National Construction Code

Volume One
Building Code of Australia

PREVIEW
ENERGY EFFICIENCY AND CONDENSATION PROVISIONS

Australian Building Codes Board

2022

Copyright and Licence Notice

Australian Building Codes Board

GPO Box 2013, Canberra ACT 2601

Phone: 1300 134 631

Email: ncc@abcb.gov.au

Web: abcb.gov.au

Attribution

Disclaimer

Part A5 Documentation of design and construction

Governing Requirements

A5G9 NatHERS

[New for 2022]

Where *house energy rating software* is *required* to be used, evidence of the *house energy rating software* output must be in the form of a NatHERS certificate issued in accordance with the NatHERS scheme.

Part B1 Structural provisions

Performance Requirements

B1P1 Structural reliability

[2019: BP1.1]

(1) By resisting the actions to which it may reasonably be expected to be subjected, a building or structure, during construction and use, with appropriate degrees of reliability, must—

(a) perform adequately under all reasonably expected design actions; and

(b) withstand extreme or frequently repeated design actions; and

(c) be designed to sustain local damage, with the structural system as a whole remaining stable and not being damaged to an extent disproportionate to the original local damage; and

(d) avoid causing damage to *other properties*.

(2) The actions to be considered to satisfy (1) include but are not limited to—

(a) permanent actions (dead loads) including, for a Class 7b building, an additional notional permanent roof load of not less than 0.15 kPa to support the addition of solar photovoltaic panels; and

(b) imposed actions (live loads arising from occupancy and use); and

(c) wind action; and

(d) earthquake action; and

(e) snow action; and

(f) liquid pressure action; and

(g) ground water action; and

(h) rainwater action (including ponding action); and

(i) earth pressure action; and

(j) differential movement; and

(k) time dependent effects (including creep and shrinkage); and

(l) thermal effects; and

(m) ground movement caused by—

(i) swelling, shrinkage or freezing of the subsoil; and

(ii) landslip or subsidence; and

(iii) siteworks associated with the building or structure; and

(n) construction activity actions; and

(o) termite actions.

Exemptions

The requirement for an additional notional permanent roof load to support photovoltaic panels in B1P1(2)(a) does not apply to a Class 7b building—

(a) where 100% of the roof area is shaded for more than 70% of daylight hours; or

(b) with a roof area of not more than 55 m^2; or

(c) where more than 50% of the roof area is used as a terrace, *carpark*, roof garden, roof light or the like.

Deemed-to-Satisfy Provisions

B1D3 Determination of individual actions

[2019: B1.2]

The magnitude of individual actions must be determined in accordance with the following:

(a) Permanent actions:
  (i) the design or known dimensions of the building or structure; and
  (ii) the unit weight of the construction; and
  (iii) AS/NZS 1170.1; and
  (iv) for a Class 7b building, a notional additional permanent roof load of not less than 0.15 kPa to support the addition of solar photovoltaic panels.

(b) Imposed actions:
  (i) the known loads that will be imposed during the occupation or use of the building or structure; and
  (ii) construction activity actions; and
  (iii) AS/NZS 1170.1.

(c) Wind, snow and ice and earthquake actions:
  (i) the applicable annual probability of design event for safety, determined by—
    (A) assigning the building or structure an Importance Level in accordance with Table B1D3a; and
    (B) determining the corresponding annual probability of exceedance in accordance with Table B1D3b; and
  (ii) AS/NZS 1170.2; and
  (iii) AS/NZS 1170.3 as appropriate; and
  (iv) AS 1170.4; and
  (v) in cyclonic areas, metal roof cladding, its connections and immediate supporting members must comply with Specification 4; and
  (vi) for the purposes of (v), cyclonic areas are those determined as being located in wind regions C and D in accordance with AS/NZS 1170.2.

(d) Actions not covered in (a), (b) and (c) above:
  (i) the nature of the action; and
  (ii) the nature of the building or structure; and
  (iii) the Importance Level of the building or structure determined in accordance with Table B1D3a; and
  (iv) AS/NZS 1170.1.

(e) For the purposes of (d) the actions include but are not limited to—
  (i) liquid pressure action; and
  (ii) ground water action; and
  (iii) rainwater action (including ponding action); and
  (iv) earth pressure action; and
  (v) differential movement; and
  (vi) time dependent effects (including creep and shrinkage); and
  (vii) thermal effects; and
  (viii) ground movement caused by—
    (A) swelling, shrinkage or freezing of the subsoil; and
    (B) landslip or subsidence; and
    (C) *siteworks* associated with the building or structure; and
  (ix) *construction activity actions*.

Table B1D3a: Importance Levels of buildings and structures

Importance level	Building Types
1	Buildings or structures presenting a low degree of hazard to life and *other property* in the case of failure.
2	Buildings or structures not included in Importance Level 1, 3 and 4.
3	Buildings or structures that are designed to contain a large number of people.
4	Buildings or structures that are essential to post-disaster recovery or associated with hazardous facilities.

Table B1D3b: Design events for safety

Importance level	Annual probability of exceedance for non-cyclonic wind	Annual probability of exceedance for cyclonic wind	Annual probability of exceedance for snow	Annual probability of exceedance for earthquake
1	1:100	1:200	1:100	1:250
2	1:500	1:500	1:150	1:500
3	1:1000	1:1000	1:200	1:1000
4	1:2000	1:2000	1:250	1:1500

Exemptions

B1D3(a)(iv) does not apply to a Class 7b building—

(a) where 100% of the roof area is shaded for more than 70% of daylight hours; or

(b) with a roof area of not more than 55m^2; or

(c) where more than 50% of the roof area is used as a terrace, *carpark*, roof garden, roof light or the like.

Part F8 Condensation management

Introduction to this Part

This Part is intended to reduce the risk of illness or loss of *amenity* due to the occurrence of condensation inside a building. It does this by requiring features that enable moisture-laden air to be removed from inside the building and the building structure.

Objectives

F8O1 Objective

[2019: FO6]

The Objective of this Part is to safeguard occupants from illness or loss of *amenity* as a result of excessive internal moisture.

Applications

F8O1 only applies to a *sole-occupancy unit* of a Class 2 building or Class 4 part of a building.

Functional Statements

F8F1 Condensation

[2019: FF6.1]

A building is to be constructed to avoid the likelihood of excessive internal moisture accumulating within the building structure.

Applications

F8F1 only applies to a *sole-occupancy unit* of a Class 2 building or Class 4 part of a building.

Performance Requirements

TAS F8P1

F8P1 Condensation and water vapour management

[2019: FP6.1]

Risks associated with water vapour and *condensation* must be managed to minimise their impact on the health of occupants.

Applications

F8P1 only applies to a *sole-occupancy unit* of a Class 2 building or Class 4 part of a building.

Verification Methods

F8V1 Condensation management

[2019: FV6]

(1) Compliance with *Performance Requirement* F8P1 is verified for a roof or *external wall* assembly when it is determined that a mould index of greater than 3, as defined by Section 6 of AIRAH DA07, does not occur on—

(a) the interior surface of the *water control layer*; or

(b) the surfaces of building *fabric* components interior to the *water control layer*.

(2) The calculation method for (1) must use—

(a) input assumptions in accordance with AIRAH DA07; and

(b) the intermediate method for calculating indoor design humidity in Section 4.3.2 of AIRAH DA07.

Deemed-to-Satisfy Provisions

F8D1 Deemed-to-Satisfy Provisions

[2019: F6.0]

(1) Compliance with *Performance Requirement* F8P1 is satisfied by complying with *Deemed-to-Satisfy Provisions* F8D2 to F8D5.

(2) Where a *Performance Solution* is proposed, the relevant *Performance Requirements* must be determined in accordance with A2G2(3) and A2G4(3) as applicable.

Explanatory Information

The intent of these requirements is to assist in the mitigation of *condensation* within a building. The implementation of a *condensation* management strategy may not prevent *condensation* from occurring.

F8D2 Application of Part

[2019: F6.1]

The *Deemed-to-Satisfy Provisions* of this Part only apply to a *sole-occupancy unit* of a Class 2 building and a Class 4 part of a building.

F8D3 External wall construction

[2019: F6.2]

(1) Where a *pliable building membrane* is installed in an *external wall*, it must—

(a) comply with AS 4200.1; and

(b) be installed in accordance with AS 4200.2; and

(c) be located on the exterior side of the *primary insulation layer* of wall assemblies that form the external envelope of a building.

(2) Where a *pliable building membrane*, *sarking-type material* or insulation layer is installed on the exterior side of the *primary insulation layer* of an *external wall* it must have a *vapour permeance* of not less than—

(a) in *climate zones* 4 and 5, 0.143 µg/N.s; and

(b) in *climate zones* 6, 7 and 8, 1.14 µg/N.s.

(3) Except for single skin masonry and single skin concrete, where a *pliable building membrane* is not installed in an *external wall*, the primary *water control layer* must be separated from *water sensitive materials* by a drained cavity.

Explanatory Information

F8D3(2) requires some wall materials on the external side of the *primary insulation layer* to have a minimum level of *vapour permeance*. *Vapour permeance* is measured in µg/N.s (micrograms per newton-second).

Class 3 and 4 vapour control membranes (as defined by clause 5.3.4 of AS 4200.1) meet the *vapour permeance* requirements of F8D3(2)(a), while Class 4 vapour control membranes meet the *vapour permeance* requirements of F8D3(2)(b).

Open-cell insulation, such as mineral wool or fibreglass, typically has a high *vapour permeance*, while closed-cell insulation such as polystyrene typically has a low *vapour permeance*. Many foil-faced insulation products have a low *vapour permeance*.

F8D4 Exhaust systems

[2019: F6.3]

(1) An exhaust system installed in a kitchen, bathroom, *sanitary compartment* or laundry must have a minimum flow rate of—

  (a) 25 L/s for a bathroom or *sanitary compartment*; and

  (b) 40 L/s for a kitchen or laundry.

(2) Exhaust from a kitchen, kitchen range hood, bathroom, *sanitary compartment* or laundry must discharge directly or via a shaft or duct to *outdoor air*.

(3) Where space for a clothes drying appliance is provided in accordance with F4D2(1)(b), space must also be provided for ducting from the clothes drying appliance to *outdoor air*.

(4) (3) does not apply if a condensing-type clothes drying appliance is installed.

(5) An exhaust system that is not run continuously and is serving a bathroom or *sanitary compartment* that is not ventilated in accordance with F6D7 must—

  (a) be interlocked with the room's light switch; and

  (b) include a run-on timer so that the exhaust system continues to operate for 10 minutes after the light switch is turned off.

(6) Except for rooms that are ventilated in accordance with F6D7, a room with space for ducting a clothes drying appliance to *outdoor air* in accordance with (3) must be provided with make-up air in accordance with AS 1668.2

Explanatory Information

A range hood installed in a kitchen must comply with F8D4(2).

Part F6 includes other ventilation requirements which must be met, including a requirement for make-up air to be provided to mechanically ventilated rooms in accordance with AS 1668.2.

F8D5 Ventilation of roof spaces

[2019: F6.4]

(1) In *climate zones* 6, 7 and 8, a roof must have a roof space that—

  (a) is located—

    (i) immediately above the *primary insulation layer*; or

    (ii) immediately above sarking with a *vapour permeance* of not less than 1.14 µg/N.s, which is immediately above the *primary insulation layer*; or

    (iii) immediately above ceiling insulation which meets the requirements of J3D7(3) and J3D7(4); and

  (b) has a height of not less than 20 mm; and

  (c) is either—

    (i) ventilated to *outdoor air* through evenly distributed openings in accordance with Table F8D5; or

    (ii) located immediately underneath roof tiles of an unsarked tiled roof.

(2) The requirements of (1) do not apply to a—

(a) concrete roof; or

(b) roof that is made of structural insulated panels; or

(c) roof that is subject to Bushfire Attack Level FZ requirements in accordance with AS 3959.

Table F8D5: Roof space ventilation requirements

Roof pitch	Ventilation openings
<10°	25,000 mm^2/m provided at each of two opposing ends
≥10° and <15°	25,000 mm^2/m provided at the eaves and 5,000 mm^2/m at high level
≥15° and <75°	7,000 mm^2/m provided at the eaves and 5,000 mm^2/m at high level, plus an additional 18,000 mm^2/m at the eaves if the roof has a cathedral ceiling

Table Notes

(1) Ventilation openings are specified as a minimum free open area per metre length of the longest horizontal dimension of the roof.

(2) For the purposes of this table, high level openings are openings provided at the ridge or not more than 900 mm below the ridge or highest point of the roof space, measured vertically.

Section J Energy efficiency

Part J1 Energy efficiency performance requirements

Objectives

J1O1 Objective

Functional Statements

J1F1 Energy efficiency

Performance Requirements

J1P1 Energy use

J1P2 Thermal performance of a sole-occupancy unit of a Class 2 building or a Class 4 part of a building

J1P3 Energy usage of a sole-occupancy unit of a Class 2 building or a Class 4 part of a building

J1P4 Renewable energy and electric vehicle charging

Verification Methods

J1V1 NABERS Energy

J1V2 Green Star

J1V3 Verification using a reference building

J1V4 Verification of building envelope sealing

J1V5 Verification using a reference building for a Class 2 sole-occupancy unit

Part J2 Energy efficiency

Deemed-to-Satisfy Provisions

J2D1 Deemed-to-Satisfy Provisions

J2D2 Application of Section J

Part J3 Elemental provisions for a sole-occupancy unit of a Class 2 building or a Class 4 part of a building

Deemed-to-Satisfy Provisions

J3D1 Deemed-to-Satisfy Provisions

J3D2 Application of Part

J3D3 Reducing heating and cooling loads of a sole-occupancy unit of a Class 2 building or a Class 4 part of a building using house energy rating software

J3D4 Ceiling fans in a sole-occupancy unit of a Class 2 building or a Class 4 part of a building

J3D5 Roof thermal breaks of a sole-occupancy unit of a Class 2 building or a Class 4 part of a building

J3D6 Wall thermal breaks of a sole-occupancy unit of a Class 2 building or a Class 4 part of a building

J3D7 Roofs and ceilings of a sole-occupancy unit of a Class 2 building or a Class 4 part of a building

J3D8 External walls of a sole-occupancy unit of a Class 2 building or a Class 4 part of a building

J3D9 Wall-glazing construction of a sole-occupancy unit of a Class 2 building or a Class 4 part of a building

Part J1 Energy efficiency performance requirements

Introduction to this Part

This Part sets the thermal performance properties of building *fabric*, the energy efficiency of key energy using equipment and the features a building must have to facilitate the future installation of distributed energy resources.

Notes: Tasmania Section J Energy Efficiency

In Tasmania, for a Class 2 building and Class 4 part of a building, Section J is replaced with Section J of BCA 2019 Amendment 1.

Objectives

J1O1 Objective

[2019: JO1]

The Objective of this Section is to—

(a) reduce energy consumption and energy peak demand; and

(b) reduce greenhouse gas emissions; and

(c) improve occupant health and *amenity*.

Functional Statements

J1F1 Energy efficiency

[2019: JF1]

A building must—

(a) reduce the energy consumption and energy peak demand of key energy using equipment; and

(b) reduce the greenhouse gas emissions that occur as a result of a building's energy consumption and energy source; and

(c) for a *sole-occupancy unit* of a Class 2 building or a Class 4 part of a building, improve occupant health and *amenity* by mitigating the impact of extreme hot and cold weather events and energy blackouts; and

(d) for other than in a *sole-occupancy unit* of a Class 2 building or a Class 4 part of a building, protect occupant health and *amenity* by ensuring the building *envelope* assists in the maintenance of acceptable internal conditions while the building is occupied; and

(e) be able to accommodate the future installation of distributed energy resources.

Performance Requirements

J1P1 Energy use

[2019: JP1]

A building, other than a *sole-occupancy unit* of a Class 2 building or a Class 4 part of a building, including its *services*,

must have features that facilitate the efficient use of energy appropriate to—

(a) the function and use of the building; and

(b) the level of human comfort required for the building use; and

(c) solar radiation being—

(i) utilised for heating; and

(ii) controlled to minimise energy for cooling; and

(d) the energy source of the *services*; and

(e) the sealing of the building *envelope* against air leakage; and

(f) for a *conditioned space*, achieving an hourly *regulated energy* consumption, averaged over the annual *hours of operation*, of not more than—

(i) for a Class 6 building, 80 kJ/m².hr; and

(ii) for a Class 5, 7b, 8 or 9a building other than a *ward area*, or a Class 9b *school*, 43 kJ/m².hr; and

(iii) for all other building classifications, 15 kJ/m².hr.

J1P2 Thermal performance of a sole-occupancy unit of a Class 2 building or a Class 4 part of a building

[New for 2022]

(1) The total *heating load* of the *habitable rooms* and *conditioned spaces* in a *sole-occupancy unit* of a Class 2 building or a Class 4 part of a building must not exceed the *heating load* limit in Specification 44.

(2) The total *cooling load* of the *habitable rooms* and *conditioned spaces* in a *sole-occupancy unit* of a Class 2 building or a Class 4 part of a building must not exceed the *cooling load* limit in Specification 44.

(3) The total *thermal energy load* of the *habitable rooms* and *conditioned spaces* in a *sole-occupancy unit* of a Class 2 building or a Class 4 part of a building must not exceed the *thermal energy load* limit in Specification 44.

J1P3 Energy usage of a sole-occupancy unit of a Class 2 building or a Class 4 part of a building

[New for 2022]

(1) The *energy value* of the *domestic services* of a *sole-occupancy unit* of a Class 2 building or Class 4 part of a building must not exceed the *energy value* with—

(a) a 3-star ducted heat pump, rated under the 2019 GEMS determination, heating all spaces that are provided with heating; and

(b) a 3-star ducted heat pump, rated under the 2019 GEMS determination, cooling all spaces that are provided with cooling; and

(c) a 5-star instantaneous gas water heater, rated under the 2017 GEMS determination, providing all domestic hot water; and

(d) a lighting power density of 4 W/m^2 serving all internal spaces that are provided with artificial lighting.

(2) *Domestic services*, including any associated distribution system and components must, to the degree necessary, have features that facilitate the efficient use of energy appropriate to—

(a) the *domestic service* and its usage; and

(b) the geographic location of the building; and

(c) the location of the *domestic service*; and

(d) the energy source.

J1P4 Renewable energy and electric vehicle charging

[New for 2022]

A building must have features that facilitate the future installation of on-site renewable energy generation and storage and electric vehicle charging equipment.

Verification Methods

J1V1 NABERS Energy

[2019: JV1]

(1) For a Class 5 building, compliance with J1P1 is verified when—

(a) a minimum 5.5-star *NABERS Energy* base building Commitment Agreement is obtained; and

(b) the energy model required for (a) demonstrates—

(i) the base building's greenhouse gas emissions are not more than 67% of the 5.5-star level when excluding—

(A) tenant supplementary heating and cooling systems; and

(B) external lighting; and

(C) carpark services; and

(ii) a *thermal comfort level* of between a *Predicted Mean Vote* of -1 to +1 is achieved across not less than 95% of the *floor area* of all occupied zones for not less than 98% of the annual *hours of operation* of the building; and

(c) the building complies with the additional requirements in Specification 33.

(2) For a Class 2 building, other than *sole-occupancy units*, compliance with J1P1 is verified when—

(a) a minimum 4-star *NABERS Energy* for Apartment Buildings Commitment Agreement is obtained; and

(b) air-conditioning, which operates not less than 18 hours per day, is provided to all enclosed common lift lobbies and corridors; and

(c) the energy model *required* for (a) demonstrates—

(i) the greenhouse gas emissions of the *services* are less than 90% of the 5-star level; and

(ii) a *thermal comfort level* of between a *Predicted Mean Vote* of -1 to +1 is achieved across not less than 95% of the *floor area* of the *air-conditioned* common area occupied zones, excluding indoor *swimming pool* chambers, for not less than 98% of the annual *hours of operation* of the building; and

(iii) the space temperature in any indoor *swimming pool* chamber is maintained at 2°C above the pool temperature during occupied hours of not less than 12 hours per day; and

(d) the building complies with the additional requirements in Specification 33.

(3) For a Class 3 building, compliance with J1P1 is verified when—

(a) a minimum 4-star *NABERS Energy* for Hotels Commitment Agreement is obtained; and

(b) the operating hours of the *services* are not less than 12 hours per day in bedrooms, dining rooms and conference facilities, 24 hours per day in corridors and foyers and 18 hours per day in back-of-house areas; and

(c) the energy model *required* for (a) demonstrates that—

(i) the greenhouse gas emissions of the *services* are less than 70% of the 5-star level; and

(ii) a *thermal comfort level* of between a *Predicted Mean Vote* of -1 to +1 is achieved across not less than 95% of the *floor area* of occupied zones, excluding indoor *swimming pool* chambers, for not less than 98% of the annual *hours of operation* of the building; and

(iii) the space temperature in any indoor *swimming pool* chamber is maintained at 2°C above the pool temperature during occupied hours of not less than 12 hours per day; and

(d) the building complies with the additional requirements in Specification 33.

(4) For a Class 6 shopping centre, compliance with J1P1 is verified when—

(a) a minimum 4.5-stars *NABERS Energy* for Shopping Centres Commitment Agreement is obtained; and

(b) the building has:

(i) an *air-conditioned* common area of not less than 20% of the gross lettable area; and

(ii) a gross lettable area greater than 15 000 m^2; and

(c) the energy model *required* for (a) demonstrates—

(i) the greenhouse gas emissions of the *services* covered within the scope of *NABERS Energy* for Shopping Centres ratings are less than 80% of the 4.5-star level; and

(ii) a *thermal comfort level* of between a *Predicted Mean Vote* of -1 to +1 is achieved across not less than 95% of the *floor area* of *air-conditioned* spaces within the scope of the rating for not less than 98% of the annual *hours of operation* the building; and

(d) the building complies with the additional requirements in Specification 33.

(5) The calculation method for (1), (2), (3) and (4) must comply with ANSI/ASHRAE Standard 140.

J1V2 Green Star

[2019: JV2]

(1) For a Class 3, 5, 6, 7, 8 or 9 building, or common area of a Class 2 building, compliance with J1P1 is verified when—

(a) the building complies with the simulation requirements, and is registered, for a *Green Star* – Design & As-Built or Green Star Buildings rating; and

(b) the *annual greenhouse gas emissions* of the proposed building are less than 90% of the *annual greenhouse gas emissions* of the *reference building*; and

(c) in the proposed building, a *thermal comfort level* of between a *Predicted Mean Vote* of -1 to +1 is achieved across not less than 95% of the *floor area* of all occupied zones for not less than 98% of the annual *hours of operation* of the building; and

(d) the building complies with the additional requirements in Specification 33.

(2) The calculation method used for (1) must comply with ANSI/ASHRAE Standard 140.

J1V3 Verification using a reference building

[2019: JV3]

(1) For a Class 3, 5, 6, 7, 8 or 9 building or common area of a Class 2 building, compliance with J1P1 is verified when—

(a) it is determined that the *annual greenhouse gas emissions* of the proposed building are not more than the *annual greenhouse gas emissions* of a *reference building* when—

(i) the proposed building is modelled with the proposed *services*; and

(ii) the proposed building is modelled with the same *services* as the *reference building*; and

(b) in the proposed building, a *thermal comfort level* of between a *Predicted Mean Vote* of -1 to +1 is achieved across not less than 95% of the *floor area* of all occupied zones for not less than 98% of the annual *hours of operation* of the building; and

(c) the building complies with the additional requirements in Specification 33.

(2) The *annual greenhouse gas emissions* of the proposed building may be offset by—

(a) *renewable energy* generated and used on *site*; and

(b) another process such as reclaimed energy, used on *site*.

(3) The calculation method used for (1) and (2) must comply with—

(a) ANSI/ASHRAE Standard 140; and

(b) Specification 34.

J1V4 Verification of building envelope sealing

[2019: JV4]

(1) Compliance with J1P1(e) and J1P2 is verified for building *envelope* sealing when the *envelope* is sealed at an air permeability rate, tested in accordance with Method 1 of AS/NZS ISO 9972, of not more than—

(a) for a Class 2 building or a Class 4 part of a building, 10 m³/hr.m² at 50 Pa reference pressure; or

(b) for a Class 5, 6, 8 or 9a or 9b building, other than a *ward area*, in *climate zones* 1, 7 and 8, 5 m³/hr.m² at 50 Pa reference pressure; or

(c) for a Class 3 or 9c building, or a Class 9a *ward area* in *climate zones* 1, 3, 4, 6, 7 and 8, 5 m³/hr.m² at 50 Pa reference pressure.

(2) In a *sole-occupancy unit* of a Class 2 building or a Class 4 part of a building, where an air permeability rate of not more than 5 $m^3/hr.m^2$ at 50 Pa reference pressure is achieved—

(a) a mechanical ventilation system must be provided that—

(i) can be manually overridden; and

(ii) provides outdoor air, either—

(A) continuously; or

(B) intermittently, where the system has controls that enable operation for not less than 25 per cent of each 4 hour segment; and

(iii) provides a flow rate not less than that achieved with the following formula: $Q = (0.05 \times A + 3.5 \times (N + 1))/p$

, where—

(A) Q

= the required air flow rate (L/s); and

(B) A

= the total area of the *sole-occupancy unit* of a Class 2 or Class 4 part of a building (m^2); and

(C) N

= the number of bedrooms in the *sole-occupancy unit* of a Class 2 or Class 4 part of a building; and

(D) p

= the fraction of time within each 4 hour segment that the system is operational; and

(b) any space with a solid-fuel burning combustion appliance must be ventilated with permanent openings directly to outside with a free area of not less than half of the cross-sectional area of the appliance's flue; and

(c) any space with a gas-fueled combustion appliance must be ventilated in accordance with—

(i) clause 6.4 of AS/NZS 5601.1; and

(ii) clause 6.4.5 of AS/NZS 5601.1.

