrating compliance depending on the type of space, as follows. A combination of methods is acceptable.

- Naturally ventilated spaces – The internal temperatures in each space are within 80% of Acceptability Limit 1 of ASHRAE Standard 55-2013
- Mechanically ventilated spaces – The space meets specified prescriptive criteria for Thermal Comfort or the Predicted Mean Vote (PMV) levels are between -1 and +1, inclusive

This criterion applies to all regularly occupied areas in the building – those continuously occupied or occupied for more than two hours (previously known as 'primary' and 'secondary' spaces) including living and sleeping areas. Areas that are either transient or accessed intermittently such as corridors, storage, back of house or plant rooms can be excluded. Spaces can also be excluded if the use of the space (for example, a laboratory) justifies specific thermal conditions – a Technical Question must be submitted to the NZGBC for confirmation. A space can be excluded if the applicable Standard recommends that specialist advice be sought.

Naturally Ventilated Spaces

For naturally ventilated spaces, project teams must demonstrate that internal temperatures in each space are within 80% of Acceptability Limit 1, as per standard ASHRAE 55-2020, it must be shown that occupants have direct control over the opening and closing of windows, and that these are the main sources of ventilation. These spaces can contain ceiling fans.

The ASHRAE standard 55-2020 Applicability section 5.4.1 states that this method may be used only when (a) no heating system is operating, and (d) when the prevailing mean outdoor temperature is greater than 10°C. Where projects are not in accordance with the methodology outlined in ASHRAE 55-2020 Section 5.4.1(a) and section 5.4.1(d), due to having an operating heating system and prevailing mean outdoor temperatures lower than 10°C which falls outside the applicability limits of the methodology. The winter discomfort or underheating should be assessed through the Predicted Mean Vote (PMV) methodology outlined in the following section. Summer discomfort and overheating can still be assessed using the adaptive comfort methodology outlined in ASHRAE – 55 provided all relevant applicability limits are met i.e. a combination of assessment methods is acceptable with PMV used during the heating season and adaptive comfort model approach used for the remainder of the year.

Mechanically Ventilated Spaces

Project teams must demonstrate that each space either:

A. Meets prescriptive thermal comfort requirements; or

B. The Predicted Mean Vote (PMV) levels are between -1 and +1, inclusive.

A. Prescriptive Thermal Comfort Requirements

This option can be applied in climate zones 1-3, as identified on the climate zone map in H1/VM1 5th edition and H1/VM2 1ST edition. Any other location in climate zones 4 - 6 is required to demonstrate compliance via thermal modelling.

To comply with this requirement, the HVAC system and building façade must meet the following requirements.

HVAC system requirements:

- Dry bulb temperature must be between 20° C and 24° C.
- Relative humidity must be controlled between 40% and 60%.
- Air velocity must be no more than 0.2m/s with no supply air directed at occupants (unless they have direct control over air flow and/or direction).
- Systems must have modulation/turn down capability (i.e., the demonstrated ability to maintain both dry bulb temperature and relative humidity at low space loads).

- The system must have distinct internal zones (no more than 120 m^2) and external perimeter zones (no more than 75m^2) with independent temperature controls. Perimeter zones must have a maximum depth of 4m and cannot serve more than one orientation. Small deviations are allowed for zone sizes at the discretion of the mechanical engineer.

Building façade requirements:

- Solar Heat Gain Coefficient of façade glazing must be 0.3 or lower; OR, maximum solar heat gain through the glass must be calculated as no greater than 250W/m^2 peak.
- Total glazing U-Value (inclusive of glass and frame) is 3.0W/m2 .K or lower.

B. Thermal Modelling Requirements

For this option, PMV levels must be calculated in accordance with either ISO 7730-2005 or ASHRAE Standard 55-2020. The specified PMV levels must be met for each zone, not as an average.