(3) For the purposes of (2)(c), the volume of the space is considered to be 1 m^3 for determining ventilation requirements.

J1V5 Verification using a reference building for a Class 2 sole-occupancy unit

[New for 2022]

(1) Compliance with J1P2 is verified when each Class 2 *sole-occupancy unit* of a proposed building—

(a) in *climate zones* 3, 4, 5, 6, 7 and 8, has a *heating load* less than or equal to—

(i) that of a *reference building*; and

(ii) 120% of J1P2(1); and

(b) in *climate zones* 1, 2, 3, 4 and 5, has a *cooling load* less than or equal to—

(i) that of a *reference building*; and

(ii) 120% of J1P2(2); and

(c) complies with the additional requirements in Specifications 33 and 45 as applicable.

(2) Compliance with J1P3 is determined when the *energy value* of the *domestic services*, including all centralised *domestic services* infrastructure, of a proposed building is less than that of a *reference building* when—

(a) each *sole-occupancy unit* of a *reference building* has—

(i) a 3-star ducted air-to-air heat pump, rated under the 2019 GEMS determination, heating all spaces that are provided with heating; and

(ii) a 3-star ducted heat pump, rated under the 2019 GEMS determination, cooling all spaces that are provided with cooling; and

(iii) a 5-star instantaneous gas water heater, rated under the 2017 GEMS determination, providing all domestic *heated water*; and

(iv) a lighting power density of 4 W/m^2 serving all internal spaces that are provided with artificial lighting; and

(b) the proposed building and a *reference building* comply with the additional requirements in Specifications 33 and 45 as applicable.

(3) The calculation method used for (1) and (2) must—

(a) comply with ANSI/ASHRAE Standard 140; and

(b) not be *house energy rating software*.

Part J2 Energy efficiency

Introduction to this Part

This Part sets out the application of the *Deemed-to-Satisfy Provisions* in Parts J3 to J9.

Notes: Tasmania Section J Energy Efficiency

In Tasmania, for a Class 2 building and Class 4 part of a building, Section J is replaced with Section J of BCA 2019 Amendment 1.

Deemed-to-Satisfy Provisions

J2D1 Deemed-to-Satisfy Provisions

[2019: J0.0]

(1) Where a *Deemed-to-Satisfy Solution* is proposed, *Performance Requirements* J1P1 to J1P4 are satisfied by complying with—

- (a) J2D2; and
- (a) J3D2 to J3D15; and
- (b) J4D2 to J4D7; and
- (c) J5D2 to J5D8; and
- (d) J6D2 to J6D13; and
- (e) J7D2 to J7D9; and
- (f) J8D2 to J8D4; and
- (g) J9D2 to J9D5.

(2) Where a *Performance Solution* is proposed, the relevant *Performance Requirements* must be determined in accordance with A2G2(3) and A2G4(3) as applicable.

J2D2 Application of Section J

[2019: J0.1]

(1) For a Class 2 to 9 building, other than a sole-occupancy unit of a Class 2 building or a Class 4 part of a building, *Performance Requirement* J1P1 is satisfied by complying with—

- (a) Part J4, for the building *fabric*; and
- (b) Part J5, for building sealing; and
- (c) Part J6, for *air-conditioning* and ventilation; and
- (d) Part J7, for artificial lighting and power; and
- (e) Part J8, for heated water supply and *swimming pool* and spa pool plant; and
- (f) J9D3, for facilities for energy monitoring.

(2) For a *sole-occupancy unit* of a Class 2 building or a Class 4 part of a building, *Performance Requirement* J1P2 is satisfied by complying with—

(a) J3D3, using *house energy rating software*; or

(b) the following—

(i) J3D4, for ceiling fans; and

(ii) J3D5, J3D6, J4D3, J4D7(3), J4D7(4) and Part J5, for general thermal construction; and

(iii) J3D7, for roofs; and

(iv) J3D8 and J3D11 to J3D13, or J3D9, for walls and *glazing*; and

(v) J3D10, for floors.

(3) For a *sole-occupancy unit* of a Class 2 building or a Class 4 part of a building, *Performance Requirement* J1P3 is satisfied by complying with—

(a) for the net equivalent energy usage—

(i) J3D14, for a *sole-occupancy unit* of a Class 2 building or a Class 4 part of a building with a total floor area not greater than 500 m^2; or

(ii) J3D15, using *house energy rating software*; and

(b) Part J6, for *air-conditioning* and ventilation; and

(c) Part J7, for artificial lighting and power.

(4) For a Class 2 to 9 building, *Performance Requirement* J1P4 is satisfied by complying with J9D4 and J9D5.

Part J3 Elemental provisions for a sole-occupancy unit of a Class 2 building or a Class 4 part of a building

Introduction to this Part

This Part contains *Deemed-to-Satisfy Provisions* (elemental) for compliance with Part J1. It sets out provisions for the insulation of building *fabric* and the energy efficiency of *domestic services* of a *sole-occupancy unit* of a Class 2 building or a Class 4 part of a building.

Deemed-to-Satisfy Provisions

J3D1 Deemed-to-Satisfy Provisions

[New for 2022]

(1) Where a *Deemed-to-Satisfy Solution* is proposed, *Performance Requirements* J1P1 to J1P4 are satisfied by complying with—

(a) J2D2; and

(b) J3D2 to J3D15; and

(c) J4D2 to J4D7; and

(d) J5D2 to J5D8; and

(e) J6D2 to J6D13; and

(f) J7D2 to J7D9; and

(g) J8D2 to J8D4; and

(h) J9D2 to J9D5.

(2) Where a *Performance Solution* is proposed, the relevant *Performance Requirements* must be determined in accordance with A2G2(3) and A2G4(3) as applicable.

J3D2 Application of Part

[New for 2022]

The *Deemed-to-Satisfy Provisions* of this Part apply to building elements forming the external building *fabric* and *domestic services* of a *sole-occupancy unit* of a Class 2 building and a Class 4 part of a building.

J3D3 Reducing heating and cooling loads of a sole-occupancy unit of a Class 2 building or a Class 4 part of a building using house energy rating software

[2019: J0.3]

(1) The *sole-occupancy units* of a Class 2 building or a Class 4 part of a building must—

(a) for reducing the heating or cooling loads—

(i) collectively achieve an average energy rating of not less than 7 stars, including the separate heating and cooling load limits; and

(ii) individually achieve an energy rating of not less than 6 stars, including the separate heating and cooling load limits; and

(b) for thermal breaks, comply with J3D5 and J3D6; and

(c) for compensating for a loss of ceiling insulation, other than where the *house energy rating software* has compensated for a loss of ceiling insulation, comply with Table J3D7w; and

(d) for general thermal construction, comply with J4D3; and

(e) for floor edge insulation, comply with J3D10(3), J3D10(5) and J3D10(6); and

(f) for building sealing, comply with Part J5.

(2) Energy ratings referred to in (1)(a)(i) and (ii) must be achieved using—

(a) house energy rating software; and

(b) the load limits specified in the ABCB Standard for NatHERS Heating and Cooling Load Limits.

J3D4 Ceiling fans in a sole-occupancy unit of a Class 2 building or a Class 4 part of a building

[2019: J0.3]

(1) Ceiling fans must be installed in accordance with Table J3D4 in—

(a) climate zones 1, 2 and 3; and

(b) climate zone 5 in New South Wales and Queensland.

(2) Ceiling fans *required* by (1) must—

(a) be permanently installed; and

(b) have a speed controller.

Table J3D4: Minimum ceiling fan requirements in climate zones 1, 2, 3 and 5

Size of room (m^2)	Minimum number and diameter (mm) of ceiling fans *required* for a bedroom in *climate zones* 1, 2 and 3	Minimum number and diameter (mm) of ceiling fans *required* in a *habitable room* other than a bedroom in *climate zones* 1, 2, 3 and 5 (NSW and Qld)
< 15	1 x 900	1 x 900
≥ 15 to < 20	1 x 1200	1 x 1200
≥ 20 to < 25	1 x 1200	1 x 1400
≥ 25 to < 30	1 x 1400	2 x 1200
≥ 30 to < 45	1 x 1400	2 x 1400
≥ 45 to < 50	2 x 1400	3 x 1200
≥ 50	2 x 1400	3 x 1400

J3D5 Roof thermal breaks of a sole-occupancy unit of a Class 2 building or a Class 4 part of a building

[2019: J0.4]

(1) A roof that—

(a) has metal sheet roofing directly fixed to metal purlins, metal rafters or metal battens; and

(b) does not have a ceiling lining or has a ceiling lining fixed directly to those metal purlins, metal rafters or metal battens,

must have a thermal break, consisting of a material with an *R-Value* of greater than or equal to R0.2, installed between

the metal sheet roofing and its supporting metal purlins, metal rafters or metal battens.

(2) The requirements of (1) do not apply to roofs constructed using insulated sandwich panels.

J3D6 Wall thermal breaks of a sole-occupancy unit of a Class 2 building or a Class 4 part of a building

[2019: J0.5]

(1) A metal-framed wall that forms part of the building *envelope* must have a thermal break, consisting of a material with an *R-Value* of not less than R0.2, installed at all points of contact between the external cladding and the metal frame if the wall—

(a) does not have a wall lining or has a wall lining that is fixed directly to the same metal frame; and

(b) is clad with weatherboards, fibre-cement or the like, or metal sheeting fixed to a metal frame.

(2) The requirements of (1) do not apply to walls constructed using insulated sandwich panels.

J3D7 Roofs and ceilings of a sole-occupancy unit of a Class 2 building or a Class 4 part of a building

[New for 2022]

(1) Roof and ceiling insulation must achieve the minimum *R-Value*—

(a) in *climate zone* 1, in accordance with Tables J3D7a, J3D7b and J3D7c as applicable; and

(b) in *climate zone* 2, in accordance with Tables J3D7d, J3D7e and J3D7f as applicable; and

(c) in *climate zone* 3, in accordance with Tables J3D7g, J3D7h and J3D7i as applicable; and

(d) in *climate zone* 4, in accordance with Tables J3D7j, J3D7k and J3D7l as applicable; and

(e) in *climate zone* 5, in accordance with Tables J3D7m, J3D7n and J3D7o as applicable; and

(f) in *climate zone* 6—

(i) R3.5; or

(ii) if the roof contains *reflective insulation*, R3.0; and

(g) in *climate zones* 7 and 8, in accordance with Tables J3D7p, J3D7q and J3D7r as applicable.

(2) *Reflective insulation* installed to comply with (1) must—

(a) have a surface emittance of not more than 0.05; and

(b) be adjacent to a roof space of not less than 20 mm; and

(c) in *climate zones* 3 to 8, be downward facing.

(3) The thermal bridging in a metal-framed roof must be addressed as follows—

(a) for a pitched roof with a horizontal ceiling—

(i) achieving the *Total R-Value* in Table J3D7s, calculated using a method that accounts for the effects of thermal bridging; or

(ii) increasing the *R-Value* of the insulation between the ceiling frames by R0.5 more than the *R-Value* derived from (1); or

(iii) adding a continuous ceiling insulation layer with a minimum *R-Value* of R0.13 above or below the ceiling joists or the bottom chords of the trusses; or

(iv) achieving the *required* ceiling *R-Value* derived from (1) by stacking two layers of insulation immediately on top of each other, such that the top layer is orientated to cover the ceiling joists or bottom chord of the trusses and has an *R-Value* of at least R0.5; or

(b) for a flat, skillion or cathedral roof—

(i) achieving the *Total R-Value* in Table J3D7t, calculated using a method that accounts for the effects of

thermal bridging; or

(ii) complying with Table J3D7u.

(4) Where F8D5(1) applies, continuous insulation placed above the *primary insulation layer* to mitigate thermal bridging must have a *vapour permeance* of not less than that of the *primary insulation layer*.

(5) Where, for operational or safety reasons, the area of ceiling insulation *required* is reduced, the loss of insulation must be compensated for in accordance with Table J3D7w.

(6) Where the ceiling insulation *required* by (1) to (5) has an *R-Value*—

(a) greater than R3.0 and less than or equal to R4.5, it may be reduced to R3.0 within 450 mm of an *external wall*; or

(b) greater than R4.5, it may be reduced to R3.0 within 450 mm of an *external wall*, provided all other *required* ceiling insulation is increased by R0.5.

(7) The requirements of (1) to (6) do not apply to roofs constructed using insulated sandwich panels.

(8) Roofs constructed using insulated sandwich panels must achieve the minimum *Total R-Value* in Table J3D7x.

(9) In *climate zones* 1 to 5, the solar absorptance of the upper surface of a roof must not be more than 0.64.

Table J3D7a: Flat concrete roof — minimum R-Value for ceiling insulation: climate zone 1

Reflective insulation under-roof	SA ≤ 0.23	SA > 0.23 to ≤ 0.32	SA > 0.32 to ≤ 0.42	SA > 0.42 to ≤ 0.53	SA > 0.53 to ≤ 0.64
Yes	1.0	1.5	2.0	2.5	3.0
No	1.5	2.0	2.5	3.0	4.0

Table Notes

(1) SA = solar absorptance.

(2) The *R-Value* of *reflective insulation* is not to be included in the *R-Value* of any under-roof or ceiling insulation.

(3) *R-Values* listed are for the labelled, declared *R-Value* of insulation.

Table J3D7b: Timber-framed pitched roof with horizontal ceiling — minimum R-Value for ceiling insulation: climate zone 1

Roof ventilation	*Reflective insulation* under-roof	Under-roof insulation *R-Value*	SA ≤ 0.23	SA > 0.23 to ≤ 0.32	SA > 0.32 to ≤ 0.42	SA > 0.42 to ≤ 0.53	SA > 0.53 to ≤ 0.64
Vented	Yes	< 1.0	1.5	1.5	1.5	1.5	2.0
		≥ 1.0 to < 1.5	1.5	1.5	1.5	1.5	1.5
		≥ 1.5 to < 2.0	1.5	1.5	1.5	1.5	1.5
		≥ 2.0	1.5	1.5	1.5	2.0	2.0
	No	< 1.0	2.0	2.5	4.0	5.0	X
		≥ 1.0 to < 1.5	1.5	1.5	1.5	1.5	2.5
		≥ 1.5 to < 2.0	1.5	1.5	1.5	2.0	2.0
		≥ 2.0	1.5	1.5	1.5	1.5	1.5
Standard	Yes	< 1.0	1.5	1.5	2.0	3.0	4.0
		≥ 1.0 to < 1.5	1.5	1.5	1.5	1.5	2.5
		≥ 1.5 to < 2.0	1.5	1.5	1.5	1.5	2.0
		≥ 2.0	1.5	1.5	1.5	1.5	1.5
	No	< 1.0	2.5	4.0	6.0	X	X
		≥ 1.0 to < 1.5	1.5	1.5	1.5	1.5	4.0
		≥ 1.5 to < 2.0	1.5	1.5	2.0	2.0	2.5

Roof ventilation	*Reflective insulation* under-roof	Under-roof insulation *R-Value*	SA ≤ 0.23	SA > 0.23 to ≤ 0.32	SA > 0.32 to ≤ 0.42	SA > 0.42 to ≤ 0.53	SA > 0.53 to ≤ 0.64
		≥ 2.0	1.5	1.5	1.5	2.0	2.5

Table Notes

(1) SA = solar absorptance.

(2) A roof space is to be considered 'vented' if it—

(a) has one wind-driven roof ventilator per 50 m^2 of ceiling area with gable, eave or ridge vents; or

(b) has one powered roof ventilator per 200 m^2 of ceiling area with gable, eave or ridge vents; or

(c) is a tiled roof without *sarking-type material* at roof level.

(3) If a roof is not 'vented', it is a 'standard' roof.

(4) The *R-Value* of *reflective insulation* is not to be included in the *R-Value* of any under-roof or ceiling insulation.

(5) *R-Values* listed are for the labelled, declared *R-Value* of insulation.

(6) X = not permitted.

Table J3D7c: Timber-framed flat, skillion or cathedral roof — minimum R-Value for ceiling insulation: climate zone 1

Reflective insulation under-roof	SA ≤ 0.23	SA > 0.23 to ≤ 0.32	SA > 0.32 to ≤ 0.42	SA > 0.42 to ≤ 0.53	SA > 0.53 to ≤ 0.64
Yes	1.5	1.5	2.0	3.0	4.0
No	1.5	3.5	5.0	X	X

Table Notes

(1) SA = solar absorptance.

(2) The *R-Value* can be achieved by installing insulation under the roof or on top of the ceiling or a combination of both.

(3) The *R-Value* of *reflective insulation* is not to be included in the *R-Value* of any under-roof or ceiling insulation.

(4) *R-Values* listed are for the labelled, declared *R-Value* of insulation.

(5) X = not permitted.

Table J3D7d: Flat concrete roof — minimum R-Value for ceiling insulation: climate zone 2

Reflective insulation under-roof	SA ≤ 0.23	SA > 0.23 to ≤ 0.32	SA > 0.32 to ≤ 0.42	SA > 0.42 to ≤ 0.53	SA > 0.53 to ≤ 0.64
Yes	2.0	2.5	2.5	3.0	3.5
No	3.0	3.0	3.5	4.0	4.5

Table Notes

(1) SA = solar absorptance.

(2) The *R-Value* of *reflective insulation* is not to be included in the *R-Value* of any under-roof or ceiling insulation.

(3) *R-Values* listed are for the labelled, declared *R-Value* of insulation.

Table J3D7e: Timber-framed pitched roof with horizontal ceiling — minimum R-Value for ceiling insulation: climate zone 2

Roof ventilation	*Reflective insulation* under-roof	Under-roof insulation *R-Value*	SA ≤ 0.23	SA > 0.23 to ≤ 0.32	SA > 0.32 to ≤ 0.42	SA > 0.42 to ≤ 0.53	SA > 0.53 to ≤ 0.64
Vented	Yes	Any	2.5				
	No	0 to < 0.5	2.5	3.0	3.0	3.5	3.5
		≥ 0.5	2.5				
Standard	Yes	Any	2.5				
	No	0 to < 0.5	3.0	3.0	3.5	4.0	4.0
		≥ 0.5 to < 1.0	2.5	2.5	2.5	3.0	3.0
		≥ 1.0	2.5				

Table Notes

(1) SA = solar absorptance.

(2) A roof is considered 'vented' if it—

(a) has one wind-driven roof ventilator per 50 m^2 of ceiling area with gable, eave or ridge vents; or

(b) has one powered roof ventilator per 200 m^2 of ceiling area with gable, eave or ridge vents; or

(c) is a tiled roof without *sarking-type material* at roof level.

(3) If a roof is not 'vented', it is a 'standard' roof.

(4) The *R-Value* of *reflective insulation* is not to be included in the *R-Value* of any under-roof or ceiling insulation.

(5) *R-Values* listed are for the labelled, declared *R-Value* of insulation.

Table J3D7f: Timber-framed flat, skillion or cathedral roof — minimum R-Value for ceiling insulation: climate zone 2

Reflective insulation under-roof	SA ≤ 0.23	SA > 0.23 to ≤ 0.32	SA > 0.32 to ≤ 0.42	SA > 0.42 to ≤ 0.53	SA > 0.53 to ≤ 0.64
Yes	2.5	2.5	2.5	2.5	2.5
No	3.0	3.0	3.5	4.0	4.0

Table Notes

(1) SA = solar absorptance.

(2) The *R-Value* can be achieved by installing insulation under the roof or on top of the ceiling or a combination of both.

(3) The *R-Value* of *reflective insulation* is not to be included in the *R-Value* of any under-roof or ceiling insulation.

(4) *R-Values* listed are for the labelled, declared *R-Value* of insulation.

Table J3D7g: Flat concrete roof — minimum R-Value for ceiling insulation: climate zone 3

Reflective insulation under-roof	SA ≤ 0.23	SA > 0.23 to ≤ 0.32	SA > 0.32 to ≤ 0.42	SA > 0.42 to ≤ 0.53	SA > 0.53 to ≤ 0.64
Yes	2.0	2.0	2.5	2.5	3.0
No	3.0	3.5	4.0	4.5	5.0

Table Notes

(1) SA = solar absorptance.

(2) The *R-Value* of *reflective insulation* is not to be included in the *R-Value* of any under-roof or ceiling insulation.

(3) *R-Values* listed are for the labelled, declared *R-Value* of insulation.

Table J3D7h: Timber-framed pitched roof with horizontal ceiling — minimum R-Values for ceiling insulation: climate zone 3

Roof ventilation	*Reflective insulation* under-roof	Under-roof insulation *R-Value*	SA ≤ 0.23	SA > 0.23 to ≤ 0.32	SA > 0.32 to ≤ 0.42	SA > 0.42 to ≤ 0.53	SA > 0.53 to ≤ 0.64
Vented	Yes	< 0.5	2.5	2.5	2.5	2.5	2.5
		≥ 0.5 to < 1.0	2.0	2.0	2.0	2.0	2.0
		≥ 1.0 to < 1.5	2.5	2.0	2.0	2.0	2.0
		≥ 1.5 to < 2.0	2.0	2.0	2.5	2.5	2.5
		≥ 2.0	2.5	2.5	3.0	3.0	3.0
	No	< 0.5	3.5	4.0	4.5	5.0	X
		≥ 0.5 to < 1.0	3.0	3.5	3.5	4.0	4.5
		≥ 1.0 to < 1.5	2.5	3.0	3.0	3.0	3.5
		≥ 1.5 to < 2.0	2.5	3.0	3.0	3.0	3.0
		≥ 2.0	2.5	2.5	3.0	3.0	3.0
Standard	Yes	< 0.5	2.0	2.0	2.5	2.5	2.5
		≥ 0.5 to < 1.0	2.0	2.0	2.5	2.5	2.5
		≥ 1.0 to < 1.5	2.0	2.0	2.0	2.0	2.5
		≥ 1.5 to < 2.0	2.0	2.5	2.5	2.5	3.0
		≥ 2.0	2.0	2.0	2.5	2.5	2.5
	No	< 0.5	3.5	4.0	5.0	X	X
		≥ 0.5 to < 1.0	3.0	3.0	3.5	4.0	5.0
		≥ 1.0 to < 1.5	2.5	2.5	3.0	3.0	3.5
		≥ 1.5 to < 2.0	2.0	2.0	2.5	2.5	2.5
		≥ 2.0	2.0	2.0	2.5	2.5	2.5

Table Notes

(1) SA = solar absorptance.

(2) A roof is considered 'vented' if it—

(a) has one wind-drive roof ventilator per 50 m^2 of ceiling area with gable, eave or ridge vents; or

(b) has one powered roof ventilator per 200 m^2 of ceiling area with gable, eave or ridge vents; or

(c) is a tiled roof without *sarking-type material* at roof level.

(3) If a roof is not 'vented', it is a 'standard' roof.

(4) The *R-Value* of *reflective insulation* is not to be included in the *R-Value* of any under-roof or ceiling insulation.

(5) *R-Values* listed are for the labelled, declared *R-Value* of insulation.

(6) X = not permitted.

Table J3D7i: Timber-framed flat, skillion or cathedral roof — minimum R-Value for ceiling insulation: climate zone 3

Reflective insulation under-roof	SA ≤ 0.23	SA > 0.23 to ≤ 0.32	SA > 0.32 to ≤ 0.42	SA > 0.42 to ≤ 0.53	SA > 0.53 to ≤ 0.64
Yes	2.0	2.0	2.5	2.5	2.5
No	3.5	4.0	5.0	X	X

Table Notes

(1) SA = solar absorptance.

(2) The *R-Value* can be achieved by installing insulation under the roof or on top of the ceiling or a combination of both.

(3) The *R-Value* of *reflective insulation* is not to be included in the *R-Value* of any under-roof or ceiling insulation.

(4) R-Values listed are for the labelled, declared *R-Value* of insulation.

(5) X = not permitted.

Table J3D7j: Flat concrete roof — minimum R-Value for ceiling insulation: climate zone 4

Reflective insulation under-roof	SA 0.23 ≤ to ≤ 0.64
Yes	2.0
No	2.5

Table Notes

(1) SA = solar absorptance.

(2) The *R-Value* of *reflective insulation* is not to be included in the *R-Value* of any under-roof or ceiling insulation.

(3) R-Values listed are for the labelled, declared *R-Value* of insulation.

Table J3D7k: Timber-framed pitched roof with horizontal ceiling — minimum R-Value for ceiling insulation: climate zone 4

Roof ventilation	*Reflective insulation* under- roof	Under-roof insulation *R-Value*	SA ≤ 0.23	SA > 0.23 to ≤ 0.64
Vented	Yes	< 0.5	3.0	3.5
		≥ 0.5	3.0	3.0
	No	Any	3.5	
Standard	Yes	Any	3.0	
	No	< 0.5	3.5	
		≥ 0.5	3.0	

Table Notes

(1) SA = solar absorptance.