Modelling must be carried out in accordance with ASHRAE Standard 55-2020. All inputs into the modelling or calculations (e.g., building form, materials, air conditioning system(s), shading, internal loads, etc.) must be clearly justified and referenced consistently throughout the rest of the submission (i.e. in related credits such as 'Energy Use' (22) or ‘Clean Air’ (10)). Values must be justified and sourced from either ASHRAE Standard 55-2020 or ISO 7730-2005. Alternative values may be accepted with proper justification and sourcing.

For equitable assessment the model must comply with the following requirements:

- Perimeter zones shall have a maximum depth of 4m;
- Zoning shall match the air conditioning zones (with the exception of perimeter zones which must be 4m in depth) with exceptions permitted for small, enclosed spaces at the discretion of the mechanical engineer (e.g. a small perimeter office);
- Inter-zone partitions should be modelled;
- Each perimeter shall be reported independently (e.g., North, South, East and West);
- Perimeter air conditioning zones cannot exceed 75m^2;
- Perimeter zones shall be reported independently of interior zones;
- Model shall be completed with all systems assessed simultaneously;
- Comfort predictions shall be measured at the midpoint of each zone (i.e., if the perimeter zone is 4m deep then the comfort prediction will be 2m from the perimeter), or taken as an average across the zone.
- Comfort predictions shall be measured at a height of between 0.8 and 1.5m above finished floor level (FFL) of each zone or taken as an average across the zone.

Credit Achievement

In addition to the *Minimum Expectation*, the project must comply with one of the following criteria:

- Amenity Rooms
- High Thermal Comfort

Amenity Rooms

The building includes one or several rooms designed to promote either inclusivity, mindfulness or exercise for staff or occupants.

For a room(s) to qualify, it must be classified as per below:

- Parent room
- Relaxation, meditation, or prayer room
- Exercise room

The room size to be provided must be as follows:

- The size of the room is calculated at a ratio of 1m² per every 10 staff or occupants

- The room must be no smaller than $10m^2$

Building occupancy is determined by the project team and must be consistent with other credits in the submission.

The room(s) must be accessible to all staff and occupants. The room must be separate from bathrooms, showers, lockers, and active facilities. All amenities and/or infrastructure necessary to use the room(s) for its intended purposes must be provided (for example, including a sink or bench for a parent room).

In addition, the room(s) must meet the following:

- *Credit Achievement* for the Light Quality credit
- *Credit Achievement* for the Acoustic Comfort credit
- The 'Inclusive Design' criterion of the Design for Inclusion credit.

These amenity rooms are for staff or occupants. Examples of building occupants are:

- Facilities management staff
- Building tenants
- Residents in an apartment building
- Staff in shops in a shopping centre
- Workers in an industrial setting
- Staff in hospitality buildings, tourism centres, or conference facilities

Amenity rooms provided for the primary purpose of visitor enjoyment, even if staff and occupants can use them, are not acceptable alternatives, unless the room sizes have been designed to account for visitor numbers too.

Examples of visitors include:

- People who shop in shopping centre or shops
- Delivery drivers
- Hotel occupants
- Conference attendees

High Thermal Comfort

In conjunction with the Minimum requirement, the project teams demonstrate that, for 95% of the regularly occupied areas and 98% of the year, a high degree of thermal comfort is provided. There are a number of methods for demonstrating compliance, as follows:

- Naturally ventilated spaces – The internal temperatures in each space are within 90% of Acceptability Limit 1 of ASHRAE Standard 55-2013
- Mechanically ventilated spaces – The Predicted Mean Vote (PMV) levels are between -0.5 and +0.5, inclusive, in accordance with 14.1.2B; or

A combination of methods is acceptable.

Exceptional Performance

In addition to the *Minimum Expectation*, the project must comply with both of the following criteria:

- Amenity Rooms
- High Thermal Comfort

Submission content

Submissions for this credit must contain:

- **Submission form**
- **Evidence** to support claims made in the submission

Recommended evidence:

- A narrative describing the various rooms
- As build drawings showing the location and size of the rooms
- Evidence that all necessary equipment for the room type has been provided
- Evidence that the rooms comply with the Light Quality and Acoustic Comfort credits
- Evidence that the room complies with the ''Inclusive Design' criterion of the *Design for Inclusion* credit
- Drawings showing the building's ventilation strategy.
- Modelling report showing the results of the ventilation compliance method.
- Confirmation from the relevant sub-contractors that all services have been installed and commissioned in line with the listed DTS criteria.