(2) A roof is considered 'vented' if it—

(a) has one wind-driven roof ventilator per 50 m^2 of ceiling area with gable, eave or ridge vents; or

(b) has one powered roof ventilator per 200 m^2 of ceiling area with gable, eave or ridge vents; or

(c) is a tiled roof without *sarking-type material* at roof level.

(3) If a roof is not 'vented', it is a 'standard' roof.

(4) The *R-Value* of *reflective insulation* is not to be included in the *R-Value* of any under-roof or ceiling insulation.

(5) R-Values listed are for the labelled, declared *R-Value* of insulation.

Table J3D7l: Timber-framed flat, skillion or cathedral timber roof — minimum R-Value for ceiling insulation: climate zone 4

Reflective insulation under-roof	SA ≤ 0.64
Yes	3.0
No	3.5

Table Notes

(1) SA = solar absorptance.

(2) The *R-Value* can be achieved by installing insulation under the roof or on top of the ceiling or a combination of both.

(3) The *R-Value* of *reflective insulation* is not to be included in the *R-Value* of any under-roof or ceiling insulation.

(4) *R-Values* listed are for the labelled, declared *R-Value* of insulation.

Table J3D7m: Flat concrete roof — minimum R-Value for ceiling insulation: climate zone 5

Reflective insulation under-roof	SA ≤ 0.42	SA > 0.42 to ≤ 0.64
Yes	3.0	3.5
No	4.0	4.0

Table Notes

(1) SA = solar absorptance.

(2) The *R-Value* of *reflective insulation* is not to be included in the *R-Value* of any under-roof or ceiling insulation.

(3) *R-Values* listed are for the labelled, declared *R-Value* of insulation.

Table J3D7n: Timber-framed pitched roof with horizontal ceiling — minimum R-Value for ceiling insulation: climate zone 5

Roof ventilation	*Reflective insulation* under- roof	Under-roof insulation *R-Value*	SA ≤ 0.42	SA > 0.42 to ≤ 0.64
Vented	Yes	< 0.5	3.0	2.5
		≥ 0.5	2.5	
	No	0 to < 2.0	3.0	
		≥ 2.0	2.5	
Standard	Yes	Any	2.5	
	No	0 to < 1.0	3.0	
		≥ 1.0 to < 2.0	2.5	
		≥ 2.0	3.0	

Table Notes

(1) SA = solar absorptance.

(2) A roof is considered 'vented' if it—

(a) has one wind-driven roof ventilator per 50 m^2 of ceiling area with gable, eave or ridge vents; or

(b) has one powered roof ventilator per 200 m^2 of ceiling area with gable, eave or ridge vents; or

(c) is a tiled roof without *sarking-type material* at roof level.

(3) If a roof is not 'vented', it is a 'standard' roof.

(4) The *R-Value* of *reflective insulation* is not to be included in the *R-Value* of any under-roof or ceiling insulation.

(5) *R-Values* listed are for the labelled, declared *R-Value* of insulation.

Table J3D7o: Timber-framed flat, skillion or cathedral roof — minimum R-Value for ceiling insulation: climate zone 5

Reflective insulation under- roof	*R-Value*
Yes	2.5
No	3.0

Table Notes

(1) The *R-Value* can be achieved by installing insulation under the roof or on top of the ceiling or a combination of both.

(2) The *R-Value* of *reflective insulation* is not to be included in the *R-Value* of any under-roof or ceiling insulation.

(3) *R-Values* listed are for the labelled, declared *R-Value* of insulation.

Table J3D7p: Flat concrete roof — minimum R-Value for ceiling insulation: climate zones 7 and 8

Reflective insulation under-roof	SA ≤ 0.23	SA > 0.23 to ≤ 0.32	SA > 0.32 to ≤ 0.42	SA > 0.42 to ≤ 0.53	SA > 0.53 to ≤ 0.64	SA > 0.64 to ≤ 0.73	SA > 0.73
Yes	3.5	3.5	3.5	3.0	3.0	3.0	2.5
No	4.0	3.0	3.0	2.5	2.5	2.5	2.0

Table Notes

(1) SA = solar absorptance.

(2) The *R-Value* of *reflective insulation* is not to be included in the *R-Value* of any under-roof or ceiling insulation.

(3) *R-Values* listed are for the labelled, declared *R-Value* of insulation.

Table J3D7q: Timber-framed pitched roof with flat ceiling — minimum R-Value for ceiling insulation: climate zones 7 and 8

Roof ventilation	*Reflective insulation* under-roof	Under-roof insulation *R-Value*	SA ≤ 0.23	SA > 0.23 to ≤ 0.32	SA > 0.32 to ≤ 0.42	SA > 0.42 to ≤ 0.53	SA > 0.53 to ≤ 0.64	SA > 0.64 to ≤ 0.73	SA > 0.73 to ≤ 0.85	SA > 0.85
Standard	Yes	0 to < 1.0	4.5	4.5	4.5	4.0	4.0	4.0	4.0	4.0
		≥ 1.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
	No	0 to < 1.0	5.0	4.5	4.5	4.0	4.0	3.5	3.5	3.5
		≥ 1.0 to < 1.5	4.5	4.5	4.0	4.0	4.0	4.0	3.5	3.5
		≥ 1.5	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vented	Yes	0 to < 1.0	4.5	4.5	4.5	4.5	4.5	4.0	4.0	4.0
		≥ 1.0	4.5	4.5	4.5	4.5	4.0	4.0	4.0	4.0
	No	0 to < 1.0	5.0	4.5	4.5	4.5	4.0	4.0	3.5	3.5
		≥ 1.0 to < 1.5	4.5	4.5	4.5	4.5	4.0	4.0	4.0	4.0
		≥ 1.5	4.5	4.5	4.5	4.5	4.5	4.0	4.0	4.0

Table Notes

(1) SA = solar absorptance.

(2) A roof is considered 'vented' if it—

(a) has one wind-driven roof ventilator per 50 m^2 of ceiling area with gable, eave or ridge vents; or

(b) has one powered roof ventilator per 200 m^2 of ceiling area with gable, eave or ridge vents; or

(c) is ventilated to *outdoor air* through evenly distributed openings in accordance with Table F8D5; or

(d) is a tiled roof without *sarking-type material* at roof level.

(3) If a roof is not 'vented', it is a 'standard' roof.

(4) The *R-Value* of *reflective insulation* is not to be included in the *R-Value* of any under-roof or ceiling insulation.

(5) *R-Values* listed are for the labelled, declared *R-Value* of insulation.

Table J3D7r: Timber-framed flat, skillion or cathedral roof — minimum R-Value for ceiling insulation: climate zones 7 and 8

Reflective insulation under-roof	SA ≤ 0.23	SA > 0.23 to ≤ 0.32	SA > 0.32 to ≤ 0.42	SA > 0.42 to ≤ 0.53	SA > 0.53 to ≤ 0.64	SA > 0.64 to ≤ 0.73	SA > 0.73 to ≤ 0.85	SA > 0.85
Yes	4.5	4.5	4.5	4.0	4.0	4.0	4.0	4.0
No	5.0	4.5	4.5	4.0	4.0	3.5	3.5	3.5

Table Notes

(1) SA = solar absorptance.

(2) The *R-Value* can be achieved by installing insulation under the roof or on top of the ceiling or a combination of both.

(3) The *R-Value* of *reflective insulation* is not to be included in the *R-Value* of any under-roof or ceiling insulation.

(4) *R-Values* listed are for the labelled, declared *R-Value* for insulation.

Table J3D7s: Metal-framed pitched roof with horizontal ceiling — minimum Total R-Value of ceiling to account for thermal bridging

Ceiling insulation *R-Value* from Tables J3D7a to J3D7r and J3D7(1)(f) as applicable	Minimum *Total R-Value* to account for thermal bridging
1.5	1.38
2.0	1.74
2.5	2.09
3.0	2.43
3.5	2.63
4.0	2.95
4.5	3.27
5.0	3.59
5.5	3.91
6.0	4.23

Table Notes

(1) The *Total R-Value* calculation only includes the ceiling frame, insulation and ceiling lining. It is not to include the internal air films, roof space or roof lining.

(2) Minimum ceiling *Total R-Values* are in-situ values. They account for compression of insulation.

Table J3D7t: Metal-framed flat, skillion or cathedral roof — minimum Total R-Value to account for thermal bridging

Ceiling insulation *R-Value* from Tables J3D7a to J3D7r, and J3D7(1)(f) as applicable	Minimum *Total R-Value* to account for thermal bridging: heat flow down	Minimum *Total R-Value* to account for thermal bridging: heat flow up
1.0	1.40	1.32
1.5	1.86	1.78
2.0	2.29	2.21
2.5	2.71	2.63
3.0	3.11	3.02
3.5	3.31	3.22
4.0	3.66	3.57

Ceiling insulation *R-Value* from Tables J3D7a to J3D7r, and J3D7(1)(f) as applicable	Minimum *Total R-Value* to account for thermal bridging: heat flow down	Minimum *Total R-Value* to account for thermal bridging: heat flow up
4.5	3.98	3.90
5.0	4.32	4.22
5.5	4.63	4.53
6.0	4.93	4.82

Table Notes

(1) Minimum *Total R-Values* are in-situ values. They account for compression of insulation.

(2) Direction of heat flow must be determined in accordance with Table J3D7v.

Table J3D7u: Metal-framed flat, skillion or cathedral roof – thermal bridging mitigation

Minimum ceiling *R-Value* from Tables J3D7a to J3D7r, and J3D7(1)(f) as applicable	Option 1– increase insulation between roof frame members to specified minimum *R-Value*	Option 2 – add a layer of continuous insulation with specified minimum *R-Value* above or below the roof frame members
1.0	1.5	0.13
1.5	2.5	0.30
2.0	3.5	0.30
2.5	5.0	0.40
3.0	6.0	0.60
3.5	X	0.60
4.0	X	0.60
4.5	X	0.60
5.0	X	0.60
5.5	X	0.60
6.0	X	0.60

Table Notes

(1) Minimum *R-Values* are in-situ values. They account for compression of insulation.

(2) X= not permitted.

Table J3D7v: Direction of heat flow

Climate zone	Direction of heat flow
1	Down
2 – altitude less than 300 m	Down
2 – altitude 300 m or more	Down and up
3	Down and up
4	Up
5	Up
6	Up
7	Up
8	Up

Table J3D7w: Adjusted minimum R-Value of ceiling insulation required to compensate for loss of ceiling insulation area

Percentage of ceiling area uninsulated	Minimum *R-Value* of ceiling insulation *required* to satisfy J3D7(1) and J3D7(3)									
	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5
0.5% to less than 1.0%	1.0	1.6	2.2	2.8	3.4	4.0	4.7	5.4	6.2	6.9
1.0% to less than 1.5%	1.1	1.7	2.3	2.9	3.6	4.4	5.2	6.1	7.0	X
1.5% to less than 2.0%	1.1	1.7	2.4	3.1	3.9	4.8	5.8	6.8	X	X
2.0% to less than 2.5%	1.1	1.8	2.5	3.3	4.2	5.3	6.5	X	X	X
2.5% to less than 3.0%	1.2	1.9	2.6	3.6	4.6	5.9	X	X	X	X
3.0% to less than 4.0%	1.2	2.0	3.0	4.2	5.7	X	X	X	X	X
4.0% to less than 5.0%	1.3	2.2	3.4	5.0	X	X	X	X	X	X

Table Notes

(1) Interpolation is allowed for values between those shown.

(2) X = not permitted.

Table J3D7x: Total R-Values for roofs constructed with insulated sandwich panels

Climate zone	SA ≤ 0.23	SA > 0.23 to ≤ 0.32	SA > 0.32 to ≤ 0.42	SA > 0.42 to ≤ 0.53	SA > 0.53 to ≤ 0.64	SA > 0.64 to ≤ 0.73	SA > 0.73 to ≤ 0.85	SA > 0.85
1	1.86	3.31	4.32	X	X	X	X	X
2 – heat flow down	3.11	3.11	3.31	3.66	3.66	X	X	X
2 – heat flow up	3.02	3.02	3.22	3.57	3.57	X	X	X
3 – heat flow down	3.31	3.66	4.32	X	X	X	X	X
3 – heat flow up	3.22	3.57	4.22	X	X	X	X	X
4	3.22	3.22	3.22	3.22	3.22	X	X	X
5	3.02	3.02	3.02	3.02	3.02	X	X	X
6	3.57	3.57	3.57	3.57	3.57	3.57	3.57	3.57
7	4.22	3.90	3.90	3.57	3.57	3.22	3.22	3.22
8	3.90	3.57	3.57	3.22	3.22	3.02	3.02	3.02

Table Notes

(1) SA = solar absorptance.

(2) Direction of heat flow must be determined in accordance with Table J3D7v.

(3) X = not permitted.

J3D8 External walls of a sole-occupancy unit of a Class 2 building or a Class 4 part of a building

[New for 2022]

(1) The *Total R-Value* of an *external wall*—

(a) in *climate zones* 1, 2, 3, 5 and 6—

(i) where the ratio of the area of opaque *external walls* to the *floor area* of the *sole-occupancy unit* is less than 20%, must be at least R1.15; and

(ii) where the ratio of the area of opaque *external walls* to the *floor area* of the *sole-occupancy unit* is greater than or equal to 20% but less than 35%, must be at least R2.04; and

(iii) where the ratio of the area of opaque *external walls* to the *floor area* of the *sole-occupancy unit* is greater than or equal to 35%, must be at least R2.24; and

(b) in *climate zones* 4, 7 and 8, must be at least R2.24.

(2) The *Total R-Value* of an *external wall* must be determined in accordance with—

(a) for a spandrel panel in a curtain wall system, in accordance with Specification 38; and

(b) for all other walls, in accordance with AS/NZS 4859.2.

(3) The solar absorptance of an *external wall* must—

(a) in *climate zones* 1 to 6, be in accordance with Table J3D8a; and

(b) in *climate zones* 7 and 8, be in accordance with Table J3D8b.

Table J3D8a: Solar absorptance – climate zones 1 to 6

Climate zone	Opaque *external wall* to net *floor area* ratio	Permitted solar absorptance
1 and 3	< 45%	≤ 0.8
	≥ 45%	≤ 0.35
2	< 35%	Any
	≥ 35%	Any, or ≤ 0.35, if shading device overhang is < 300 mm
4 and 5	< 45%	Any
	≥ 45%	≤ 0.35, if shading device overhang is < 1500 mm
6	Any	Any

Table J3D8b: Solar absorptance – climate zones 7 and 8

Opaque *external wall* to net *floor area* ratio	Shading device overhang (mm)			
	≥ 0 to < 600	≥ 600 to < 900	≥ 900 to < 1200	≥ 1200
< 20%	Any	Any	≥ 0.4	X
≥ 20% to < 35%	Any	Any	X	X
≥ 35% to < 45%	Any	≥ 0.4	X	X
≥ 45%	Any	≥ 0.6	X	X

Table Notes

X = not permitted

J3D9 Wall-glazing construction of a sole-occupancy unit of a Class 2 building or a Class 4 part of a building

[New for 2022]

(1) The *Total System U-Value* of *wall-glazing construction* that forms part of the external building *fabric* must not be greater than—

(a) in *climate zones* 1 to 5, U2.2; or

(b) in *climate zone* 6, U2.0; or

(c) in *climate zones* 7 and 8, U1.4.

(2) The *Total System U-Value* of *wall-glazing construction* that forms part of the external building *fabric* must be calculated in accordance with Specification 37.

(3) Wall components of *wall-glazing construction* must achieve a minimum *Total R-Value* of—

(a) where the wall is less than 80% of the area of the *wall-glazing construction*, R1.0; or

(b) where the wall is 80% or more of the area of the *wall-glazing construction*, the value specified in Table J4D6a for a Class 3 building.

(4) In *climate zones* 1 to 6, the *solar admittance* of externally facing *wall-glazing construction* must be not greater than that shown in Table J3D9.

(5) In *climate zones* 7 and 8, *glazing* in a *wall-glazing construction* must have a *Total System SHGC* of at least 0.4.

(6) The *solar admittance* of a *wall-glazing construction* must be calculated in accordance with Specification 37.

(7) The solar absorptance of an *external wall* must be in accordance with J3D8(3).

Table J3D9: Maximum wall-glazing construction solar admittance

Climate zone	Eastern aspect *solar admittance*	Northern aspect *solar admittance*	Southern aspect *solar admittance*	Western aspect *solar admittance*
1	0.10	0.10	0.14	0.10
2	0.10	0.10	0.10	0.10
3	0.11	0.11	0.11	0.11
4	0.11	0.11	0.11	0.11
5	0.13	0.13	0.13	0.13
6	0.14	0.14	0.14	0.14
7	N/A	N/A	N/A	N/A
8	N/A	N/A	N/A	N/A

J3D10 Floors of a sole-occupancy unit of a Class 2 building or a Class 4 part of a building

[New for 2022]

(1) Where a *sole-occupancy unit* of a Class 2 building or a Class 4 part of a building has a concrete floor above an unenclosed *carpark*, undercroft, or the like, underfloor insulation must be installed with an *R-Value* at least—

(a) in *climate zone* 2 and *climate zones* 5 to 8, R2.0; and

(b) in *climate zones* 3 and 4, R1.5.

(2) Where a *sole-occupancy unit* of a Class 2 building or Class 4 part of a building has a concrete floor above an enclosed *carpark*, undercroft or the like, underfloor insulation must be installed with an *R-Value* at least—

(a) in *climate zone* 2, R0.5; and

(b) in *climate zones* 4 and 5, R1.0; and

(c) in *climate zone* 6, R1.5; and

(d) in *climate zones* 7 and 8, R2.0.

(3) A concrete slab-on-ground with an in-slab or in-screed heating or cooling system must have insulation with an *R-Value* at least 1.0 installed around the vertical edge of tis perimeter.

(4) Except for a waffle-pod slab—

(a) in *climate zones* 6 and 7—

(i) insulation with an *R-Value* of at least 0.64 must be installed around the vertical edge of its perimeter; and

(ii) insulation with an *R-Value* of at least 0.64 must be installed underneath the slab; and

(b) in *climate zone* 8—

(i) insulation with an *R-Value* of at least 1.0 must be installed around the vertical edge of its perimeter; and

(ii) insulation with an *R-Value* of at least 2.0 must be installed underneath the slab.

(5) Insulation *required* by (3), (4)(a)(i) and (4)(b)(i) must—

(a) be *water resistant*; and

(b) be continuous from the adjacent finished ground level—

(i) to a depth of not less than 300 mm; or

(ii) for at least the full depth of the vertical edge of the concrete slab-on-ground.

(6) The requirements of (3) do not apply to an in-screed heating or cooling system used solely in a bathroom, amenity area or the like.

J3D11 External winter glazing of a sole-occupancy unit of a Class 2 building or a Class 4 part of a building

[New for 2022]

(1) In *climate zones* 2 to 8, the ratio of the conductance (C_U) and solar heat gain (C_{SHGC}) of the *glazing* of each *storey*, including any *mezzanine*, of a *sole-occupancy unit* of a Class 2 building or a Class 4 part of a building must—

(a) not exceed the allowance obtained from Table J3D11a; and

(b) be calculated in accordance with the following formula:

$$\frac{[(A_1 \times U_1 \times BC_1 \times OC_1 \times R_{W1}) + (A_2 \times U_2 \times BC_2 \times OC_2 \times R_{W2}) + \ldots]}{[(A_1 \times SHGC_1 \times E_{W1} \times BS_{W1} \times F_{W1} \times H_{W1} \times R_{W1}) + (A_2 \times SHGC_2 \times E_{W2} \times BS_{W2} \times F_{W2} \times H_{W2} \times R_{W2}) + \ldots]}$$

(2) In the formula at (1)(b)—

(a) $A_{1,2,etc}$

= the area of each *glazing* element; and

(b) $U_{1,2,etc}$

= the *Total System U-Value* of each *glazing* element; and

(c) $SHGC_{1,2,etc}$

= the *Total System SHGC* for each *glazing* element, not exceeding 0.7; and

(d) $E_{W1,2,etc}$

= the winter exposure factor for each *glazing* element obtained from Tables J3D11b, J3D11c, J3D11d, J3D11e, J3D11f and J3D11g; and

(e) $BC_{1,2,etc}$

= the bedroom conductance factor obtained from Tables J3D11h, J3D11i, J3D11j, J3D11k, J3D11l and J3D11m; and

(f) $OC_{1,2,etc}$

= the orientation sector conductance factor obtained from Table J3D11n; and

(g) $R_{W1,2,etc}$

= the room type factor obtained from Tables J3D11h, J3D11i, J3D11j, J3D11k, J3D11l and J3D11m; and

(h) $BS_{W1,2,etc}$

= the bedroom solar heat gain factor obtained from Tables J3D11h, J3D11i, J3D11j, J3D11k, J3D11l and J3D11m; and

(i) $F_{W1,2,etc}$

= the frame factor obtained from Tables J3D11o, J3D11p, J3D11q, J3D11r, J3D11s and J3D11t for each *glazing* element; and

(j) $H_{W1,2,etc}$

= the floor factor obtained from Tables J3D11h, J3D11i, J3D11j, J3D11k, J3D11l and J3D11m for each *glazing* element.

(3) For the purpose of J3D11—

(a) orientation sectors must be determined in accordance with Figure 13.3.2a of the ABCB Housing Provisions; and

(b) P/H must be determined in accordance with Figure S37C7; and

(c) For P/H between those in Tables J3D11b, J3D11c, J3D11d, J3D11e, J3D11f and J3D11g, either use the next

highest P/H or interpolate.

Table J3D11a: Maximum conductance to solar heat gain ratio (C_U/C_{SHGC})

Climate zone	Maximum conductance to solar heat gain ratio (C_U/C_{SHGC})
2	16.95
3	19.88
4	13.34
5	11.83
6	6.27
7	12.90
8	12.90

Table J3D11b: Orientation sector winter exposure factor (E_W): climate zone 2

P/H	North	North east	East	South east	South	South west	West	North west
0.00	1.49	1.61	1.23	0.96	0.68	1.03	1.37	1.71
0.05	1.44	1.53	1.14	0.81	0.57	0.90	1.27	1.64
0.10	1.38	1.48	1.09	0.76	0.53	0.85	1.22	1.55
0.20	1.21	1.32	0.97	0.69	0.50	0.75	1.10	1.39
0.40	1.00	1.06	0.77	0.57	0.42	0.63	0.92	1.14
0.60	0.83	0.87	0.69	0.50	0.37	0.55	0.77	0.96
0.80	0.62	0.69	0.56	0.43	0.35	0.50	0.66	0.79
1.00	0.43	0.59	0.46	0.41	0.33	0.43	0.56	0.65
1.20	0.26	0.47	0.40	0.36	0.31	0.40	0.53	0.53
1.40	0.22	0.40	0.33	0.33	0.29	0.38	0.47	0.44
1.60	0.18	0.32	0.31	0.33	0.28	0.35	0.39	0.39
1.80	0.15	0.28	0.27	0.31	0.26	0.33	0.35	0.32
2.00	0.12	0.21	0.24	0.29	0.26	0.33	0.33	0.31

Table J3D11c: Orientation sector winter exposure factor (E_W): climate zone 3

P/H	North	North east	East	South east	South	South west	West	North west
0.00	0.90	1.10	0.88	0.69	0.50	0.58	0.67	0.91
0.05	0.89	1.06	0.82	0.60	0.44	0.51	0.64	0.89
0.10	0.83	1.01	0.78	0.58	0.42	0.49	0.61	0.84
0.20	0.74	0.90	0.70	0.52	0.40	0.44	0.55	0.76
0.40	0.59	0.74	0.60	0.43	0.36	0.37	0.47	0.63
0.60	0.44	0.57	0.48	0.39	0.34	0.32	0.38	0.51
0.80	0.30	0.45	0.43	0.34	0.30	0.30	0.32	0.41
1.00	0.20	0.38	0.35	0.30	0.28	0.28	0.29	0.33
1.20	0.14	0.29	0.31	0.28	0.28	0.25	0.24	0.28
1.40	0.11	0.26	0.25	0.26	0.26	0.23	0.21	0.24
1.60	0.08	0.23	0.24	0.24	0.24	0.21	0.20	0.20
1.80	0.07	0.16	0.19	0.24	0.24	0.19	0.17	0.18
2.00	0.06	0.16	0.18	0.21	0.24	0.19	0.15	0.16

Table J3D11d: Orientation sector winter exposure factor (E_W): climate zone 4

P/H	North	North east	East	South east	South	South west	West	North west
0.00	1.58	1.66	1.16	0.93	0.70	0.78	0.85	1.38
0.05	1.54	1.60	1.06	0.79	0.58	0.66	0.79	1.32
0.10	1.53	1.54	1.04	0.74	0.56	0.62	0.75	1.28
0.20	1.30	1.41	0.94	0.67	0.50	0.56	0.68	1.15
0.40	1.18	1.20	0.78	0.57	0.44	0.48	0.58	0.99
0.60	0.98	0.99	0.69	0.50	0.38	0.42	0.49	0.81
0.80	0.85	0.81	0.60	0.45	0.36	0.38	0.44	0.68
1.00	0.68	0.73	0.52	0.41	0.32	0.34	0.37	0.58
1.20	0.49	0.56	0.46	0.36	0.32	0.32	0.34	0.50
1.40	0.38	0.52	0.42	0.33	0.30	0.30	0.30	0.42
1.60	0.27	0.45	0.39	0.33	0.28	0.28	0.26	0.37
1.80	0.21	0.39	0.35	0.31	0.28	0.26	0.24	0.32
2.00	0.19	0.35	0.31	0.29	0.26	0.24	0.22	0.26

Table J3D11e: Orientation sector winter exposure factor (E_W): climate zone 5

P/H	North	North east	East	South east	South	South west	West	North west
0.00	1.61	1.34	1.08	0.87	0.67	0.76	0.85	1.23
0.05	1.56	1.29	0.98	0.74	0.56	0.64	0.78	1.17
0.10	1.56	1.23	0.92	0.69	0.54	0.62	0.75	1.14
0.20	1.30	1.10	0.83	0.63	0.49	0.54	0.67	1.03
0.40	1.19	0.91	0.69	0.54	0.41	0.47	0.55	0.86
0.60	0.97	0.75	0.56	0.47	0.38	0.41	0.47	0.70
0.80	0.78	0.62	0.49	0.42	0.34	0.37	0.42	0.57
1.00	0.64	0.47	0.39	0.38	0.32	0.33	0.36	0.49
1.20	0.43	0.42	0.35	0.36	0.31	0.31	0.29	0.39
1.40	0.32	0.31	0.29	0.34	0.29	0.29	0.28	0.33
1.60	0.22	0.27	0.27	0.31	0.25	0.25	0.23	0.28
1.80	0.18	0.23	0.22	0.29	0.25	0.25	0.20	0.25
2.00	0.14	0.17	0.21	0.27	0.25	0.23	0.19	0.19

Table J3D11f: Orientation sector winter exposure factor (E_W): climate zone 6

P/H	North	North east	East	South east	South	South west	West	North west
0.00	3.04	2.50	1.52	1.51	1.51	1.63	1.76	2.75
0.05	2.94	2.36	1.39	1.28	1.26	1.38	1.62	2.61
0.10	2.91	2.28	1.33	1.21	1.19	1.30	1.52	2.55
0.20	2.50	2.05	1.18	1.08	1.05	1.16	1.40	2.34
0.40	2.29	1.77	1.01	0.91	0.91	0.98	1.20	1.98
0.60	1.95	1.51	0.86	0.77	0.81	0.83	1.04	1.71
0.80	1.73	1.28	0.72	0.71	0.74	0.80	0.92	1.42
1.00	1.38	1.02	0.65	0.64	0.67	0.69	0.78	1.24
1.20	1.12	0.95	0.55	0.61	0.60	0.65	0.72	1.04
1.40	0.85	0.72	0.49	0.54	0.60	0.62	0.64	0.93

P/H	North	North east	East	South east	South	South west	West	North west
1.60	0.70	0.65	0.42	0.50	0.56	0.54	0.56	0.79
1.80	0.51	0.53	0.40	0.47	0.53	0.51	0.54	0.72
2.00	0.40	0.47	0.38	0.44	0.49	0.51	0.48	0.58

Table J3D11g: Orientation sector winter exposure factor (E_W): climate zones 7 and 8

P/H	North	North east	East	South east	South	South west	West	North west
0.00	1.66	1.53	0.90	0.82	0.74	0.78	0.83	1.43
0.05	1.61	1.47	0.83	0.69	0.61	0.66	0.76	1.37
0.10	1.61	1.44	0.79	0.64	0.59	0.62	0.73	1.34
0.20	1.51	1.34	0.73	0.58	0.53	0.55	0.66	1.22
0.40	1.30	1.17	0.63	0.49	0.44	0.47	0.55	1.07
0.60	1.19	1.02	0.54	0.43	0.40	0.41	0.48	0.91
0.80	1.02	0.88	0.48	0.39	0.36	0.37	0.43	0.79
1.00	0.93	0.78	0.44	0.34	0.34	0.33	0.37	0.67
1.20	0.73	0.66	0.37	0.32	0.32	0.31	0.33	0.60
1.40	0.66	0.64	0.36	0.30	0.29	0.29	0.30	0.46
1.60	0.51	0.46	0.32	0.28	0.27	0.25	0.28	0.43
1.80	0.42	0.44	0.26	0.26	0.27	0.25	0.25	0.37
2.00	0.31	0.37	0.26	0.24	0.25	0.25	0.22	0.31

Table J3D11h: Conductance and radiation factors: climate zone 2

Type of factor	Factor
Bedroom conduction weighting factor (BC)	0.43
Room type multiplier (for bedroom and unconditioned areas) (R_W)	1.00
Bedroom solar heat gain weighting factor (BS_W)	0.40
Floor factor for tiled or vinyl covered floors (H_W)	1.02
Floor factor for other than tiled or vinyl covered floors (H_W)	0.96

Table J3D11i: Conductance and radiation factors: climate zone 3

Type of factor	Factor
Bedroom conduction weighting factor (BC)	0.42
Room type multiplier (for bedroom and unconditioned areas) (R_W)	1.00
Bedroom solar heat gain weighting factor (BS_W)	1.28
Floor factor for tiled or vinyl covered floors (H_W)	1.02
Floor factor for other than tiled or vinyl covered floors (H_W)	0.97

Table J3D11j: Conductance and radiation factors: climate zone 4

Type of factor	Factor
Bedroom conduction weighting factor (BC)	0.70

Type of factor	Factor
Room type multiplier (for bedroom and unconditioned areas) (R_W)	1.00
Bedroom solar heat gain weighting factor (BS_W)	0.60
Floor factor for tiled or vinyl covered floors (H_W)	1.04
Floor factor for other than tiled or vinyl covered floors (H_W)	0.92

Table J3D11k: Conductance and radiation factors: climate zone 5

Type of factor	Factor
Bedroom conduction weighting factor (BC)	0.63
Room type multiplier (for bedroom and unconditioned areas) (R_W)	1.10
Bedroom solar heat gain weighting factor (BS_W)	0.81
Floor factor for tiled or vinyl covered floors (H_W)	1.03
Floor factor for other than tiled or vinyl covered floors (H_W)	0.93

Table J3D11l: Conductance and radiation factors: climate zone 6

Type of factor	Factor
Bedroom conduction weighting factor (BC)	0.81
Room type multiplier (for bedroom and unconditioned areas) (R_W)	1.00
Bedroom solar heat gain weighting factor (BS_W)	0.65
Floor factor for tiled or vinyl covered floors (H_W)	1.02
Floor factor for other than tiled or vinyl covered floors (H_W)	0.98

Table J3D11m: Conductance and radiation factors: climate zones 7 and 8

Type of factor	Factor
Bedroom conduction weighting factor (BC)	0.60
Room type multiplier (for bedroom and unconditioned areas) (R_W)	1.00
Bedroom solar heat gain weighting factor (BS_W)	0.51
Floor factor for tiled or vinyl covered floors (H_W)	1.03
Floor factor for other than tiled or vinyl covered floors (H_W)	0.93

Table J3D11n: Orientation sector conductance factor (OC)

Climate zone	North	North east	East	South east	South	South west	West	North west
2	1.70	1.34	0.98	0.84	0.70	0.90	1.10	1.40
3	1.30	1.10	0.90	0.95	1.00	0.95	0.90	1.10
4	1.30	1.25	1.20	1.03	0.85	0.92	0.99	1.15
5	1.20	1.15	1.10	1.05	1.00	1.05	1.10	1.15
6	1.23	1.13	1.00	1.00	1.02	1.00	1.00	1.16

Climate zone	North	North east	East	South east	South	South west	West	North west
7 and 8	1.40	1.25	1.10	1.00	0.90	0.95	1.00	1.20

Table J3D11o: Frame factor (F_W) — climate zone 2

Frame solar absorptance	Factor
≤ 0.40	0.97
> 0.40 to < 0.68	1.00
≥ 0.68	1.08

Table Notes

Interpolation is allowed for values between those shown.

Table J3D11p: Frame factor (F_W) — climate zone 3

Frame solar absorptance	Factor
≤ 0.40	0.98
> 0.40 to < 0.68	1.00
≥ 0.68	1.05

Table Notes

Interpolation is allowed for values between those shown.

Table J3D11q: Frame factor (F_W) — climate zone 4

Frame solar absorptance	Factor
≤ 0.40	0.99
> 0.40 to < 0.68	1.00
≥ 0.68	1.01

Table Notes

Interpolation is allowed for values between those shown.

Table J3D11r: Frame factor (F_W) — climate zone 5

Frame solar absorptance	Factor
≤ 0.40	1.00
> 0.40 to < 0.68	1.00
≥ 0.68	1.01

Table Notes

Interpolation is allowed for values between those shown.

Table J3D11s: Frame factor (F_W) — climate zone 6

Frame solar absorptance	Factor
≤ 0.40	0.92
> 0.40 to < 0.68	1.00
≥ 0.68	1.13

Table Notes

Interpolation is allowed for values between those shown.

Table J3D11t: Frame factor (F_W) — climate zones 7 and 8

Frame solar absorptance	Factor
≤ 0.40	0.97
> 0.40 to < 0.68	1.00
≥ 0.68	1.01

Table Notes

Interpolation is allowed for values between those shown.

J3D12 External summer glazing of a sole-occupancy unit of a Class 2 building or a Class 4 part of a building

[New for 2022]

(1) In *climate zones* 1 to 7, the aggregate solar heat gain of the *glazing* in each *storey*, including any *mezzanine*, of a *sole-occupancy unit* of a Class 2 building or a Class 4 part of a building must—

(a) not exceed the allowance resulting from multiplying the *floor area* of the *storey*, including any *mezzanine*, measured within the enclosing walls, by the constant C_{SHGC} obtained from Table J3D12a; and

(b) be calculated in accordance with the following formula:

$$(A_1 \times SHGC_1 \times E_{S1} \times R_{S1} \times F_{S1} \times H_{S1}) + (A_2 \times SHGC_2 \times E_{S2} \times R_{S2} \times F_{S2} \times H_{S2}) + \ldots$$

(2) In the formula at (1)(b)—

(a) $A_{1,2,etc}$

= the area of each *glazing* element; and

(b) $SHGC_{1,2,etc}$

= the *Total System SHGC* for each *glazing* element, not exceeding 0.7; and

(c) $E_{S1,2,etc}$

= the summer exposure factor for each *glazing* element obtained from Tables J3D12b, J3D12c, J3D12d, J3D12e, J3D12f, J3D12g and J3D12h.

(d) $R_{S1,2,etc}$

= the factor obtained from Table J3D12i or Table J3D12j for each *glazing* element located in a bedroom or room which is not a *conditioned space*; and

(e) $F_{S1,2,etc}$

= the frame factor obtained from Table J3D12i or Table J3D12j for *glazing* element; and

(f) $H_{S1,2,etc}$

= the floor factor obtained from Table J3D12i or Table J3D12j for each *glazing* element.

(3) For the purpose of J3D12—

(a) orientation sectors must be determined in accordance with Figure 13.3.2a of the ABCB Housing Provisions; and

(b) P/H must be determined in accordance with Figure S37C7; and

(c) for P/H between those shown in Tables J3D12b, J3D12c, J3D12d, J3D12e, J3D12f, J3D12g, J3D12h, J3D12i and J3D12j, either use the next highest P/H or interpolate.

Table J3D12a: Constant for Solar Heat Gain (C_{SHGC}) — climate zones 1 to 7

% *Ventilation opening* area per m^2	*Climate zone* 1	*Climate zone* 2	*Climate zone* 3	*Climate zone* 4	*Climate zone* 5	*Climate zone* 6	*Climate zone* 7
≥5%	0.0191	0.0245	0.0547	0.0506	0.0674	0.1472	0.0930
10%	0.0237	0.0532	0.0745	0.0946	0.1111	0.2969	0.2405
15%	0.0294	0.0700	0.0861	0.1203	0.1367	0.3845	0.3267
≥20% to 90%	0.0364	0.0819	0.0943	0.1385	0.1548	0.4466	0.3879

Table Notes

(1) The *ventilation opening* area is the total area of each *ventilation opening* divided by the *floor area* of the *storey*, including any *mezzanine*.

(2) No window can have a design *ventilation opening* greater than 90% because the window frame will always obstruct some area of the opening.

(3) Interpolation is allowed for values between those shown.

Table J3D12b: Orientation sector summer exposure factor (E_s) — climate zone 1

P/H	North	North east	East	South east	South	South west	West	North west
0.00	0.62	0.76	0.79	0.75	0.52	0.89	1.06	0.85
0.05	0.52	0.67	0.73	0.68	0.45	0.82	0.98	0.75
0.10	0.49	0.61	0.68	0.65	0.41	0.76	0.92	0.69
0.20	0.44	0.53	0.62	0.57	0.33	0.66	0.80	0.60
0.40	0.36	0.41	0.48	0.42	0.25	0.53	0.66	0.47
0.60	0.30	0.33	0.40	0.36	0.20	0.42	0.53	0.38
0.80	0.26	0.28	0.32	0.28	0.18	0.36	0.46	0.32
1.00	0.23	0.23	0.27	0.25	0.15	0.30	0.38	0.28
1.20	0.21	0.21	0.23	0.20	0.13	0.27	0.34	0.26
1.40	0.20	0.19	0.20	0.18	0.13	0.22	0.30	0.22
1.60	0.18	0.16	0.17	0.16	0.11	0.20	0.27	0.21
1.80	0.15	0.16	0.16	0.13	0.10	0.20	0.24	0.18
2.00	0.14	0.15	0.14	0.13	0.10	0.17	0.22	0.17

Table J3D12c: Orientation sector summer exposure factor (E_s) — climate zone 2

P/H	North	North east	East	South east	South	South west	West	North west
0.00	0.65	1.16	1.59	1.20	0.73	1.30	1.77	1.23
0.05	0.54	1.01	1.43	1.06	0.61	1.18	1.62	1.10
0.10	0.50	0.94	1.35	0.99	0.58	1.10	1.50	1.00
0.20	0.42	0.81	1.20	0.88	0.51	0.98	1.32	0.87
0.40	0.35	0.62	0.95	0.70	0.40	0.78	1.10	0.67
0.60	0.30	0.48	0.78	0.57	0.33	0.64	0.88	0.50
0.80	0.26	0.41	0.65	0.47	0.29	0.54	0.77	0.43
1.00	0.23	0.33	0.56	0.40	0.24	0.47	0.62	0.36
1.20	0.21	0.30	0.46	0.35	0.22	0.40	0.54	0.31
1.40	0.19	0.26	0.42	0.32	0.21	0.35	0.48	0.27
1.60	0.17	0.25	0.36	0.29	0.19	0.31	0.41	0.24

P/H	North	North east	East	South east	South	South west	West	North west
1.80	0.15	0.22	0.31	0.25	0.17	0.30	0.37	0.22
2.00	0.15	0.21	0.29	0.24	0.16	0.26	0.36	0.21

Table J3D12d: Orientation sector summer exposure factor (E_s) — climate zone 3

P/H	North	North east	East	South east	South	South west	West	North west
0.00	0.80	1.26	1.41	1.38	0.89	1.33	1.29	1.20
0.05	0.67	1.14	1.31	1.26	0.77	1.21	1.20	1.07
0.10	0.63	1.03	1.24	1.19	0.73	1.14	1.13	0.99
0.20	0.54	0.88	1.09	1.05	0.62	1.00	1.01	0.87
0.40	0.46	0.68	0.87	0.83	0.51	0.83	0.80	0.67
0.60	0.40	0.52	0.73	0.68	0.42	0.66	0.67	0.52
0.80	0.34	0.42	0.58	0.55	0.36	0.58	0.57	0.42
1.00	0.29	0.35	0.50	0.47	0.32	0.49	0.50	0.35
1.20	0.27	0.31	0.42	0.40	0.28	0.43	0.41	0.31
1.40	0.24	0.27	0.35	0.36	0.27	0.37	0.39	0.27
1.60	0.24	0.24	0.33	0.32	0.22	0.36	0.33	0.25
1.80	0.21	0.23	0.30	0.28	0.22	0.32	0.31	0.23
2.00	0.21	0.22	0.25	0.28	0.20	0.28	0.26	0.20

Table J3D12e: Orientation sector summer exposure factor (E_s) — climate zone 4

P/H	North	North east	East	South east	South	South west	West	North west
0.00	0.79	1.13	1.12	1.05	0.68	1.14	1.44	1.23
0.05	0.67	1.05	1.05	0.97	0.59	1.05	1.34	1.12
0.10	0.62	0.95	0.99	0.91	0.55	0.98	1.29	1.03
0.20	0.47	0.83	0.90	0.82	0.49	0.87	1.16	0.89
0.40	0.33	0.63	0.74	0.67	0.41	0.71	0.94	0.68
0.60	0.30	0.48	0.59	0.56	0.35	0.61	0.79	0.50
0.80	0.26	0.36	0.50	0.49	0.30	0.52	0.65	0.40
1.00	0.22	0.29	0.44	0.42	0.26	0.45	0.56	0.33
1.20	0.21	0.25	0.37	0.37	0.24	0.40	0.50	0.28
1.40	0.18	0.22	0.31	0.34	0.20	0.38	0.42	0.23
1.60	0.18	0.19	0.30	0.30	0.19	0.33	0.36	0.22
1.80	0.15	0.17	0.26	0.27	0.17	0.29	0.35	0.19
2.00	0.14	0.16	0.22	0.23	0.17	0.28	0.29	0.18

Table J3D12f: Orientation sector summer exposure factor (E_s) — climate zone 5

P/H	North	North east	East	South east	South	South west	West	North west
0.00	0.82	1.20	1.31	1.06	0.82	1.04	1.30	1.16
0.05	0.69	1.06	1.18	0.94	0.68	0.92	1.19	1.04
0.10	0.63	0.97	1.11	0.87	0.65	0.86	1.11	0.94
0.20	0.51	0.84	0.98	0.77	0.58	0.76	0.99	0.83
0.40	0.39	0.64	0.78	0.63	0.46	0.62	0.81	0.62
0.60	0.35	0.51	0.64	0.52	0.40	0.51	0.65	0.48

P/H	North	North east	East	South east	South	South west	West	North west
0.80	0.30	0.41	0.55	0.44	0.34	0.43	0.52	0.40
1.00	0.26	0.34	0.46	0.37	0.30	0.37	0.46	0.31
1.20	0.24	0.29	0.40	0.33	0.26	0.33	0.40	0.27
1.40	0.21	0.25	0.35	0.30	0.24	0.29	0.34	0.24
1.60	0.20	0.24	0.32	0.25	0.22	0.27	0.30	0.21
1.80	0.18	0.22	0.28	0.23	0.20	0.23	0.27	0.20
2.00	0.17	0.19	0.26	0.23	0.19	0.21	0.25	0.19

Table J3D12g: Orientation sector summer exposure factor (E_s) — climate zone 6

P/H	North	North east	East	South east	South	South west	West	North west
0.00	2.18	2.75	2.88	2.22	1.59	2.46	2.91	2.90
0.05	1.85	2.47	2.63	1.99	1.35	2.25	2.70	2.64
0.10	1.69	2.30	2.48	1.89	1.27	2.13	2.60	2.43
0.20	1.35	1.96	2.20	1.66	1.14	1.92	2.33	2.13
0.40	0.94	1.48	1.78	1.38	0.94	1.57	1.87	1.61
0.60	0.78	1.10	1.53	1.15	0.81	1.36	1.58	1.19
0.80	0.68	0.89	1.25	0.97	0.68	1.17	1.37	0.94
1.00	0.57	0.74	1.05	0.82	0.60	0.98	1.16	0.84
1.20	0.52	0.61	0.93	0.74	0.60	0.91	1.00	0.68
1.40	0.47	0.56	0.80	0.66	0.49	0.80	0.87	0.61
1.60	0.42	0.48	0.70	0.61	0.47	0.73	0.79	0.49
1.80	0.39	0.46	0.65	0.56	0.44	0.66	0.71	0.47
2.00	0.36	0.43	0.60	0.54	0.44	0.61	0.64	0.40

Table J3D12h: Orientation sector summer exposure factor (E_s) — climate zone 7

P/H	North	North east	East	South east	South	South west	West	North west
0.00	0.89	1.06	1.06	0.93	0.70	0.91	1.06	1.07
0.05	0.77	0.95	0.97	0.82	0.59	0.81	0.97	0.97
0.10	0.71	0.88	0.92	0.79	0.56	0.76	0.92	0.89
0.20	0.58	0.77	0.82	0.69	0.50	0.68	0.81	0.78
0.40	0.37	0.59	0.67	0.57	0.42	0.55	0.66	0.58
0.60	0.30	0.46	0.57	0.50	0.36	0.47	0.56	0.46
0.80	0.26	0.36	0.48	0.44	0.31	0.41	0.47	0.36
1.00	0.23	0.30	0.42	0.37	0.28	0.35	0.39	0.29
1.20	0.20	0.25	0.36	0.34	0.25	0.31	0.34	0.25
1.40	0.18	0.21	0.32	0.30	0.23	0.28	0.29	0.22
1.60	0.17	0.19	0.29	0.27	0.22	0.26	0.28	0.19
1.80	0.16	0.18	0.25	0.24	0.20	0.24	0.24	0.17
2.00	0.15	0.17	0.24	0.23	0.20	0.21	0.22	0.16

Table J3D12i: Conductance factors — climate zone 1

Factor	Value
Room type multiplier (for bedroom and unconditioned areas) (R_S)	0.32
Frame solar absorptance multiplier Frame SA = 0.3 up to 0.4 (F_S)	0.83
Frame solar absorptance multiplier Frame SA = 0.4 up to 0.5 (F_S)	1.00
Frame solar absorptance multiplier Frame SA = 0.5 or more (F_S)	1.20
Floor factor for tiled or vinyl covered floors (H_S)	1.00
Floor factor for other than tiled or vinyl covered floors (H_S)	1.00

Table J3D12j: Conductance factors — climate zones 2 to 7

Type of factor	*Climate zone* 2	*Climate zone* 3	*Climate zone* 4	*Climate zone* 5	*Climate zone* 6	*Climate zone* 7
Room type multiplier (for bedroom and unconditioned areas) (R_S)	0.40	0.56	0.71	0.91	0.87	1.11
Frame solar absorptance multiplier (for metal frame windows) (F_S) SA ≤ 0.40	1.00	0.89	0.87	0.85	0.74	0.86
Frame solar absorptance multiplier (for metal frame windows) (F_S) SA > 0.40 to < 0.68	1.06	1.00	1.00	1.00	1.00	1.00
Frame solar absorptance multiplier (for metal frame windows) (F_S) SA ≥ 0.68	1.22	1.18	1.22	1.24	1.22	1.32
Floor factor for tiled or vinyl covered floors (H_S)	1.06	1.06	1.13	1.13	1.04	1.21
Floor factor for other than tiled or vinyl covered floors (H_S)	0.97	0.97	0.94	0.94	0.94	0.90

Table Notes

Interpolation is allowed for values between those shown.

J3D13 Shading of a sole-occupancy unit of a Class 2 building or a Class 4 part of a building

[New for 2022]

Where shading is *required* to comply with J3D11 or J3D12, it must—

(a) be provided by an external permanent projection, such as a verandah, balcony, fixed canopy, eaves, shading hood or carport, which—

(i) extends horizontally on both sides of the *glazing* for a distance greater than or equal to the projection distance P in Figure S37C7; or

(ii) provide the equivalent shading to (i) with a reveal or the like; or

(b) be provided by an external shading device, such as a shutter, blind, vertical or horizontal building screen with blades, battens or slats, which—

(i) is capable of restricting at least 80% of the summer solar radiation; and

(ii) if adjustable, is readily operated either manually, mechanically or electronically by the building occupants.

J3D14 Net equivalent energy usage of a sole-occupancy unit of a Class 2 building or a Class 4 part of a building

[New for 2022]

(1) The net equivalent energy usage of a *sole-occupancy unit* of a Class 2 building or Class 4 part of a building, calculated in accordance with (a), must not exceed the allowance calculated in accordance with (b)—

(a) $(A \times E_E) + E_P + E_S - E_R$

, where—

(i) A

= the floor area factor obtained from multiplying the total floor area by the adjustment factor in Table J3D14a; and

(ii) E_E

= the *main space conditioning* and *main water heater* efficiency factor obtained from the ABCB Standard for Whole-of-Home Efficiency Factors; and

(iii) E_P

= the swimming pool pump energy usage in (2); and

(iv) E_S

= the spa pump energy usage in (3); and

(v) E_R

= the installed capacity of on-site photovoltaics apportioned to the *sole-occupancy unit* of a Class 2 building or Class 4 part of a building (kW); and

(b) $A \times E_F$

, where—

(i) A

= the floor area factor obtained from multiplying the total floor area by the adjustment factor in Table J3D14a; and

(ii) E_F

= the energy factor obtained from Table J3D14b.

(2) The swimming pool pump energy usage (E_P) must be determined in accordance with the following formula: $E_P = V \times FP / 1000$

, where—

(a) E_P

= the swimming pool pump energy usage; and

(b) V

= the volume of the swimming pool to the nearest 1000 litres; and

(c) FP

= the swimming pool pump factor in Table 13.6.2c of the ABCB Housing Provisions.