Alternate documentation can also be used by project teams to demonstrate compliance.

*Where a NZGBC Accredited Energy Modeller has been engaged to undertake the energy modelling, a **Producer Statement** from the Accredited Energy Modeller may be submitted to show compliance of this credit, in lieu of a full energy report.

The recommended evidence listed above is applicable to the as built submission. See the Design Assessment section in the Introduction for more information on submitting evidence for the Design assessment.

The key requirement is that evidence is provided to support each claim made within the Submission form.

Guidance

Types of spaces

If a project would like to claim a different type of room that provides a unique amenity to occupants, a Technical Question must be submitted to the NZGBC.

Multi-functional rooms

Rooms can be dedicated to one purpose or can be a multi-functional room that caters to several of these at once. If rooms are multi-functional, then all necessary equipment for the types of uses must be provided.

Rooms should be designed and built based on the needs of the demographics of the building users. The rooms should also be sized and spaced to suit the needs of the building users.

It is recommended that where multiple rooms are designed, a diverse range of room types be provided.

Design guidelines

Below are relevant guidelines that provide useful insights and design principles for parent and prayer rooms.

- Parenting room
  - https://aushfg-prod-com-au.s3.amazonaws.com/download/RDS_PAR_4.pdf
  - https://aushfg-prod-com-au.s3.amazonaws.com/download/RLS_PAR_3.pdf
- Quiet or religious rooms
  - https://www.diversitybestpractices.com/sites/diversitybestpractices.com/files/import/embedded/anchors/files/_attachments_articles/rr_quietroomsbestpractices.final_.feb2015_0.pdf

Existing Buildings

An approximation of the estimated thermal and visual properties of an existing façade (e.g., the U-values and shading coefficients of walls/glazing) can be used, provided that all assumptions made are conservative (i.e. described the 'worst-case scenario').

Spaces where HVAC is not Fully Installed at Time of Submission

Where HVAC systems are not installed or fully fitted out at the time of submission, thermal comfort modelling may be carried out in line with the following requirements, in addition to requirements set for mechanically ventilated spaces:

- Internal tenant loads including lighting and small power must be modelled using a notional fitout assuming the most energy intensive fitout allowable by the New Zealand Building Code Clause H1 Energy Efficiency and referenced New Zealand Standards (code compliance minima), or according to the lease agreement or tenant fitout guide.
- HVAC system zoning, cooling capacity, delivered air velocity and delivered air temperature may be assumed as aligned with other like spaces or floors within the building. Alternatively, a design as provided by the mechanical engineer is acceptable.
- It may be assumed that an HVAC system has separate internal and perimeter zones with independent temperature control. The assumptions must then be provided to the tenant as part of the fitout guide.
- Outdoor air rates and base building HVAC supply and relief air rates must be aligned with the as built mechanical design.
- All other attributes are modelled in line with the requirements for mechanically ventilated spaces.

Supporting information

The following resources support this credit:

- American Society of Heating, Refrigerating and Air-conditioning Engineers (ASHRAE) (2013), ASHRAE Standard 55: Thermal Environmental conditions for Human Occupancy, Atlanta, www.ashrae.org
- International Organisation for Standardisation (ISO) (2005), ISO 7730:2005 Ergonomics of the thermal environment – Analytical determination and interpretation of thermal comfort using calculation of the PMV and PDD indices and local thermal comfort criteria, www.iso.org
- Chartered Institution of Building Services Engineers, UK (CIBSE) Applications Manual 10-2005, Natural Ventilation in Non-Domestic Buildings
- Wyon, D. (2001), 'Enhancing productivity while reducing energy use in buildings', in E-Vision 2000: Key issues that will shape our energy future, Conference Proceedings, Science and Technology Policy Institute, Washington, D.C., June 2000, Enhancing Productivity While Reducing Energy Use in Buildings