(3) The spa pump energy usage (E_S) must be determined in accordance with the following formula: $E_S = V \times FSB / 100$

,where—

(a) ES

= the spa pump energy usage; and

(b) V

= the volume of the spa to the nearest 100 litres; and

(c) FSB

= the spa pump factor in Table 13.6.2d of the ABCB Housing Provisions.

Table J3D14a: Floor area adjustment factor for a sole-occupancy unit of a Class 2 building or a Class 4 part of a building

Total floor area m^2	Floor area factor	Total floor area m^2	Floor area factor	Total floor area m^2	Floor area factor	Total floor area m^2	Floor area factor
< 50	0.0123	160–169	0.0097	280–289	0.0087	400–409	0.0080
50–59	0.0119	170–179	0.0096	290–299	0.0086	410–419	0.0079
60–69	0.0116	180–189	0.0095	300–309	0.0085	420–429	0.0079
70–79	0.0113	190–199	0.0094	310–319	0.0085	430–439	0.0078
80–89	0.0111	200–209	0.0093	320–329	0.0084	440–449	0.0078
90–99	0.0108	210–219	0.0092	330–339	0.0083	450–459	0.0077
100–109	0.0106	220–229	0.0091	340–349	0.0083	460–469	0.0077
110–119	0.0105	230–239	0.0090	350–359	0.0082	470–479	0.0077
120–129	0.0103	240–249	0.0090	360–369	0.0082	480–489	0.0076
130–139	0.0101	250–259	0.0089	370–379	0.0081	490–499	0.0076
140–149	0.0100	260–269	0.0088	380–389	0.0081	500	0.0075
150–159	0.0099	270–279	0.0087	390–399	0.0080	—	—

Table Notes

(1) The total floor area is measured within the inside face of the *external walls* of the *sole-occupancy unit* and includes any conditioned attached Class 10a building.

(2) Where values fall between ranges given, the floor area must be rounded up to the nearest whole square metres of floor area.

Table J3D14b: Energy factor for a sole-occupancy unit of a Class 2 building or a Class 4 part of a building

Climate zone	ACT	NSW	NT	QLD	SA	TAS	Vic	WA
1	—	—	2.73	3.95	—	—	—	4.64
2	—	1.88	—	2.54	—	—	—	—
3	—	—	1.76	3.52	—	—	—	4.10
4	—	2.57	—	—	2.65	—	1.79	3.34
5	—	2.50	—	3.26	2.56	—	—	3.36
6	—	3.43	—	—	3.58	—	2.32	4.58
7	3.66	3.32	—	—	—	4.41	2.32	—
8	—	5.70	—	—	—	5.60	4.02	—

J3D15 Net equivalent energy usage for a sole-occupancy unit of a Class 2 building or Class 4 part of building – home energy rating software

[New for 2022]

A *sole-occupancy unit* of a Class 2 building or a Class 4 part of a building must achieve a whole-of-home rating of not less than 50 using *house energy rating software*.

Part J4 Building fabric

Introduction to this Part

This Part contains *Deemed-to-Satisfy Provisions* for compliance with Part J1. It sets out provisions for the building *envelope* including roofs, ceilings, roof lights, walls, *glazing* and floors.

Notes: Tasmania Section J Energy Efficiency

In Tasmania, for a Class 2 building and Class 4 part of a building, Section J is replaced with Section J of BCA 2019 Amendment 1.

Deemed-to-Satisfy Provisions

J4D1 Deemed-to-Satisfy Provisions

[2019: J1.0]

(1) Where a *Deemed-to-Satisfy Solution* is proposed, *Performance Requirements* J1P1 to J1P4 are satisfied by complying with—

(a) J2D2; and

(a) J3D2 to J3D15; and

(b) J4D2 to J4D7; and

(c) J5D2 to J5D8; and

(d) J6D2 to J6D13; and

(e) J7D2 to J7D9; and

(f) J8D2 to J8D4; and

(g) J9D2 to J9D5.

(2) Where a *Performance Solution* is proposed, the relevant *Performance Requirements* must be determined in accordance with A2G2(3) and A2G4(3) as applicable.

J4D2 Application of Part

[2019: J1.1]

The *Deemed-to-Satisfy Provisions* of this Part apply to building elements forming the *envelope* of a Class 2 to 9 building other than J4D3(5), J4D4, J4D5, J4D6 and J4D7 which do not apply to a Class 2 *sole-occupancy unit* or a Class 4 part of a building.

J4D3 Thermal construction — general

[2019: J1.2]

(1) Where *required*, insulation must comply with AS/NZS 4859.1 and be installed so that it—

(a) abuts or overlaps adjoining insulation other than at supporting members such as studs, noggings, joists, furring

channels and the like where the insulation must be against the member; and

(b) forms a continuous barrier with ceilings, walls, bulkheads, floors or the like that inherently contribute to the thermal barrier; and

(c) does not affect the safe or effective operation of a *service* or fitting.

(2) Where *required*, *reflective insulation* must be installed with—

(a) the necessary airspace to achieve the *required R-Value* between a reflective side of the *reflective insulation* and a building lining or cladding; and

(b) the *reflective insulation* closely fitted against any penetration, door or *window* opening; and

(c) the *reflective insulation* adequately supported by framing members; and

(d) each adjoining sheet of roll membrane being—

(i) overlapped not less than 50 mm; or

(ii) taped together.

(3) Where *required*, bulk insulation must be installed so that—

(a) it maintains its position and thickness, other than where it is compressed between cladding and supporting members, water pipes, electrical cabling or the like; and

(b) in a ceiling, where there is no bulk insulation or *reflective insulation* in the wall beneath, it overlaps the wall by not less than 50 mm.

(4) Roof, ceiling, wall and floor materials, and associated surfaces are deemed to have the thermal properties listed in Specification 36.

(5) The *required Total R-Value* and *Total System U-Value*, including allowance for thermal bridging, must be—

(a) calculated in accordance with AS/NZS 4859.2 for a roof or floor; or

(b) determined in accordance with Specification 37 for *wall-glazing construction*; or

(c) determined in accordance with Specification 39 or Section 3.5 of CIBSE Guide A for soil or sub-floor spaces.

J4D4 Roof and ceiling construction

[2019: J1.3]

(1) A roof or ceiling must achieve a *Total R-Value* greater than or equal to—

(a) in *climate zones* 1, 2, 3, 4 and 5, R3.7 for a downward direction of heat flow; and

(b) in *climate zone* 6, R3.2 for a downward direction of heat flow; and

(c) in *climate zone* 7, R3.7 for an upward direction of heat flow; and

(d) in *climate zone* 8, R4.8 for an upward direction of heat flow.

(2) In *climate zones* 1, 2, 3, 4, 5, 6 and 7, the solar absorptance of the upper surface of a roof must be not more than 0.45.

J4D5 Roof lights

[2019: J1.4]

Roof lights must have—

(a) a total area of not more than 5% of the *floor area* of the room or space served; and

(b) transparent and translucent elements, including any imperforate ceiling diffuser, with a combined performance of—

(i) for *Total system SHGC*, in accordance with Table J4D5; and

(ii) for *Total system U-Value*, not more than U3.9.

Table J4D5: Roof lights – Total system SHGC

Roof light shaft index Note 1	Total area of *roof lights* up to 3.5% of the *floor area* of the room or space	Total area of *roof lights* more than 3.5% and up to 5% of the *floor area* of the room or space
<1.0	≤ 0.45	≤ 0.29
≥ 1.0 to < 2.5	≤ 0.51	≤ 0.33
≥ 2.5	≤ 0.76	≤ 0.49

Table Notes

(1) The *roof light* shaft index is determined by measuring the distance from the centre of the shaft at the roof to the centre of the shaft at the ceiling level and dividing it by the average internal dimension of the shaft opening at the ceiling level (or the diameter for a circular shaft) in the same units of measurement.

(2) The area of a *roof light* is the area of the roof opening that allows light to enter the building.

(3) The total area of *roof lights* is the combined area for all *roof lights* serving the room or space.

J4D6 Walls and glazing

[2019: J1.5]

(1) The *Total System U-Value* of *wall-glazing construction*, including *wall-glazing construction* which wholly or partly forms the *envelope* internally, must not be greater than—

(a) for a Class 2 common area, a Class 5, 6, 7, 8 or 9b building or a Class 9a building other than a *ward area*, U2.0; and

(b) for a Class 3 or 9c building or a Class 9a *ward area*—

(i) in *climate zones* 1, 3, 4, 6 or 7, U1.1; or

(ii) in *climate zones* 2 or 5, U2.0; or

(iii) in *climate zone* 8, U0.9.

(2) The *Total System U-Value* of *display glazing* must not be greater than U5.8.

(3) The *Total System U-Value* of *wall-glazing construction* must be calculated in accordance with Specification 37.

(4) Wall components of a *wall-glazing construction* must achieve a minimum *Total R-Value* of—

(a) where the wall is less than 80% of the area of the *wall-glazing construction*, R1.0; or

(b) where the wall is 80% or more of the area of the *wall-glazing construction*, the value specified in Table J4D6a.

(5) The *solar admittance* of externally facing *wall-glazing construction*, excluding *wall-glazing construction* which is wholly internal, must not be greater than—

(a) for a Class 2 common area, a Class 5, 6, 7, 8 or 9b building or a Class 9a building other than a *ward area*, the values specified in Table J4D6b; and

(b) for a Class 3 or 9c building or a Class 9a *ward area*, the values specified in Table J4D6c.

(6) The *solar admittance* of a *wall-glazing construction* must be calculated in accordance with Specification 37.

(7) The *Total system SHGC* of *display glazing* must not be greater than 0.81 divided by the applicable shading factor specified in S37C7.

Table J4D6a: Minimum wall Total R-Value - Wall area 80% or more of wall-glazing construction area

Climate zone	Class 2 common area, Class 5, 6, 7, 8 or 9b building or a Class 9c building other than a *ward area*	Class 3 or 9c building or Class 9a *ward area*
1	2.4	3.3
2	1.4	1.4

Climate zone	Class 2 common area, Class 5, 6, 7, 8 or 9b building or a Class 9c building other than a *ward area*	Class 3 or 9c building or Class 9a *ward area*
3	1.4	3.3
4	1.4	2.8
5	1.4	1.4
6	1.4	2.8
7	1.4	2.8
8	1.4	3.8

Table J4D6b: Maximum wall-glazing construction solar admittance - Class 2 common area, Class 5, 6, 7, 8 or 9b building or Class 9a building other than a ward area

Climate zone	Eastern aspect *solar admittance*	Northern aspect *solar admittance*	Southern aspect *solar admittance*	Western aspect *solar admittance*
1	0.12	0.12	0.12	0.12
2	0.13	0.13	0.13	0.13
3	0.16	0.16	0.16	0.16
4	0.13	0.13	0.13	0.13
5	0.13	0.13	0.13	0.13
6	0.13	0.13	0.13	0.13
7	0.13	0.13	0.13	0.13
8	0.2	0.2	0.42	0.36

Table J4D6c: Maximum wall-glazing construction solar admittance - Class 3 or 9c building or Class 9a ward area

Climate zone	Eastern aspect *solar admittance*	Northern aspect *solar admittance*	Southern aspect *solar admittance*	Western aspect *solar admittance*
1	0.07	0.07	0.10	0.07
2	0.10	0.10	0.10	0.10
3	0.07	0.07	0.07	0.07
4	0.07	0.07	0.07	0.07
5	0.10	0.10	0.10	0.10
6	0.07	0.07	0.07	0.07
7	0.07	0.07	0.08	0.07
8	0.08	0.08	0.08	0.08

J4D7 Floors

[2019: J1.6]

(1) A floor must achieve the *Total R-Value* specified in Table J4D7.

(2) For the purposes of (1), a slab-on-ground that does not have an in-slab heating or cooling system is considered to achieve a *Total R-Value* of R2.0, except—

(a) in *climate zone* 8; or

(b) a Class 3, Class 9a *ward area* or Class 9b building in *climate zone* 7 that has a *floor area* to floor perimeter ratio of less than or equal to 2.

(3) A floor must be insulated around the vertical edge of its perimeter with insulation having an *R-Value* greater than or

equal to 1.0 when the floor—

(a) is a concrete slab-on-ground in *climate zone* 8; or

(b) has an in-slab or in-screed heating or cooling system, except where used solely in a bathroom, amenity area or the like.

(4) Insulation *required* by (3) for a concrete slab-on-ground must—

(a) be *water resistant*; and

(b) be continuous from the adjacent finished ground level—

(i) to a depth not less than 300 mm; or

(ii) for the full depth of the vertical edge of the concrete slab-on-ground.

Table J4D7: Floors – Minimum Total R-Value

Location	*Climate zone* 1— upwards heat flow	*Climate zones* 2 and 3 — upwards and downwards heat flow	*Climate zones* 4, 5, 6 and 7 — downwards heat flow	*Climate zone* 8 — downwards heat flow
A floor without an in-slab heating or cooling system	2.0	2.0	2.0	3.5
A floor with an in-slab heating or cooling system	3.25	3.25	3.25	4.75

Table Notes

For the purpose of calculating the *Total R-Value* of a floor, the sub-floor and soil *R-Value* must be calculated in accordance with Specification 39 or Section 3.5 of CIBSE Guide A.

Part J5 Building sealing

Introduction to this Part

This Part contains *Deemed-to-Satisfy Provisions* for compliance with Part J1. It sets out provisions for the sealing of a building's *glazing*, doors, exhaust fans and the like in order to increase thermal comfort for occupants and reduce the energy consumption of any installed *air-conditioning* systems.

Notes: Tasmania Section J Energy Efficiency

In Tasmania, for a Class 2 building and Class 4 part of a building, Section J is replaced with Section J of BCA 2019 Amendment 1.

Deemed-to-Satisfy Provisions

J5D1 Deemed-to-Satisfy Provisions

[2019: J3.0]

(1) Where a *Deemed-to-Satisfy Solution* is proposed, *Performance Requirements* J1P1 to J1P4 are satisfied by complying with—

(a) J2D2; and

(a) J3D2 to J3D15; and

(b) J4D2 to J4D7; and

(c) J5D2 to J5D8; and

(d) J6D2 to J6D13; and

(e) J7D2 to J7D9; and

(f) J8D2 to J8D4; and

(g) J9D2 to J9D5.

(2) Where a *Performance Solution* is proposed, the relevant *Performance Requirements* must be determined in accordance with A2G2(3) and A2G4(3) as applicable.

J5D2 Application of Part

[2019: J3.1]

The *Deemed-to-Satisfy Provisions* of this Part apply to elements forming the *envelope* of a Class 2 to 9 building, other than—

(a) a building in *climate zones* 1, 2, 3 and 5 where the only means of *air-conditioning* is by using an evaporative cooler; or

(b) a permanent building opening, in a space where a gas appliance is located, that is necessary for the safe operation of a gas appliance; or

(c) a building or space where the mechanical ventilation *required* by Part F6 provides sufficient pressurisation to prevent infiltration.

J5D3 Chimneys and flues

[2019: J3.2]

The chimney or flue of an open solid-fuel burning appliance must be provided with a damper or flap that can be closed to seal the chimney or flue.

J5D4 Roof lights

[2019: J3.3]

(1) A *roof light* must be sealed, or capable of being sealed, when serving—

(a) a *conditioned space*; or

(b) a *habitable room* in *climate zones* 4, 5, 6, 7 or 8.

(2) A *roof light required* by (1) to be sealed, or capable of being sealed, must be constructed with—

(a) an imperforate ceiling diffuser or the like installed at the ceiling or internal lining level; or

(b) a weatherproof seal; or

(c) a shutter system readily operated either manually, mechanically or electronically by the occupant.

J5D5 Windows and doors

[2019: J3.4]

(1) A door, openable *window* or the like must be sealed—

(a) when forming part of the *envelope*; or

(b) in *climate zones* 4, 5, 6, 7 or 8.

(2) The requirements of (1) do not apply to—

(a) a *window* complying with AS 2047; or

(b) a fire door or smoke door; or

(c) a roller shutter door, roller shutter grille or other security door or device installed only for out-of-hours security.

(3) A seal to restrict air infiltration—

(a) for the bottom edge of a door, must be a draft protection device; and

(b) for the other edges of a door or the edges of an openable *window* or other such opening, may be a foam or rubber compression strip, fibrous seal or the like.

(4) An entrance to a building, if leading to a *conditioned space* must have an airlock, *self-closing* door, *rapid roller door*, revolving door or the like, other than—

(a) where the *conditioned space* has a *floor area* of not more than 50 m^2; or

(b) where a café, restaurant, open front shop or the like has—

(i) a 3 m deep un-conditioned zone between the main entrance, including an open front, and the *conditioned space*; and

(ii) at all other entrances to the café, restaurant, open front shop or the like, *self-closing* doors.

(5) A loading dock entrance, if leading to a *conditioned space*, must be fitted with a *rapid roller door* or the like.

J5D6 Exhaust fans

[2019: J3.5]

An exhaust fan must be fitted with a sealing device such as a self-closing damper or the like when serving—

(a) a *conditioned space*; or

(b) a *habitable room* in *climate zones* 4, 5, 6, 7 or 8.

J5D7 Construction of ceilings, walls and floors

[2019: J3.6]

(1) Ceilings, walls, floors and any opening such as a *window* frame, door frame, *roof light* frame or the like must be constructed to minimise air leakage in accordance with (2)—

(a) when forming part of the *envelope*; or

(b) in *climate zones* 4, 5, 6, 7 or 8.

(2) Construction *required* by (1) must be—

(a) enclosed by internal lining systems that are close fitting at ceiling, wall and floor junctions; or

(b) sealed at junctions and penetrations with—

(i) close fitting architrave, skirting or cornice; or

(ii) expanding foam, rubber compressible strip, caulking or the like.

(3) The requirements of (1) do not apply to openings, grilles or the like *required* for smoke hazard management.

J5D8 Evaporative coolers

[2019: J3.7]

An evaporative cooler must be fitted with a self-closing damper or the like—

(a) when serving a heated space; or

(b) in *climate zones* 4, 5, 6, 7 or 8.

Part J6 Air-conditioning and ventilation

Introduction to this Part

This Part contains *Deemed-to-Satisfy Provisions* for compliance with Part J1. It sets out the provisions for the efficiency and control of *air-conditioning*, space heating and ventilation equipment, the efficiency, sealing and insulation requirements for ductwork systems containing fans, and for the efficiency and insulation of pipework and pump systems.

Notes: Tasmania Section J Energy Efficiency

In Tasmania, for a Class 2 building and Class 4 part of a building, Section J is replaced with Section J of BCA 2019 Amendment 1.

Deemed-to-Satisfy Provisions

J6D1 Deemed-to-Satisfy Provisions

[2019: J5.0]

(1) Where a *Deemed-to-Satisfy Solution* is proposed, *Performance Requirements* J1P1 to J1P4 are satisfied by complying with—

(a) J2D2; and

(a) J3D2 to J3D15; and

(b) J4D2 to J4D7; and

(c) J5D2 to J5D8; and

(d) J6D2 to J6D13; and

(e) J7D2 to J7D9; and

(f) J8D2 to J8D4; and

(g) J9D2 to J9D5.

(2) Where a *Performance Solution* is proposed, the relevant *Performance Requirements* must be determined in accordance with A2G2(3) and A2G4(3) as applicable.

J6D2 Application of Part

[2019: J5.1]

The *Deemed-to-Satisfy Provisions* of this Part do not apply to a Class 8 *electricity network substation*.

J6D3 Air-conditioning system control

[2019: J5.2]

(1) An *air-conditioning* system—

(a) must be capable of being deactivated when the building or part of a building served by that system is not occupied; and

(b) when serving more than one *air-conditioning* zone or area with different heating or cooling needs, must—

(i) thermostatically control the temperature of each zone or area; and

(ii) not control the temperature by mixing actively heated air and actively cooled air; and

(iii) limit reheating to not more than—

(A) for a fixed supply air rate, a 7.5 K rise in temperature; and

(B) for a variable supply air rate, a 7.5 K rise in temperature at the nominal supply air rate but increased or decreased at the same rate that the supply air rate is respectively decreased or increased; and

(c) which provides the *required* mechanical ventilation, other than in *climate zone* 1 or where dehumidification control is needed, must have an *outdoor air* economy cycle if the total air flow rate of any airside component of an *air-conditioning* system is greater than or equal to the flow rates in Table J6D3; and

(d) which contains more than one water heater, chiller or coil, must be capable of stopping the flow of water to those not operating; and

(e) with an airflow of more than 1000 L/s, must have a variable speed fan when its supply air quantity is capable of being varied; and

(f) when serving a *sole-occupancy unit* in a Class 3 building, must not operate when any external door of the *sole-occupancy unit* that opens to a balcony or the like, is open for more than one minute; and

(g) must have the ability to use direct signals from the control components responsible for the delivery of comfort conditions in the building to regulate the operation of central plant; and

(h) must have a control dead band of not less than 2°C, except where a smaller range is *required* for specialised applications; and

(i) must be provided with balancing dampers and balancing valves, as *required* to meet the needs of the system at its maximum operating condition, that ensure the maximum design air or fluid flow is achieved but not exceeded by more than 15% above design at each—

(i) component; or

(ii) group of components operating under a common control in a system containing multiple components; and

(j) must ensure that each independently operating space of more than 1 000 m^2 and every separate floor of the building has provision to terminate airflow independently of the remainder of the system sufficient to allow for different operating times; and

(k) must have automatic variable temperature operation of heated water and chilled water circuits; and

(l) when deactivated, must close any motorised outdoor air or return air damper that is not otherwise being actively controlled.

(2) When two or more *air-conditioning* systems serve the same space they must use control sequences that prevent the systems from operating in opposing heating and cooling modes.

(3) Time switches — the following applies:

(a) A time switch must be provided to control—

(i) an *air-conditioning* system of more than 2 kWr; and

(ii) a heater of more than 1 $kW_{heating}$ used for *air-conditioning*.

(b) The time switch must be capable of switching electric power on and off at variable pre-programmed times and on variable pre-programmed days.

(c) The requirements of (a) and (b) do not apply to—

(i) an *air-conditioning* system that serves—

(A) only one *sole-occupancy unit* in a Class 2, 3 or 9c building; or

(B) a Class 4 part of a building; or

(ii) a *conditioned space* where *air-conditioning* is needed for 24 hour continuous use.

Table J6D3: Requirement for an outdoor air economy cycle

Climate zone	Total air flow rate *requiring* an economy cycle (L/s)
2	9000
3	7500

Climate zone	Total air flow rate *requiring* an economy cycle (L/s)
4	3500
5	3000
6	2000
7	2500
8	4000

J6D4 Mechanical ventilation system control

[2019: J5.3]

(1) General — A mechanical ventilation system, including one that is part of an *air-conditioning* system, except where the mechanical system serves only one *sole-occupancy unit* in a Class 2 building or serves only a Class 4 part of a building, must—

(a) be capable of being deactivated when the building or part of the building served by that system is not occupied; and

(b) when serving a *conditioned space*, except in periods when evaporative cooling is being used—

(i) where specified in Table J6D4, have—

(A) an energy reclaiming system that preconditions *outdoor air* at a minimum sensible heat transfer effectiveness of 60%; or

(B) demand control ventilation in accordance with AS 1668.2 if appropriate to the application; and

(ii) not exceed the minimum *outdoor air* quantity *required* by Part F6 by more than 20%, except where—

(A) additional unconditioned *outdoor air* is supplied for free cooling; or

(B) additional mechanical ventilation is needed to balance the *required* exhaust or process exhaust; or

(C) an energy reclaiming system preconditions all the *outdoor air*; and

(c) for an airflow of more than 1000 L/s, have a variable speed fan unless the downstream airflow is *required* by Part F6 to be constant.

(2) Exhaust systems — An exhaust system with an air flow rate of more than 1000 L/s must be capable of stopping the motor when the system is not needed, except for an exhaust system in a *sole-occupancy unit* in a Class 2, 3 or 9c building.

(3) *Carpark* exhaust systems — *Carpark* exhaust systems must have a control system in accordance with—

(a) clause 4.11.2 of AS 1668.2; or

(b) clause 4.11.3 of AS 1668.2.

(4) Time switches — The following applies:

(a) A time switch must be provided to a mechanical ventilation system with an air flow rate of more than 1000 L/s.

(b) The time switch must be capable of switching electric power on and off at variable pre-programmed times and on variable pre-programmed days.

(c) The requirements of (a) and (b) do not apply to—

(i) a mechanical ventilation system that serves—

(A) only one *sole-occupancy unit* in a Class 2, 3 or 9c building; or

(B) a Class 4 part of a building; or

(ii) a building where mechanical ventilation is needed for 24 hour occupancy.

Table J6D4: Required outdoor air treatment

Climate zone	*Outdoor air* flow (L/s)	*Required* measure
1	>500	Modulating control
2	Not applicable	No *required* measure

Climate zone	*Outdoor air* flow (L/s)	*Required* measure
3	>1000	Modulating control
4 and 6	>500	Modulating control or energy reclaiming system
5	<1000	Modulating control or energy reclaiming system
7 and 8	>250	Modulating control or energy reclaiming system

J6D5 Fans and duct systems

[2019: J5.4]

(1) Fans, ductwork and duct components that form part of an *air-conditioning* system or mechanical ventilation system must—

(a) separately comply with (2), (3), (4) and (5); or

(b) achieve a fan motor input power per unit of flowrate lower than the fan motor input power per unit of flowrate achieved when applying (2), (3), (4) and (5) together.

(2) Fans:

(a) Fans in systems that have a static pressure of not more than 200 Pa must have an efficiency at the full load operating point not less than the efficiency calculated with the following formula:

$$\eta_{min} = 0.13 \times \ln(p) - 0.3$$

(a) In the formula at (a)—

(i) η_{min}

= the minimum *required* system static efficiency for installation type A or C or the minimum *required* system total efficiency installation type B or D; and

(ii) p

= the static pressure of the system (Pa); and

(iii) ln

= natural logarithm.

(b) Fans in systems that have a static pressure above 200 Pa must have an efficiency at the full load operating point not less than the efficiency calculated with the following formula:

$$\eta_{min} = 0.85 \times (a \times \ln(P) - b + N)/100$$

(c) In the formula at (c)—

(i) η_{min}

= the minimum *required* system static efficiency for installation type A or C or the minimum *required* system total efficiency installation type B or D; and

(ii) P

= the motor input power of the fan; and

(iii) N

= the minimum performance grade obtained from Table J6D5a; and

(iv) a

= regression coefficient a, obtained from Table J6D5b; and

(v) b

= regression coefficient b, obtained from Table J6D5c; and

(vi) ln

= natural logarithm.

(d) The requirements of (a), (b), (c) and (d) do not apply to fans that need to be explosion proof.

(3) Ductwork:

(a) The pressure drop in the index run across all straight sections of rigid ductwork and all sections of flexible ductwork must not exceed 1 Pa/m when averaged over the entire length of straight rigid duct and flexible duct. The pressure drop of flexible ductwork sections may be calculated as if the flexible ductwork is laid straight.

(b) Flexible ductwork must not account for more than 6 m in length in any duct run.

(c) The upstream connection to ductwork bends, elbows and tees in the index run must have an equivalent diameter to the connected duct.

(d) Turning vanes must be included in all rigid ductwork elbows of 90° or more acute than 90° in the index run except where—

(i) the inclusion of turning vanes presents a fouling risk; or

(ii) a long radius bend in accordance with AS 4254.2 is used.

(4) Ductwork components in the index run:

(a) The pressure drop across a coil must not exceed the value specified in Table J6D5d.

(b) A high efficiency particulate arrestance (HEPA) air filter must not exceed the higher of—

(i) a pressure drop of 200 Pa when clean; or

(ii) the filter design pressure drop when clean at an air velocity of 1.5 m/s.

(c) Any other air filter must not exceed—

(i) the pressure drop specified in Table J6D5e when clean; or

(ii) the filter design pressure drop when clean at an air velocity of 2.5 m/s.

(d) The pressure drop across intake louvres must not exceed the higher of—

(i) for single stage louvres, 30 Pa; and

(ii) for two stage louvres, 60 Pa; and

(iii) for acoustic louvres, 50 Pa; and

(iv) for other non-weatherproof louvres, 30 Pa.

(e) The pressure drop across a variable air volume box, with the damper in the fully open position, must not exceed—

(i) for units with electric reheat, 100 Pa; and

(ii) for other units, 25 Pa not including coil pressure losses.

(f) Rooftop cowls must not exceed a pressure drop of 30 Pa.

(g) Attenuators must not exceed a pressure drop of 40 Pa.

(h) Fire dampers must not exceed a pressure drop of 15 Pa when open.

(i) Balancing and control dampers in the index run must not exceed a pressure drop of 25 Pa when in the fully open position.

(j) Supply air diffusers and grilles must not exceed a pressure drop of 40 Pa.

(k) Exhaust grilles must not exceed a pressure drop of 30 Pa.

(l) Transfer ducts must not exceed a pressure drop of 12 Pa.

(m) Door grilles must not exceed a pressure drop of 12 Pa.

(n) Active chilled beams must not exceed a pressure drop of 150 Pa.

(5) The requirements of (1), (2), (3) and (4) do not apply to—

(a) fans in unducted *air-conditioning* systems with a supply air capacity of less than 1000 L/s; and

(b) smoke spill fans, except where also used for *air-conditioning* or ventilation; and

(c) the power for process-related components; and

(d) kitchen exhaust systems.

Table J6D5a: Minimum fan performance grade

Fan type	Installation type A or C	Installation type B or D
Axial — as a component of an air handling unit or fan coil unit	46.0	51.5
Axial — other	42.0	61.0
Mixed flow — as a component of an air handling unit or fan coil unit	46.0	51.5
Mixed flow — other	52.5	65.0
Centrifugal forward — curved	46.0	51.5
Centrifugal radial bladed	46.0	51.5
Centrifugal backward-curved	64.0	64.0

Table Notes

(1) Installation type A means an arrangement where the fan is installed with free inlet and outlet conditions.

(2) Installation type B means an arrangement where the fan is installed with a free inlet and a duct at its outlet.

(3) Installation type C means an arrangement where the fan is installed with a duct fitted to its inlet and with free outlet conditions.

(4) Installation type D means an arrangement where the fan is installed with a duct fitted to its inlet and outlet.

Table J6D5b: Fan regression coefficient a

Fan type	Fan motor input power < 10 kW	Fan motor input ≥ 10 kW
Axial	2.74	0.78
Mixed flow	4.56	1.1
Centrifugal forward-curved	2.74	0.78
Centrifugal radial bladed	2.74	0.78
Centrifugal backward-curved	4.56	1.1

Table J6D5c: Fan regression coefficient b

Fan type	Fan motor input power < 10 kW	Fan motor input ≥ 10 kW
Axial	6.33	1.88
Mixed flow	10.5	2.6
Centrifugal forward-curved	6.33	1.88
Centrifugal radial bladed	6.33	1.88
Centrifugal backward-curved	10.5	2.6

Table J6D5d: Maximum coil pressure drop

Number of rows	Maximum pressure drop (Pa)
1	30
2	50
4	90
6	130
8	175
10	220

Table J6D5e: Maximum clean filter pressure drop

Filter minimum efficiency reporting value	Maximum pressure drop (Pa)
9	55
11	65
13	95
14	110

J6D6 Ductwork insulation

[2019: J5.5]

(1) Ductwork and fittings in an *air-conditioning* system must be provided with insulation—
  (a) complying with AS/NZS 4859.1; and
  (b) having an insulation *R-Value* greater than or equal to—
    (i) for flexible ductwork, 1.0; or
    (ii) for cushion boxes, that of the connecting ductwork; or
    (iii) that specified in Table J6D6.

(2) Insulation must—
  (a) be protected against the effects of weather and sunlight; and
  (b) be installed so that it—
    (i) abuts adjoining insulation to form a continuous barrier; and
    (ii) maintains its position and thickness, other than at flanges and supports; and
  (c) when conveying cooled air—
    (i) be protected by a vapour barrier on the outside of the insulation; and
    (ii) where the vapour barrier is a membrane, be installed so that adjoining sheets of the membrane—
      (A) overlap by at least 50 mm; and
      (B) are bonded or taped together.

(3) The requirements of (1) do not apply to—
  (a) ductwork and fittings located within the only or last room served by the system; or
  (b) fittings that form part of the interface with the *conditioned space*; or
  (c) return air ductwork in, or passing through, a *conditioned space*; or
  (d) ductwork for *outdoor air* and exhaust air associated with an *air-conditioning* system; or
  (e) the floor of an in-situ air-handling unit; or
  (f) packaged air conditioners, split systems, and variable refrigerant flow *air-conditioning* equipment complying with MEPS; or
  (g) flexible fan connections.

(4) For the purposes of (1), (2) and (3), fittings—
  (a) include non-active components of a ductwork system such as cushion boxes; and
  (b) exclude active components such as air-handling unit components.

Table J6D6: Ductwork and fittings – Minimum insulation R-Value

Location of ductwork and fittings	*Climate zone* 1, 2, 3, 4, 5, 6 or 7	*Climate zone* 8
Within a conditioned space	1.2	2.0
Where exposed to direct sunlight	3.0	3.0

Location of ductwork and fittings	*Climate zone* 1, 2, 3, 4, 5, 6 or 7	*Climate zone* 8
All other locations	2.0	3.0

J6D7 Ductwork sealing

[2019: J5.6]

Ductwork in an *air-conditioning* system with a capacity of 3000 L/s or greater, not located within the only or last room served by the system, must be sealed against air loss in accordance with the duct sealing requirements of AS 4254.1 and AS 4254.2 for the static pressure in the system.

J6D8 Pump systems

[2019: J5.7]

(1) General — Pumps and pipework that form part of an *air-conditioning* system must either—

  (a) separately comply with (2), (3) and (4); or

  (b) achieve a pump motor power per unit of flowrate lower than the pump motor power per unit of flowrate achieved when applying (2), (3) and (4) together.

(2) Circulator pumps — A glandless impeller pump, with a rated hydraulic power output of less than 2.5 kW and that is used in closed loop systems must have an energy efficiency index (EEI) not more than 0.27 calculated in accordance with European Union Commission Regulation No. 622/2012.

(3) Other pumps — Pumps that are in accordance with Articles 1 and 2 of European Union Commission Regulation No. 547/2012 must have a minimum efficiency index (MEI) of 0.4 or more when calculated in accordance with European Union Commission Regulation No. 547/2012.

(4) Pipework — Straight segments of pipework along the index run, forming part of an *air-conditioning* system—

  (a) in pipework systems that do not have branches and have the same flow rate throughout the entire pipe network, must achieve an average pressure drop of not more than—

    (i) for constant speed systems, the values nominated in Table J6D8a; or

    (ii) for variable speed systems, the values nominated in Table J6D8b; or

  (b) in any other pipework system, must achieve an average pressure drop of not more than—

    (i) for constant speed systems, the values nominated in Table J6D8c; or

    (ii) for variable speed systems, the values nominated in Table J6D8d.

(5) The requirements of (4) do not apply—

  (a) to valves and fittings; or

  (b) where the smallest pipe size compliant with (4) results in a velocity of 0.7 m/s or less at design flow.

Table J6D8a: Maximum pipework pressure drop – Non-distributive constant speed systems

Nominal pipe diameter (mm)	Maximum pressure drop in systems operating 5000 hours/annum or less (Pa/m)	Maximum pressure drop in systems operating more than 5000 hours/annum (Pa/m)
Not more than 20	400	400
25	400	400
32	400	400
40	400	400
50	400	350
65	400	350
80	400	350
100	400	200

Nominal pipe diameter (mm)	Maximum pressure drop in systems operating 5000 hours/annum or less (Pa/m)	Maximum pressure drop in systems operating more than 5000 hours/annum (Pa/m)
125	400	200
150 or more	400	200

Table J6D8b: Maximum pipework pressure drop – Non-distributive variable speed systems

Nominal pipe diameter (mm)	Maximum pressure drop in systems operating 5000 hours/annum or less (Pa/m)	Maximum pressure drop in systems operating more than 5000 hours/annum (Pa/m)
Not more than 20	400	400
25	400	400
32	400	400
40	400	400
50	400	400
65	400	400
80	400	400
100	400	300
125	400	300
150 or more	400	300

Table J6D8c: Maximum pipework pressure drop – Distributive constant speed systems

Nominal pipe diameter (mm)	Maximum pressure drop in systems operating 2000 hours/annum or less (Pa/m)	Maximum pressure drop in systems operating between 2000 hours/annum and 5000 hrs/yr (Pa/m)	Maximum pressure drop in systems operating more than 5000 hours/annum (Pa/m)
Not more than 20	400	300	150
25	400	220	100
32	400	220	100
40	400	220	100
50	400	220	100
65	400	400	170
80	400	400	170
100	400	400	170
125	400	400	170
150 or more	400	400	170

Table J6D8d: Maximum pipework pressure drop – Distributive variable speed systems

Nominal pipe diameter (mm)	Maximum pressure drop in systems operating 5000 hours/annum or less (Pa/m)	Maximum pressure drop in systems operating more than 5000 hours/annum (Pa/m)
Not more than 20	400	250
25	400	180
32	400	180
40	400	180
50	400	180

Nominal pipe diameter (mm)	Maximum pressure drop in systems operating 5000 hours/annum or less (Pa/m)	Maximum pressure drop in systems operating more than 5000 hours/annum (Pa/m)
65	400	300
80	400	300
100	400	300
125	400	300
150 or more	400	300

J6D9 Pipework insulation

[2019: J5.8]

(1) *Piping*, vessels, heat exchangers and tanks containing heating or cooling fluid, where the fluid is held at a heated or cooled temperature, that are part of an *air-conditioning* system, other than in appliances covered by MEPS, must be provided with insulation—

(a) complying with AS/NZS 4859.1; and

(b) for *piping* of heating and cooling fluids, having an insulation *R-Value* in accordance with Table J6D9a; and

(c) for vessels, heat exchangers or tanks, having an insulation *R-Value* in accordance with Table J6D9b; and

(d) for refill or pressure relief *piping*, having an insulation *R-Value* equal to the *required* insulation *R-Value* of the connected pipe, vessel or tank within 500 mm of the connection.

(2) Insulation must—

(a) be protected against the effects of weather and sunlight; and

(b) be able to withstand the temperatures within the *piping*, vessel, heat exchanger or tank.

(3) Insulation provided to *piping*, vessels, heat exchangers or tanks containing cooling fluid must be protected by a vapour barrier on the outside of the insulation.

(4) The requirements of (1) and (2) do not apply to *piping*, vessels or heat exchangers—

(a) located within the only or last room served by the system and downstream of the control device for the regulation of heating or cooling service to that room; or

(b) encased within a concrete slab or panel which is part of a heating or cooling system; or

(c) supplied as an integral part of a chiller, *boiler* or unitary air-conditioner complying with the requirements of J6D10, J6D11 and J6D12; or

(d) inside an air-handling unit, fan-coil unit, or the like.

(5) For the purposes of (1), (2), (3) and (4)—

(a) heating fluids include refrigerant, heated water, steam and condensate; and

(b) cooling fluids include refrigerant, chilled water, brines and glycol mixtures, but do not include condenser cooling water.

Table J6D9a: Piping — Minimum insulation R-Value

Fluid temperature	Minimum insulation *R-Value* nominal pipe diameter ≤ 40 mm	Minimum insulation *R-Value* — nominal pipe diameter > 40 mm and ≤ 80 mm	Minimum insulation *R-Value* — nominal pipe diameter between > 80 mm and ≤ 150 mm	Minimum insulation *R-Value* — nominal pipe diameter > 150 mm
Low temperature chilled — ≤ 2°C	1.3	1.7	2.0	2.7
Chilled — > 2°C but ≤ 20°C	1.0	1.5	2.0	2.0
Heated — > 30°C but ≤ 85°C	1.7	1.7	1.7	1.7

Fluid temperature	Minimum insulation *R-Value* nominal pipe diameter ≤ 40 mm	Minimum insulation *R-Value* — nominal pipe diameter > 40 mm and ≤ 80 mm	Minimum insulation *R-Value* — nominal pipe diameter between > 80 mm and ≤ 150 mm	Minimum insulation *R-Value* — nominal pipe diameter > 150 mm
High Temperature heated — > 85°C	2.7	2.7	2.7	2.7

Table Notes

The minimum *required R-Value* may be halved for *piping* penetrating a structural member.

Table J6D9b: Vessels, heat exchangers and tanks — Minimum insulation R-Value

Fluid temperature range	Minimum insulation *R-Value*
Low temperature chilled — ≤ 2°C	2.7
Chilled — > 2°C but ≤ 20°C	1.8
Heated — > 30°C but ≤ 85°C	3.0
High temperature heated — > 85°C	3.0

J6D10 Space heating

[2019: J5.9]

(1) A heater used for *air-conditioning* or as part of an *air-conditioning* system must be—

- (a) a solar heater; or
- (b) a gas heater; or
- (c) a heat pump heater; or
- (d) a heater using reclaimed heat from another process such as reject heat from a refrigeration plant; or
- (e) an electric heater if—
  - (i) the heating capacity is not more than—
    - (A) 10 W/m^2 of the *floor area* of the *conditioned space* in *climate zone* 1; or
    - (B) 40 W/m^2 of the *floor area* of the *conditioned space* in *climate zone* 2; or
    - (C) the value specified in Table J6D10 where reticulated gas is not available at the allotment boundary; or
  - (ii) the annual energy consumption for heating is not more than 15 kWh/m^2 of the *floor area* of the *conditioned space* in *climate zones* 1, 2, 3, 4 and 5; or
  - (iii) the in-duct heater complies with J6D3(1)(b)(iii); or
- (f) any combination of (a) to (e).

(2) An electric heater may be used for heating a bathroom in a Class 2, 3, 9a or 9c building if the heating capacity is not more than 1.2 kW and the heater has a timer.

(3) A fixed heating or cooling appliance that moderates the temperature of an outdoor space must be configured to automatically shut down when—

- (a) there are no occupants in the space served; or
- (b) a period of one hour has elapsed since the last activation of the heater; or
- (c) the space served has reached the design temperature.

(4) A gas water heater, that is used as part of an *air-conditioning* system, must—

- (a) if rated to consume 500 MJ/hour of gas or less, achieve a minimum gross thermal efficiency of 86%; or
- (b) if rated to consume more than 500 MJ/hour of gas, achieve a minimum gross thermal efficiency of 90%.

Table J6D10: Maximum electric heating capacity

Floor area of the *conditioned space*	W/m² of *floor area* in *climate zone* 3	W/m² of *floor area* in *climate zone* 4	W/m² of *floor area* in *climate zone* 5	W/m² of *floor area* in *climate zone* 6	W/m² of *floor area* in *climate zone* 7
≤ 500 m²	50	60	55	65	70
> 500 m²	40	50	45	55	60

J6D11 Refrigerant chillers

[2019: J5.10]

An *air-conditioning* system refrigerant chiller must comply with MEPS and the full load operation energy efficiency ratio and integrated part load energy efficiency ratio in Table J6D11a or Table J6D11b when determined in accordance with AHRI 551/591.

Table J6D11a: Minimum energy efficiency ratio for refrigerant chillers – Option 1

Chiller type	Full load operation ($W_r/W_{input\ power}$)	Integrated part load ($W_r/W_{input\ power}$)
Air-cooled chiller with a capacity ≤ 528 kWr	2.985	4.048
Air-cooled chiller with a capacity > 528 kWr	2.985	4.137
Water-cooled positive displacement chiller with a capacity ≤ 264 kWr	4.694	5.867
Water-cooled positive displacement chiller with a capacity > 264 kWr but ≤ 528 kWr	4.889	6.286
Water-cooled positive displacement chiller with a capacity > 528 kWr but ≤ 1055 kWr	5.334	6.519
Water-cooled positive displacement chiller with a capacity > 1055 kWr but ≤ 2110 kWr	5.800	6.770
Water-cooled positive displacement chiller with a capacity > 2110 kWr	6.286	7.041
Water-cooled centrifugal chiller with a capacity ≤ 528 kWr	5.771	6.401
Water-cooled centrifugal chiller with a capacity > 528 kWr but ≤ 1055 kWr	5.771	6.519
Water-cooled centrifugal chiller with a capacity > 1055 kWr but ≤ 1407 kWr	6.286	6.770
Water-cooled centrifugal chiller with a capacity > 1407 kWr	6.286	7.041

Table J6D11b: Minimum energy efficiency ratio for refrigerant chillers – Option 2

Chiller type	Full load operation ($W_r/W_{input\ power}$)	Integrated part load ($W_r/W_{input\ power}$)
Air-cooled chiller with a capacity ≤ 528 kWr	2.866	4.669
Air-cooled chiller with a capacity > 528 kWr	2.866	4.758
Water-cooled positive displacement chiller with a capacity ≤ 264 kWr	4.513	7.041

Chiller type	Full load operation ($W_r/W_{input\ power}$)	Integrated part load ($W_r/W_{input\ power}$)
Water-cooled positive displacement chiller with a capacity > 264 kWr but ≤ 528 kWr	4.694	7.184
Water-cooled positive displacement chiller with a capacity > 528 kWr but ≤ 1055 kWr	5.177	8.001
Water-cooled positive displacement chiller with a capacity > 1055 kWr but ≤ 2110 kWr	5.633	8.586
Water-cooled positive displacement chiller with a capacity > 2110 kWr	6.018	9.264
Water-cooled centrifugal chiller with a capacity ≤ 528 kWr	5.065	8.001
Water-cooled centrifugal chiller with a capacity > 528 kWr but ≤ 1055 kWr	5.544	8.001
Water-cooled centrifugal chiller with a capacity > 1055 kWr but ≤ 1407 kWr	5.917	9.027
Water-cooled centrifugal chiller with a capacity > 1407 kWr	6.018	9.264

J6D12 Unitary air-conditioning equipment

[2019: J5.11]

Unitary *air-conditioning* equipment including packaged air-conditioners, split systems, and variable refrigerant flow systems must comply with MEPS and for a capacity greater than or equal to 65 kWr—

(a) where water cooled, have a minimum energy efficiency ratio of 4.0 $W_r/W_{input\ power}$ for cooling when tested in accordance with AS/NZS 3823.1.2 at test condition T1, where input power includes both compressor and fan input power; or

(b) where air cooled, have a minimum energy efficiency ratio of 2.9 $W_r/W_{input\ power}$ for cooling when tested in accordance with AS/NZS 3823.1.2 at test condition T1, where input power includes both compressor and fan input power.

J6D13 Heat rejection equipment

[2019: J5.12]

(1) The motor rated power of a fan in a cooling tower, closed circuit cooler or evaporative condenser must not exceed the allowances in Table J6D13.

(2) The fan in an air-cooled condenser must have a motor rated power of not more than 42 W for each kW of heat rejected from the refrigerant, when determined in accordance with AHRI 460 except for—

(a) a refrigerant chiller in an *air-conditioning* system that complies with the energy efficiency ratios in J6D11; or

(b) packaged air-conditioners, split systems, and variable refrigerant flow *air-conditioning* equipment that complies with the energy efficiency ratios in J6D12.

Table J6D13: Maximum fan motor power – Cooling towers, closed circuit coolers and evaporative condensers

Type	Cooling tower maximum fan motor input power (W/kW_{rej})	Closed circuit cooler maximum fan motor input power (W/kW_{rej})	Evaporative condenser maximum fan motor input power (W/kW_{rej})
Induced draft	10.4	16.9	11.0

Type	Cooling tower maximum fan motor input power (W/kW_{rej})	Closed circuit cooler maximum fan motor input power (W/kW_{rej})	Evaporative condenser maximum fan motor input power (W/kW_{rej})
Forced draft	19.5	Note	11.0

Table Notes

A closed circuit, forced draft cooling tower must not be used.

Part J7 Artificial lighting and power

Introduction to this Part

This Part contains Deemed-to-Satisfy Provisions for compliance with Part J1. It sets out provisions for the design and configuration of artificial lighting and power, boiling and chilled water units, lifts and escalators and moving walkways.

Notes: Tasmania Section J Energy Efficiency

In Tasmania, for a Class 2 building and Class 4 part of a building, Section J is replaced with Section J of BCA 2019 Amendment 1.

Deemed-to-Satisfy Provisions

J7D1 Deemed-to-Satisfy Provisions

[2019: J6.0]

(1) Where a *Deemed-to-Satisfy Solution* is proposed, *Performance Requirements* J1P1 to J1P4 are satisfied by complying with—

(a) J2D2; and

(a) J3D2 to J3D15; and

(b) J4D2 to J4D7; and

(c) J5D2 to J5D8; and

(d) J6D2 to J6D13; and

(e) J7D2 to J7D9; and

(f) J8D2 to J8D4; and

(g) J9D2 to J9D5.

(2) Where a *Performance Solution* is proposed, the relevant *Performance Requirements* must be determined in accordance with A2G2(3) and A2G4(3) as applicable.

J7D2 Application of Part

[2019: J6.1]

J7D3, J7D4 and J7D6(1)(b) do not apply to a Class 8 *electricity network substation*.

J7D3 Artificial lighting

[2019: J6.2]

(1) In a *sole-occupancy unit* of a Class 2 building or a Class 4 part of a building—

(a) the *lamp power density* or *illumination power density* of artificial lighting must not exceed the allowance of—

(i) 5 W/m^2 within a *sole-occupancy unit*; and

(ii) 4 W/m^2 on a verandah, balcony or the like attached to a *sole-occupancy unit*; and

(b) the *illumination power density* allowance in (a) may be increased by dividing it by the *illumination power density* adjustment factor for a control device in Table J7D3b as applicable; and

(c) when designing the *lamp power density* or *illumination power density*, the power of the proposed installation must be used rather than nominal allowances for exposed batten holders or luminaires; and

(d) halogen lamps must be separately switched from fluorescent lamps.

(2) In a building other than a *sole-occupancy unit* of a Class 2 building or a Class 4 part of a building—

(a) for artificial lighting, the aggregate design illumination power load must not exceed the sum of the allowances obtained by multiplying the area of each space by the maximum *illumination power density* in Table J7D3a; and

(b) the aggregate design illumination power load in (a) is the sum of the design illumination power loads in each of the spaces served; and

(c) where there are multiple lighting systems serving the same space, the design illumination power load for (b) is—

(i) the total illumination power load of all systems; or

(ii) where a control system permits only one system to operate at a time based on the highest illumination power load; or determined by the formula—

$$[H \times T/2 + P \times (100 - T/2]/100$$

(d) In the formula at (c)(ii)—

(i) H

= the highest illumination power load; and

(ii) T

= the time for which the maximum illumination power load will occur, expressed as a percentage; and

(iii) P

= the predominant illumination power load.

(3) The requirements of (1) and (2) do not apply to the following:

(a) Emergency lighting provided in accordance with Part E4.

(b) Signage, display lighting within cabinets and display cases that are fixed in place.

(c) Lighting for accommodation within the residential part of a *detention centre*.

(d) A heater where the heater also emits light, such as in bathrooms.

(e) Lighting of a specialist process nature such as in a surgical operating theatre, fume cupboard or clean workstation.

(f) Lighting of performances such as theatrical or sporting.

(g) Lighting for the permanent display and preservation of works of art or objects in a museum or gallery other than for retail sale, purchase or auction.

(h) Lighting installed solely to provide photosynthetically active radiation for indoor plant growth on green walls and the like.

(4) For the purposes of Table J7D3b, the following control devices must comply with Specification 40:

(a) Lighting timers.

(b) Motion detectors.

(c) Daylight sensors and dynamic lighting control devices.

Table J7D3a: Maximum illumination power density

Space	Maximum *illumination power density* (W/m^2)
Auditorium, church and public hall	8
Board room and conference room	5
Carpark - general	2

Space	Maximum *illumination power density* (W/m^2)
Carpark - entry zone (first 15 m of travel) during the daytime	11.5
Carpark - entry zone (next 4 m of travel) during the day	2.5
Carpark - entry zone (first 20 m of travel) during night time	2.5
Common rooms, spaces and corridors in a Class 2 building	4.5
Control room, switch room and the like - intermittent monitoring	3
Control room, switch room and the like - constant monitoring	4.5
Corridors	5
Courtroom	4.5
Dormitory of a Class 3 building used for sleeping only	3
Dormitory of a Class 3 building used for sleeping and study	4
Entry lobby from outside the building	9
Health-care - infants' and children's wards and emergency department	4
Health-care - examination room	4.5
Health-care - examination room in intensive care and high dependency ward	6
Health-care - all other *patient care areas* including wards and corridors	2.5
Kitchen and food preparation area	4
Laboratory - artificially lit to an ambient level of 400 lx or more	6
Library - stack and shelving area	2.5
Library - reading room and general areas	4.5
Lounge area for communal use in a Class 3 or 9c building	4.5
Museum and gallery - circulation, cleaning and service lighting	2.5
Office - artificially lit to an ambient level of 200 lx or more	4.5
Office - artificially lit to an ambient level of less than 200 lx	2.5
Plant room where an average of 160 lx vertical illuminance is required on a vertical panel such as in switch rooms	4
Plant rooms with a horizontal illuminance target of 80 lx	2
Restaurant, café, bar, hotel lounge and a space for the serving and consumption of food or drinks	14
Retail space including a museum and gallery whose purpose is the sale of objects	14
School - general purpose learning areas and tutorial rooms	4.5
Sole-occupancy unit of a Class 3 or 9c building	5
Storage	1.5
Service area, cleaner's room and the like	1.5
Toilet, locker room, staff room, rest room and the like	3

Space	Maximum *illumination power density* (W/m^2)
Wholesale storage area with a vertical illuminance target of 160 lx	4
Stairways, including *fire-isolated stairways*	2
Lift cars	3

Table Notes

(1) In areas not listed above, the maximum *illumination power density* is—

(i) for an illuminance not more than 80 lx, 2 W/m^2; and

(ii) for an illuminance more than 80 lx and not more than 160 lx, 2.5 W/m^2; and

(iii) for an illuminance more than 160 lx and not more than 240 lx, 3 W/m^2; and

(iv) for an illuminance more than 240 lx and not more than 320 lx, 4.5 W/m^2; and

(v) for an illuminance more than 320 lx and not more than 400 lx, 6 W/m^2; and

(vi) for an illuminance more than 400 lx and not more than 600 lx, 10 W/m^2; and

(vii) for an illuminance more than 600 lx and not more than 800 lx, 11.5 W/m^2.

(2) For enclosed spaces with a Room Aspect Ratio of less than 1.5, the maximum *illumination power density* may be increased by dividing it by an adjustment factor for room aspect which is 0.5 + (Room Aspect Ratio/3).

(3) The Room Aspect Ratio of the enclosed space is determined by the formula: A/(H x C), where—

(i) A is the area of the enclosed space; and

(ii) H is the height of the space measured from the floor to the highest part of the ceiling; and

(iii) C is the perimeter of the enclosed space at floor level.

(4) In addition to 2, the maximum *illumination power density* may be increased by dividing it by the *illumination power density* adjustment factor in Table J7D3b and Table J7D3c and where the control device is not installed to comply with J6D4.

(5) Circulation spaces are included in the allowances listed in the Table.

Table J7D3b: Illumination power density adjustment factor for a control device

Item Notes 1 and 2	Description	*illumination power density* adjustment factor
Motion detector	In a toilet or change room, other than a public toilet, in a Class 6 building	0.4
Motion detector	Where a group of light fittings serving less than 100 m^2 is controlled by one or more detectors	0.6
Motion detector	Where a group of light fittings serving 100 m^2 or more is controlled by one or more detectors	0.7
Programmable dimming system Note 3	Where not less than 75% of the area of a space is controlled by programmable dimmers	0.85
Fixed dimming Notes 3 and 4	All fittings with fixed dimming	Whichever is greater of (a) 0.5; or (b) 0.2+0.8L where L = the illuminance turndown for the fixed dimming.
Lumen depreciation dimming Note 3	All fittings with lumen depreciation dimming	0.85
Two stage sensor - equipped lights with minimum power of 30 % of peak power or less	Fire stairs and other spaces not used for regular transit	0.4

Item Notes 1 and 2	Description	*illumination power density* adjustment factor
Two stage sensor - equipped lights with minimum power of 30% of peak power or less	Transitory spaces in regular use or in a *carpark*	0.7
Daylight sensor and dynamic lighting control device - dimmed or stepped switching of lights adjacent *windows* Notes 3 and 5	In a Class 5, 6, 7, 8 or 9b building or a Class 9a building, other than a *ward area*, where the lights are adjacent *windows*, other than *roof lights*, for a distance from the *window* equal to the depth of the floor to *window* head height	0.5 Note 3
Daylight sensor and dynamic lighting control device - dimmed or stepped switching of lights adjacent *windows* Notes 3 and 5	Serving a Class 3 or 9c building, or a Class 9a *ward area*, where the lights are adjacent *windows*, other than *roof lights*, for a distance from the *window* equal to the depth of the floor to *window* head height	0.75 Note 3
Daylight sensor and dynamic lighting control device - dimmed or stepped switching of lights adjacent *windows* Notes 3 and 5	In a Class 5, 6, 7, 8 or 9b building or a Class 9a building, other than a *ward area*, where the lights are adjacent *roof lights*	0.6 Note 3
Daylight sensor and dynamic lighting control device - dimmed or stepped switching of lights adjacent *windows* Notes 3 and 5	In a Class 3 or 9c building, or a Class 9a *ward area*, where the lights are adjacent *roof lights*	0.8 Note 3

Table Notes

(1) A maximum of two *illumination power density* adjustment factors for a control device can be applied to an area.

(2) Where more than one *illumination power density* adjustment factor (other than for room aspect) applies to an area, they are to be combined using the following formula: A x (B + [(1 - B)/2]), where—

(i) A is the lowest applicable *illumination power density* adjustment factor; and

(ii) B is the second lowest applicable *illumination power density* adjustment factor.

(3) The adjustment factor does not apply to tungsten, halogen or other incandescent sources.

(4) Includes luminaires with a pre-programmed function which provides dimming from ON to OFF (one-stage dimming).

(5) The *illumination power density* adjustment factor is only applied to lights controlled by daylight sensors between 8:00 am and 7:00 pm.

Table J7D3c: Illumination power density adjustment factor for light colour

Light source	Description	*Illumination power density* adjustment factor
CRI ≥ 90	Where lighting with good colour rendering is used	0.9
CCT ≤ 3500 K Note	Where lighting with a warm appearance is used	0.8
CCT ≥ 4500 K	Where lighting with a cool appearance is used	1.1

Table Notes

Includes luminaires that can adjust their CCT to 3500 K or below.

J7D4 Interior artificial lighting and power control

[2019: J6.3]

(1) All artificial lighting of a room or space must be individually operated by–

(a) a switch; or

(b) other control device; or

(c) a combination of (a) and (b).

(2) An occupant activated device, such as a room security device, a motion detector in accordance with Specification 40, or the like, must be provided in the *sole-occupancy unit* of a Class 3 building, other than where providing accommodation for people with a disability or the aged, to cut power to the artificial lighting, air-conditioner, local exhaust fans and bathroom heater when the *sole-occupancy unit* is unoccupied.

(3) An artificial lighting switch or other control device in (1) must—

(a) if an artificial lighting switch, be located in a visible and easily accessed position—

(i) in the room or space being switched; or

(ii) in an adjacent room or space from where 90% of the lighting being switched is visible; and

(b) for other than a single functional space such as an auditorium, theatre, *swimming pool*, sporting stadium or warehouse—

(i) if in a Class 5 building or a Class 8 laboratory, not operate lighting for an area of more than 250 m^2; or

(ii) if in a Class 3, 6, 7, 8 (other than a laboratory) or 9 building, not operate lighting for an area of more than—

(A) 250 m^2 for a space of not more than 2000 m^2; or

(B) 1000 m^2 for a space of more than 2000 m^2.

(4) 95% of the light fittings in a building or *storey* of a building, other than a Class 2 or 3 building or a Class 4 part of a building, of more than 250 m^2 must be controlled by—

(a) a time switch in accordance with Specification 40; or

(b) an occupant sensing device such as—

(i) a security key card reader that registers a person entering and leaving the building; or

(ii) a motion detector in accordance with Specification 40.

(5) In a Class 5, 6 or 8 building of more than 250 m^2, artificial lighting in a natural lighting zone adjacent to *windows* must be separately controlled from artificial lighting not in a natural lighting zone in the same *storey* except where—

(a) the room containing the natural lighting zone is less than 20 m^2; or

(b) the room's natural lighting zone contains less than 4 luminaires; or

(c) 70% or more of the luminaires in the room are in the natural lighting zone.

(6) Artificial lighting in a *fire-isolated stairway*, *fire-isolated passageway* or *fire-isolated ramp*, must be controlled by a motion detector in accordance with Specification 40.

(7) Artificial lighting in a foyer, corridor and other circulation spaces—

(a) of more than 250 W within a single zone; and

(b) adjacent to *windows*,

must be controlled by a daylight sensor and dynamic lighting control device in accordance with Specification 40.

(8) Artificial lighting for daytime travel in the first 19 m of travel in a *carpark* entry zone must be controlled by a daylight sensor in accordance with Specification 40.

(9) The requirements of (1), (2), (3), (4), (5), (6), (7) and (8) do not apply to the following:

(a) Emergency lighting in accordance with Part E4.

(b) Where artificial lighting is needed for 24 hour occupancy such as for a manufacturing process, parts of a hospital, an airport control tower or within a *detention centre*.

(10) The requirements of (4) do not apply to the following:

(a) Artificial lighting in a space where the sudden loss of artificial lighting would cause an unsafe situation such as—

(i) in a *patient care area* in a Class 9a building or in a Class 9c building; or

(ii) a plant room or lift motor room; or

(iii) a workshop where power tools are used.

(b) A heater where the heater also emits light, such as in bathrooms.

J7D5 Interior decorative and display lighting

[2019: J6.4]

(1) Interior decorative and display lighting, such as for a foyer mural or art display, must be controlled—

(a) separately from other artificial lighting; and

(b) by a manual switch for each area other than when the operating times of the displays are the same in a number of areas such as in a museum, art gallery or the like, in which case they may be combined; and

(c) by a time switch in accordance with Specification 40 where the display lighting exceeds 1 kW.

(2) Window display lighting must be controlled separately from other display lighting.

J7D6 Exterior artificial lighting

[2019: J6.5]

(1) Exterior artificial lighting attached to or directed at the facade of a building, must—

(a) be controlled by—

(i) a daylight sensor; or

(ii) a time switch that is capable of switching on and off electric power to the system at variable pre-programmed times and on variable pre-programmed days; and

(b) when the total lighting load exceeds 100 W—

(i) use LED luminaires for 90% of the total lighting load; or

(ii) be controlled by a motion detector in accordance with Specification 40; or

(iii) when used for decorative purposes, such as façade lighting or signage lighting, have a separate time switch in accordance with Specification 40.

(2) The requirements of (1)(b) do not apply to the following:

(a) Emergency lighting in accordance with Part E4.

(b) Lighting around a *detention centre*.

J7D7 Boiling water and chilled water storage units

[2019: J6.6]

Power supply to a boiling water or chilled water storage unit must be controlled by a time switch in accordance with Specification 40.

J7D8 Lifts

[2019: J6.7]

Lifts must—

(a) be configured to ensure artificial lighting and ventilation in the car are turned off when it is unused for 15 minutes; and

(b) achieve the idle and standby energy performance level in Table J7D8a; and

(c) achieve—

(i) the energy efficiency class in Table J7D8b; or

(ii) if a dedicated goods lift, energy efficiency class D in accordance with ISO 25745-2.

Table J7D8a: Lift idle and standby energy performance level

Rated load	Idle and standby energy performance level in accordance with ISO 25745-2 Note
Less than or equal to 800 kg	2
801 kg to less than or equal to 2000 kg	3
2001 kg to less than or equal to 4000 kg	4
Greater than 4000 kg	5

Table Notes

Applies to the standby power used after 30 minutes.

Table J7D8b: Lift energy efficiency class

Usage category in accordance with ISO 25745-2	Energy efficiency class in accordance with ISO 25745-2
1-4	C
> 5	D

J7D9 Escalators and moving walkways

[2019: J6.8]

Escalators and moving walkways must have the ability to slow to between 0.2 m/s and 0.05 m/s when unused for more than 15 minutes.

Part J8 Heated water supply and swimming pool and spa pool plant

Introduction to this Part

This Part contains *Deemed-to-Satisfy Provisions* for compliance with Part J1. It sets out provisions for ensuring water heaters, *swimming pool* and spa heaters and pump systems use energy efficiently.

Notes: Tasmania Section J Energy Efficiency

In Tasmania, for a Class 2 building and Class 4 part of a building, Section J is replaced with Section J of BCA 2019 Amendment 1.

Deemed-to-Satisfy Provisions

J8D1 Deemed-to-Satisfy Provisions

[2019: J7.0]

(1) Where a *Deemed-to-Satisfy Solution* is proposed, *Performance Requirements* J1P1 to J1P4 are satisfied by complying with—

(a) J2D2; and

(a) J3D2 to J3D15; and

(b) J4D2 to J4D7; and

(c) J5D2 to J5D8; and

(d) J6D2 to J6D13; and

(e) J7D2 to J7D9; and

(f) J8D2 to J8D4; and

(g) J9D2 to J9D5.

(2) Where a *Performance Solution* is proposed, the relevant *Performance Requirements* must be determined in accordance with A2G2(3) and A2G4(3) as applicable.

J8D2 Heated water supply

[2019: J7.2]

A heated water supply system for food preparation and sanitary purposes must be designed and installed in accordance with Part B2 of NCC Volume Three — Plumbing Code of Australia.

J8D3 Swimming pool heating and pumping

[2019: J7.3]

(1) Heating for a *swimming pool* must be by—

(a) a solar heater; or

(b) a heater using reclaimed heat from another process such as reject heat from a refrigeration plant; or

(c) a geothermal heater; or

(d) a gas heater that—

(i) if rated to consume 500 MJ/hour or less, achieves a minimum gross thermal efficiency of 86%; or

(ii) if rated to consume more than 500 MJ/hour, achieves a minimum gross thermal efficiency of 90%; or

(e) a heat pump; or

(f) a combination of (a) to (e).

(2) Where some or all of the heating *required* by (1) is by a gas heater or a heat pump, the *swimming pool* must have—

(a) a cover with a minimum *R-Value* of 0.05; and

(b) a time switch to control the operation of the heater.

(3) A time switch must be provided to control the operation of a circulation pump for a *swimming pool*.

(4) Where *required*, a time switch must be capable of switching electric power on and off at variable pre-programmed times and on variable pre-programmed days.

(5) Pipework carrying heated or chilled water for a *swimming pool* must comply with the insulation requirements of J6D9.

(6) For the purpose of J8D3, a *swimming pool* does not include a spa pool.

J8D4 Spa pool heating and pumping

[2019: J7.4]

(1) Heating for a spa pool that shares a water recirculation system with a *swimming pool* must be by—

(a) a solar heater; or

(b) a heater using reclaimed heat from another process such as reject heat from a refrigeration plant; or

(c) a geothermal heater; or

(d) a gas heater that—

(i) if rated to consume 500 MJ/hour or less, achieves a minimum gross thermal efficiency of 86%; or

(ii) if rated to consume more than 500 MJ/hour, achieves a minimum gross thermal efficiency of 90%; or

(e) a heat pump; or

(f) a combination of (a) to (e).

(2) Where some or all of the heating *required* by (1) is by a gas heater or a heat pump, the spa pool must have—

(a) a cover with a minimum *R-Value* of 0.05; and

(b) a push button and a time switch to control the operation of the heater.

(3) A time switch must be provided to control the operation of a circulation pump for a spa pool having a capacity of 680 L or more.

(4) Where *required*, a time switch must be capable of switching electric power on and off at variable pre-programmed times and on variable pre-programmed days.

(5) Pipework carrying heated or chilled water for a spa pool must comply with the insulation requirements of J6D9.

Part J9 Energy monitoring and on-site distributed energy resources

Introduction to this Part

This Part contains *Deemed-to-Satisfy Provisions* for compliance with Part J1. It sets out provisions that enable the monitoring of energy use (other than for billing purposes) and facilitate easy retrofit of renewable energy and electric vehicle charging equipment.

Notes: Tasmania Section J Energy Efficiency

In Tasmania, for a Class 2 building and Class 4 part of a building, Section J is replaced with Section J of BCA 2019 Amendment 1.

Deemed-to-Satisfy Provisions

J9D1 Deemed-to-Satisfy Provisions

[2019: J8.0]

(1) Where a *Deemed-to-Satisfy Solution* is proposed, *Performance Requirements* J1P1 to J1P4 are satisfied by complying with—

(a) J2D2; and

(a) J3D2 to J3D15; and

(b) J4D2 to J4D7; and

(c) J5D2 to J5D8; and

(d) J6D2 to J6D13; and

(e) J7D2 to J7D9; and

(f) J8D2 to J8D4; and

(g) J9D2 to J9D5.

(2) Where a *Performance Solution* is proposed, the relevant *Performance Requirements* must be determined in accordance with A2G2(3) and A2G4(3) as applicable.

J9D2 Application of Part

[2019: J8.1]

The *Deemed-to-Satisfy Provisions* of this Part do not apply—

(a) within a *sole-occupancy unit* of a Class 2 building or a Class 4 part of a building; or

(b) to a Class 8 *electricity network substation*.

J9D3 Facilities for energy monitoring

[2019: J8.3]

(1) A building or *sole-occupancy unit* with a *floor area* of more than 500 m^2 must have energy meters configured to record the time-of-use consumption of gas and electricity.

(2) A building with a *floor area* of more than 2 500 m^2 must have energy meters configured to enable individual time-of-use energy data recording, in accordance with (3), of—

(a) *air-conditioning* plant including, where appropriate, heating plant, cooling plant and air handling fans; and

(b) artificial lighting; and

(c) appliance power; and

(d) central hot water supply; and

(e) internal transport devices including lifts, escalators and moving walkways where there is more than one serving the building; and

(f) on-site *renewable energy* equipment; and

(g) on-site electric vehicle charging equipment; and

(h) on-site *battery systems*; and

(i) other ancillary plant.

(3) Energy meters *required* by (2) must be interlinked by a communication system that collates the time-of-use energy data to a single interface monitoring system where it can be stored, analysed and reviewed.

(4) The provisions of (2) do not apply to energy meters serving—

(a) a Class 2 building where the total *floor area* of the common areas is less than 500 m^2; or

(b) individual *sole-occupancy units* with a *floor area* of less than 2 500 m^2.

J9D4 Facilities for electric vehicle charging equipment

[New for 2022]

(1) Subject to (2), a *carpark* associated with a Class 2, 3, 5, 6, 7b, 8 or 9 building must be provided with electrical distribution boards dedicated to electric vehicle charging—

(a) in accordance with Table J9D4 in each *storey* of the *carpark*; and

(b) labelled to indicate use for electric vehicle charging equipment.

(2) Electrical distribution boards dedicated to serving electric vehicle charging in a *carpark* must—

(a) be fitted with a charging control system with the ability to manage and schedule charging of electric vehicles in response to total building demand; and

(b) when associated with a Class 2 building, have capacity for each circuit to support an electric vehicle charger able to deliver a minimum of 12 kWh from 11:00 pm to 7:00 am daily; and

(c) when associated with a Class 5 to 9 building, have capacity for each circuit to support an electric vehicle charger able to deliver a minimum of 12 kWh from 9:00 am to 5:00 pm daily; and

(d) when associated with a Class 3 building, have capacity for each circuit to support an electric vehicle charger able to deliver a minimum of 48 kWh from 11:00 pm to 7:00 am daily; and

(e) be sized to support the future installation of a 7 kW (32 A) type 2 electric vehicle charger in—

(i) 100% of the car parking spaces associated with a Class 2 building; or

(ii) 10% of car parking spaces associated with a Class 5 or 6 building; or

(iii) 20% of car parking spaces associated with a Class 3, 7b, 8 or 9 building; and

(f) contain space of at least 36 mm width of DIN rail per outgoing circuit for individual sub-circuit electricity metering to record electricity use of electric vehicle charging equipment; and

(g) be labelled to indicate the use of the space *required* by (f) is for the future installation of metering equipment.

Limitations

J9D4 does not apply to a stand-alone Class 7a building.

Table J9D4: Electric vehicle distribution board requirement for each storey of a carpark

Carpark spaces per *storey* for electric vehicles	Electrical distribution boards for electric vehicle charging per *storey*
0 - 9	0
10 - 24	1
25 - 48	2
49 - 72	3
73 - 96	4
97 - 120	5
121 - 144	6
145 - 168	7

Table Notes

Where there are more than 168 *carpark* spaces per *storey*, one additional distribution board must be provided for each additional 24 spaces or part thereof.

J9D5 Facilities for solar photovoltaic and battery systems

[New for 2022]

(1) The main electrical switchboard of a building must—

(a) contain at least two empty three-phase circuit breaker slots and four DIN rail spaces labelled to indicate the use of each space for—

(i) a solar photovoltaic system; and

(ii) a *battery system*; and

(b) be sized to accommodate the installation of solar photovoltaic panels producing their maximum electrical output on at least 20% of the building roof area.

(2) At least 20% of the roof area of a building must be left clear for the installation of solar photovoltaic panels, except for buildings—

(a) with installed solar photovoltaic panels on—

(i) at least 20% of the roof area; or

(ii) an equivalent generation capacity elsewhere on-site; or

(b) where 100% of the roof area is shaded for more than 70% of daylight hours; or

(c) with a roof area of not more than 55 m^2; or

(d) where more than 50% of the roof area is used as a terrace, *carpark*, roof garden, *roof light* or the like.

Limitations

(1) The requirements of J9D5(1)(a)(i) and (b) do not apply to a building with solar photovoltaic panels installed on at least 20% of the roof area.

(2) The requirements of J9D5(1)(a)(ii) and (b) do not apply to a building with *battery systems* installed.

Specification 33 Additional requirements

S33C1 Scope

[2019: Spec JVa: 1]

This Specification contains requirements that must be complied with in addition to the modelling requirements of J1V1, J1V2, J1V3 and J1V5.

S33C2 Additional requirements — general

[2019: Spec JVa: 2]

In addition to the modelling requirements for J1V1, J1V2, J1V3 and J1V5, a building must comply with—

(a) for general thermal construction, J4D3; and

(b) for floor edge insulation, J4D7(2) and J4D7(3); and

(c) for building sealing, J1V4 or J5; and

(d) for deactivation, control and insulation of *air-conditioning* and mechanical ventilation systems—

(i) J6D3(1)(a); and

(ii) J6D3(1)(b)(i); and

(iii) J6D3(1)(d); and

(iv) J6D3(1)(f); and

(v) J6D3(2); and

(vi) J6D3(3); and

(vii) J6D4(2); and

(viii) J6D4(4); and

(ix) J6D5; and

(x) J6D6; and

(xi) J6D9; and

(e) for testing package *air-conditioning* equipment not less than 65 kWr, AS/NZS 3823.1.2 at test condition T1; and

(f) for testing a refrigeration chiller, AHRI 551/591; and

(g) for interior artificial lighting and power control, J7D4; and

(h) for interior decorative and display lighting, J7D5; and

(i) for artificial lighting around the exterior of a building, J7D6; and

(j) for boiling water and chilled water storage units, J7D7; and

(k) for deactivation of *swimming pool* heating and pumping, J8D3(2)(b) and J8D3(3); and

(l) for deactivation of spa pool heating and pumping, J8D4(2)(b) and J8D4(3); and

(m) for facilities for energy monitoring, Part J9; and

(n) for deactivation of fixed outdoor space heating appliances, clause J6D10(3).

S33C3 Additional requirements — Green Star

[2019: Spec JVa: 4]

Where not included in the building energy simulation to satisfy J1V2(1), compliance must be achieved with—

(a) for heating, cooling and ventilation equipment outside the scope of the *Green Star* model, Part J6; and

(b) for artificial lighting outside the scope of the *Green Star* model, Part J7.

Specification 34 Modelling parameters for J1V3

S34C1 Scope

[2019: Spec JVb: 1]

This Specification contains the *required* modelling parameters for J1V3.

S34C2 Reference building

[2019: Spec JVb: 2]

The *annual greenhouse gas emissions* must be calculated for the *reference building* in accordance with the following:

(a) The *reference building* must—

(i) comply with *Deemed-to-Satisfy Provisions* in Parts J4 to J8; and

(ii) have the minimum amount of mechanical ventilation *required* by Part F6.

(b) The *external walls* must have a solar absorptance of 0.6.

(c) The *air-conditioning* must—

(i) for 98% of the annual *hours of operation*, achieve temperatures between—

(A) 18°CDB to 25°CDB for *conditioned spaces* with transitory occupancy; and

(B) subject to (ii), 21°CDB to 24°CDB in all other *conditioned spaces*; and

(ii) if the proposed building has no mechanically provided cooling or has mixed mode cooling, have the same method of control and control set points for non-mechanical cooling as the proposed building.

(d) The infiltration rate in each zone must be—

(i) 0.7 air changes per hour throughout all zones when there is no mechanically supplied *outdoor air*; and

(ii) 0.35 air changes per hour throughout all zones at all other times.

(e) The artificial lighting must achieve the *required* maximum *illumination power density* in Part J7 without applying the control device adjustment factors.

(f) *Minimum Energy Performance Standards* must be applied to *services* not covered by Parts J6 to J8.

S34C3 Proposed building and reference building

[2019: Spec JVb: 3]

(1) The *annual greenhouse gas emissions* must be calculated for the proposed building and the *reference building* using the same—

(a) *annual greenhouse gas emissions* calculation method; and

(b) greenhouse gas emissions factors in accordance with (2); and

(c) location in accordance with (3); and

(d) adjacent structures and features; and

(e) orientation; and

(f) building form in accordance with (4); and

(g) testing standards including for insulation, *glazing*, water heater and unitary *air-conditioning* equipment; and

(h) *fabric* and *glazing* in accordance with (5); and

(i) *services* in accordance with (6) and S34C4.

(2) For the purposes of (1)(b), greenhouse gas emissions factors must be based on either—

(a) the factors in Table S34C3; or

(b) the current full fuel cycle emissions factors published by the Australian Government, except, where the greenhouse gas intensity of electricity is less than half the greenhouse gas intensity of natural gas—

(i) electricity is to be weighted as 1; and

(ii) natural gas is to be weighted as 2.

(3) For the purposes of (1)(c), location must be either—

(a) location where the building is to be constructed if appropriate climatic data is available; or

(b) the nearest location with similar climatic conditions, for which climatic data is available.

(4) For the purposes of (1)(f), building form must include—

(a) the roof geometry; and

(b) the floor plan; and

(c) the number of *storeys*; and

(d) the location, extent and configuration of ground floors and basements; and

(e) the size and location of *glazing*; and

(f) external doors.

(5) For the purposes of (1)(h), fabric and *glazing* must include—

(a) quality of insulation installation; and

(b) thermal resistance of air films including any adjustment factors, moisture content of materials and the like; and

(c) dimensions of external, internal and separating walls; and

(d) internal shading devices, their colour and their criteria for operation.

(6) For the purposes of (1)(i), *services* must include—

(a) range and type of *services* and energy sources, other than *renewable energy* generated on *site*; and

(b) assumptions and means of calculating the temperature difference across *air-conditioning* zone boundaries; and

(c) floor coverings and furniture and fittings density; and

(d) internal artificial lighting illumination levels; and

(e) internal heat gains including people, lighting, appliances, meals and other electric power loads; and

(f) *air-conditioning*, including chiller, fan and *boiler* equipment, system configuration and zones; and

(g) profiles for occupancy, *air-conditioning*, lighting and internal heat gains from people, hot meals, appliances, equipment and heated water supply systems based on—

(i) Specification 35; or

(ii) *NABERS Energy* simulation requirements; or

(iii) *Green Star* simulation requirements; or

(iv) the actual building if—

(A) the operating hours per year are not less than 2 500; or

(B) the daily operating profiles are not listed in Specification 35; and

(h) supply heated water temperature and rate of use; and

(i) infiltration values, subject to (7); and

(j) sequencing for water heaters, refrigeration chillers and heat rejection equipment such as cooling towers; and

(k) representation of clothing and metabolic rate of the occupants; and

(l) control of *air-conditioning* except—

(i) the *reference building* must have variable temperature control for chilled and heated water that modulates the chilled water and heated water temperatures as required to maximise the efficiency of the chiller or boiler operation during periods of low load; and

(ii) if the controls for the proposed building are not adequately specified or cannot be simulated, the sample control specifications in Appendix B of AIRAH-DA28 must be used; and

(m) environmental conditions such as ground reflectivity, sky and ground form factors, temperature of external

bounding surfaces, air velocities across external surfaces and the like; and

(n) number, sizes, floors and traffic served by lifts and escalators.

(7) For the purposes of (6)(i), the intended building leakage at 50 Pa may be converted into a whole building infiltration value for the proposed building infiltration using Tables 4.16 to 4.24 of CIBSE Guide A if all of the following have been specified:

(a) Additional sealing provisions to those *required* by Part J5.

(b) An intended building leakage of less than 10 $m^3/hr.m^2$ at 50 Pa.

(c) Pressure testing to verify achievement of the intended building leakage.

Table S34C3: Greenhouse gas emissions factors ($kgCO_2$-e/GJ)

Energy Source	ACT	NSW	NT	QLD	SA	TAS	VIC	WA
Electricity	-	236	162	254	101	44	279	191
Gas	-	51.53	51.53	51.53	51.53	51.53	51.53	51.53

Table Notes

(1) National emissions factors are not applicable to calculations for buildings in the ACT as they do not take into account investments in renewable electricity generation in the national electricity market made by the ACT.

(2) Values for the ACT can be found in the ACT Appendix.

S34C4 Services — proposed and reference building

[2019: Spec JVb: 4]

For the modelling of *services* for the purposes of calculating *annual greenhouse gas emissions*—

(a) system demand and response for all items of plant must be calculated on a not less frequent than hourly basis; and

(b) energy usage of all items of plant must be calculated with allowances for—

(i) part load performance; and

(ii) staging to meet system demand; and

(c) energy usage of cooling plant must be calculated with allowances for—

(i) the impact of chilled water temperature on chiller efficiency; and

(ii) the impact of condenser water temperature on water-cooled plant efficiency; and

(iii) the impact of ambient temperature on air-cooled plant efficiency; and

(iv) the energy use of primary pumps serving individual chillers; and

(v) the energy use of auxiliary equipment, including controls and oil heating for chillers; and

(vi) thermal losses in the chilled water system; and

(vii) the impact of chilled water temperature on thermal losses in the chilled water system; and

(d) energy usage of water heating systems for space heating must be calculated with allowances for—

(i) the impact of water temperature on water heater efficiency; and

(ii) the energy use of primary or feedwater pumps serving individual water heaters; and

(iii) thermal losses in water heating systems; and

(iv) the thermal mass of water heating systems, accounting for thermal losses during periods when the system is not operating; and

(e) energy usage of fan and pump systems must be calculated with allowances for—

(i) the method of capacity regulation; and

(ii) the use of either fixed or variable pressure control; and

(f) energy usage of pump systems must be calculated with allowances for the system fixed static pressure head; and

(g) energy usage of auxiliary equipment associated with co-generation and tri-generation systems, including pumps, cooling towers and jacket heaters, must be calculated; and

(h) where the energy usage of the heated water supply for food preparation and sanitary purposes or the energy usage of lifts and escalators is the same in the proposed building and the *reference building*, they may be omitted from the calculation of both the proposed building and the *reference building*; and

(i) energy use of a lift in a building with more than one classification may be apportioned according to the number of *storeys* of the part for which the *annual greenhouse gas emissions* and *thermal comfort level* are being calculated.

Specification 35 Modelling profiles for J1V3

S35C1 Scope

[2019: Spec JVc: 1]

This Specification contains modelling profiles as referenced in S34C3(6)(f).

S35C2 Modelling profiles

[2019: Spec JVc: 2]

(1) The *air-conditioning*, must be modelled on the basis of—

(a) the daily occupancy and operation profiles in Tables S35C2a to S35C2k; and

(b) the internal heat gains in a building—

(i) from occupants and hot meals, in accordance with one of the options in Table S35C2n; and

(ii) from appliances and equipment, in accordance with Table S35C2l; and

(iii) from artificial lighting, determined in accordance with (2).

(2) The artificial lighting, must be modelled on the basis of the proposed level of artificial lighting in the building with the daily profile in Tables S35C2a to S35C2k.

(3) The heated water supply, must be modelled on the basis of the consumption rates of Table S35C2m.

Table S35C2a: Occupancy and operation profiles of a Class 2 common area

Time period (local standard time)	Occupancy (Daily)	Artificial lighting (Daily)	Appliances and equipment (Daily)	*Air-conditioning* (Daily)
12:00am to 1:00am	0%	30%	0%	On
1:00am to 2:00am	0%	30%	0%	On
2:00am to 3:00am	0%	30%	0%	On
3:00am to 4:00am	0%	30%	0%	On
4:00am to 5:00am	0%	30%	0%	On
5:00am to 6:00am	0%	30%	0%	On
6:00am to 7:00am	0%	50%	0%	On
7:00am to 8:00am	0%	50%	0%	On
8:00am to 9:00am	0%	50%	0%	On
9:00am to 10:00am	0%	50%	0%	On
10:00am to 11:00am	0%	50%	0%	On
11:00am to 12:00pm	0%	50%	0%	On
12:00pm to 1:00pm	0%	50%	0%	On
1:00pm to 2:00pm	0%	50%	0%	On
2:00pm to 3:00pm	0%	50%	0%	On
3:00pm to 4:00pm	0%	50%	0%	On
4:00pm to 5:00pm	0%	50%	0%	On
5:00pm to 6:00pm	0%	50%	0%	On
6:00pm to 7:00pm	0%	50%	0%	On
7:00pm to 8:00pm	0%	50%	0%	On
8:00pm to 9:00pm	0%	50%	0%	On

Time period (local standard time)	Occupancy (Daily)	Artificial lighting (Daily)	Appliances and equipment (Daily)	*Air-conditioning* (Daily)
9:00pm to 10:00pm	0%	50%	0%	On
10:00pm to 11:00pm	0%	50%	0%	On
11:00pm to 12:00am	0%	30%	0%	On

Table Notes

The artificial lighting profile is expressed as a percentage of the maximum *illumination power density* permitted under Part J7.

Table S35C2b: Occupancy and operation profiles of a Class 3 hotel

Time period (local standard time)	Occupancy (Daily)	Artificial lighting (Daily)	Appliances and equipment (Daily)	*Air-conditioning* (Daily)
12:00am to 1:00am	90%	5%	20%	On
1:00am to 2:00am	90%	5%	20%	On
2:00am to 3:00am	90%	5%	15%	On
3:00am to 4:00am	90%	5%	15%	On
4:00am to 5:00am	90%	5%	15%	On
5:00am to 6:00am	80%	25%	15%	On
6:00am to 7:00am	70%	80%	40%	On
7:00am to 8:00am	60%	80%	80%	On
8:00am to 9:00am	60%	50%	50%	On
9:00am to 10:00am	30%	20%	30%	On
10:00am to 11:00am	10%	20%	20%	Off
11:00am to 12:00pm	10%	20%	20%	Off
12:00pm to 1:00pm	10%	20%	20%	Off
1:00pm to 2:00pm	10%	20%	20%	Off
2:00pm to 3:00pm	10%	20%	20%	Off
3:00pm to 4:00pm	10%	20%	20%	Off
4:00pm to 5:00pm	20%	20%	20%	On
5:00pm to 6:00pm	30%	50%	40%	On
6:00pm to 7:00pm	40%	50%	40%	On
7:00pm to 8:00pm	50%	50%	50%	On
8:00pm to 9:00pm	60%	50%	60%	On
9:00pm to 10:00pm	70%	50%	60%	On
10:00pm to 11:00pm	70%	50%	40%	On
11:00pm to 12:00am	90%	50%	20%	On

Table Notes

(1) The occupancy profile is expressed as a percentage of the maximum number of people that can be accommodated in the Class 3 building.

(2) The artificial lighting profile is expressed as a percentage of the maximum *illumination power density* permitted under Part J7.

(3) The *air-conditioning* profile is expressed as the plant status.

Table S35C2c: Weekday occupancy and operation profiles of a Class 5 building, a Class 7 warehouse, a Class 8 Laboratory or a Class 9a clinic, day surgery or procedure unit

Time period (local standard time)	Occupancy (Monday to Friday)	Artificial lighting (Monday to Friday)	Appliances and equipment (Monday to Friday)	*Air-conditioning* (Monday to Friday)
12:00am to 1:00am	0%	15%	25%	Off
1:00am to 2:00am	0%	15%	25%	Off
2:00am to 3:00am	0%	15%	25%	Off
3:00am to 4:00am	0%	15%	25%	Off
4:00am to 5:00am	0%	15%	25%	Off
5:00am to 6:00am	0%	15%	25%	Off
6:00am to 7:00am	0%	15%	25%	Off
7:00am to 8:00am	10%	40%	65%	On
8:00am to 9:00am	20%	90%	80%	On
9:00am to 10:00am	70%	100%	100%	On
10:00am to 11:00am	70%	100%	100%	On
11:00am to 12:00pm	70%	100%	100%	On
12:00pm to 1:00pm	70%	100%	100%	On
1:00pm to 2:00pm	70%	100%	100%	On
2:00pm to 3:00pm	70%	100%	100%	On
3:00pm to 4:00pm	70%	100%	100%	On
4:00pm to 5:00pm	70%	100%	100%	On
5:00pm to 6:00pm	35%	80%	80%	On
6:00pm to 7:00pm	10%	60%	65%	Off
7:00pm to 8:00pm	5%	60%	55%	Off
8:00pm to 9:00pm	5%	50%	25%	Off
9:00pm to 10:00pm	0%	15%	25%	Off
10:00pm to 11:00pm	0%	15%	25%	Off
11:00pm to 12:00am	0%	15%	25%	Off

Table Notes

(1) The occupancy profile is expressed as a percentage of the maximum number of people that can be accommodated in the building.

(2) The artificial lighting profile is expressed as a percentage of the maximum *illumination power density* permitted under Part J7.

(3) The appliances and equipment profile is expressed as a percentage of the maximum internal heat gain in Table S35C2I.

(4) The *air-conditioning* profile is expressed as the plant status.

Table S35C2d: Weekend occupancy and operation profiles of a Class 5 building, a Class 7 warehouse, a Class 8 Laboratory or a Class 9a clinic, day surgery or procedure unit

Time period (local standard time)	Occupancy (Saturday, Sunday and holidays)	Artificial lighting (Saturday, Sunday and holidays)	Appliances and equipment (Saturday, Sunday and holidays)	*Air-conditioning* (Saturday, Sunday and holidays)
12:00am to 1:00am	0%	15%	25%	Off
1:00am to 2:00am	0%	15%	25%	Off
2:00am to 3:00am	0%	15%	25%	Off

Time period (local standard time)	Occupancy (Saturday, Sunday and holidays)	Artificial lighting (Saturday, Sunday and holidays)	Appliances and equipment (Saturday, Sunday and holidays)	*Air-conditioning* (Saturday, Sunday and holidays)
3:00am to 4:00am	0%	15%	25%	Off
4:00am to 5:00am	0%	15%	25%	Off
5:00am to 6:00am	0%	15%	25%	Off
6:00am to 7:00am	0%	15%	25%	Off
7:00am to 8:00am	0%	15%	25%	Off
8:00am to 9:00am	5%	25%	25%	Off
9:00am to 10:00am	5%	25%	25%	Off
10:00am to 11:00am	5%	25%	25%	Off
11:00am to 12:00pm	5%	25%	25%	Off
12:00pm to 1:00pm	5%	25%	25%	Off
1:00pm to 2:00pm	5%	25%	25%	Off
2:00pm to 3:00pm	5%	25%	25%	Off
3:00pm to 4:00pm	5%	25%	25%	Off
4:00pm to 5:00pm	5%	25%	25%	Off
5:00pm to 6:00pm	0%	15%	25%	Off
6:00pm to 7:00pm	0%	15%	25%	Off
7:00pm to 8:00pm	0%	15%	25%	Off
8:00pm to 9:00pm	0%	15%	25%	Off
9:00pm to 10:00pm	0%	15%	25%	Off
10:00pm to 11:00pm	0%	15%	25%	Off
11:00pm to 12:00am	0%	15%	25%	Off

Table Notes

(1) The occupancy profile is expressed as a percentage of the maximum number of people that can be accommodated in the building.

(2) The artificial lighting profile is expressed as a percentage of the maximum *illumination power density* permitted under Part J7.

(3) The appliances and equipment profile is expressed as a percentage of the maximum internal heat gain in Table S35C2l.

(4) The *air-conditioning* profile is expressed as the plant status.

Table S35C2e: Occupancy and operation profiles of a Class 6 shop or shopping centre

Time period (local standard time)	Occupancy (Daily)	Artificial lighting (Daily)	Appliances and equipment (Daily)	*Air-conditioning* (Daily)
12:00am to 1:00am	0%	25%	25%	Off
1:00am to 2:00am	0%	25%	25%	Off
2:00am to 3:00am	0%	25%	25%	Off
3:00am to 4:00am	0%	25%	25%	Off
4:00am to 5:00am	0%	25%	25%	Off
5:00am to 6:00am	0%	25%	25%	Off
6:00am to 7:00am	0%	25%	25%	Off
7:00am to 8:00am	10%	100%	70%	On
8:00am to 9:00am	20%	100%	70%	On
9:00am to 10:00am	20%	100%	70%	On

Time period (local standard time)	Occupancy (Daily)	Artificial lighting (Daily)	Appliances and equipment (Daily)	*Air-conditioning* (Daily)
10:00am to 11:00am	15%	100%	70%	On
11:00am to 12:00pm	25%	100%	70%	On
12:00pm to 1:00pm	25%	100%	70%	On
1:00pm to 2:00pm	15%	100%	70%	On
2:00pm to 3:00pm	15%	100%	70%	On
3:00pm to 4:00pm	15%	100%	70%	On
4:00pm to 5:00pm	15%	100%	70%	On
5:00pm to 6:00pm	5%	100%	70%	On
6:00pm to 7:00pm	5%	100%	70%	Off
7:00pm to 8:00pm	0%	10%	10%	Off
8:00pm to 9:00pm	0%	10%	10%	Off
9:00pm to 10:00pm	0%	10%	10%	Off
10:00pm to 11:00pm	0%	10%	10%	Off
11:00pm to 12:00am	0%	10%	10%	Off

Table Notes

(1) The occupancy profile is expressed as a percentage of the maximum number of people that can be accommodated in the building.

(2) The artificial lighting profile is expressed as a percentage of the maximum *illumination power density* permitted under Part J7.

(3) The appliances and equipment profile is expressed as a percentage of the maximum internal heat gain in S35C2I.

(4) The *air-conditioning* profile is expressed as the plant status.

Table S35C2f: Occupancy and operation profiles of a Class 6 restaurant or cafe

Time period (local standard time)	Occupancy (Monday to Saturday)	Artificial lighting (Monday to Saturday)	Appliances and equipment (Monday to Saturday)	*Air-conditioning* (Monday to Saturday)
12:00am to 1:00am	0%	5%	15%	Off
1:00am to 2:00am	0%	5%	15%	Off
2:00am to 3:00am	0%	5%	15%	Off
3:00am to 4:00am	0%	5%	15%	Off
4:00am to 5:00am	0%	5%	15%	Off
5:00am to 6:00am	0%	5%	15%	Off
6:00am to 7:00am	5%	40%	40%	Off
7:00am to 8:00am	5%	40%	40%	On
8:00am to 9:00am	5%	60%	60%	On
9:00am to 10:00am	5%	60%	60%	On
10:00am to 11:00am	20%	90%	90%	On
11:00am to 12:00pm	50%	90%	90%	On
12:00pm to 1:00pm	80%	90%	90%	On
1:00pm to 2:00pm	70%	90%	90%	On
2:00pm to 3:00pm	40%	90%	90%	On
3:00pm to 4:00pm	20%	90%	90%	On
4:00pm to 5:00pm	25%	90%	90%	On

Time period (local standard time)	Occupancy (Monday to Saturday)	Artificial lighting (Monday to Saturday)	Appliances and equipment (Monday to Saturday)	*Air-conditioning* (Monday to Saturday)
5:00pm to 6:00pm	50%	90%	90%	On
6:00pm to 7:00pm	80%	90%	90%	On
7:00pm to 8:00pm	80%	90%	90%	On
8:00pm to 9:00pm	80%	90%	90%	On
9:00pm to 10:00pm	50%	90%	90%	On
10:00pm to 11:00pm	35%	50%	50%	On
11:00pm to 12:00am	20%	30%	30%	On

Table Notes

(1) The occupancy profile is expressed as a percentage of the maximum number of people that can be accommodated in the building.

(2) The artificial lighting profile is expressed as a percentage of the maximum *illumination power density* permitted under Part J7.

(3) The appliances and equipment profile is expressed as a percentage of the maximum internal heat gain in S35C2I.

(4) The *air-conditioning* profile is expressed as the plant status.

(5) Sunday profile is 5% continuous artificial lighting and 5% continuous appliances and equipment where there is no occupancy and the *air-conditioning* is "off".

Table S35C2g: Occupancy and operation profiles of a Class 9a ward area

Time period (local standard time)	Occupancy (Daily)	Artificial lighting (Daily)	*Air-conditioning* (Daily)
12:00am to 1:00am	70%	5%	On
1:00am to 2:00am	70%	5%	On
2:00am to 3:00am	70%	5%	On
3:00am to 4:00am	70%	5%	On
4:00am to 5:00am	70%	5%	On
5:00am to 6:00am	70%	25%	On
6:00am to 7:00am	70%	80%	On
7:00am to 8:00am	70%	80%	On
8:00am to 9:00am	70%	50%	On
9:00am to 10:00am	70%	20%	On
10:00am to 11:00am	70%	20%	On
11:00am to 12:00pm	70%	20%	On
12:00pm to 1:00pm	70%	20%	On
1:00pm to 2:00pm	70%	20%	On
2:00pm to 3:00pm	70%	20%	On
3:00pm to 4:00pm	70%	20%	On
4:00pm to 5:00pm	70%	20%	On
5:00pm to 6:00pm	70%	50%	On
6:00pm to 7:00pm	70%	50%	On
7:00pm to 8:00pm	70%	50%	On
8:00pm to 9:00pm	70%	50%	On
9:00pm to 10:00pm	70%	50%	On
10:00pm to 11:00pm	70%	50%	On

Time period (local standard time)	Occupancy (Daily)	Artificial lighting (Daily)	*Air-conditioning* (Daily)
11:00pm to 12:00am	70%	5%	On

Table Notes

(1) The occupancy profile is expressed as a percentage of the maximum number of people that can be accommodated in the building.

(2) The artificial lighting profile is expressed as a percentage of the maximum *illumination power density* permitted under Part J7.

(3) The *air-conditioning* profile is expressed as the plant status.

Table S35C2h: Occupancy and operation profiles of a Class 9b theatre or cinema

Time period (local standard time)	Occupancy (Monday to Friday)	Occupancy (Saturday and Sunday)	Artificial lighting (Monday to Friday)	Artificial lighting (Saturday and Sunday)	*Air-conditioning* (Monday to Friday)	*Air-conditioning* (Saturday and Sunday)
12:00am to 1:00am	0%	0%	5%	5%	Off	Off
1:00am to 2:00am	0%	0%	5%	5%	Off	Off
2:00am to 3:00am	0%	0%	5%	5%	Off	Off
3:00am to 4:00am	0%	0%	5%	5%	Off	Off
4:00am to 5:00am	0%	0%	5%	5%	Off	Off
5:00am to 6:00am	0%	0%	5%	5%	Off	Off
6:00am to 7:00am	0%	0%	5%	5%	Off	Off
7:00am to 8:00am	0%	0%	5%	5%	Off	On
8:00am to 9:00am	0%	20%	100%	100%	Off	On
9:00am to 10:00am	0%	70%	10%	10%	Off	On
10:00am to 11:00am	0%	70%	10%	10%	Off	On
11:00am to 12:00pm	0%	70%	10%	10%	On	On
12:00pm to 1:00pm	20%	20%	100%	100%	On	On
1:00pm to 2:00pm	70%	70%	5%	5%	On	On
2:00pm to 3:00pm	70%	70%	5%	5%	On	On
3:00pm to 4:00pm	70%	70%	5%	5%	On	On
4:00pm to 5:00pm	70%	70%	5%	5%	On	On

Time period (local standard time)	Occupancy (Monday to Friday)	Occupancy (Saturday and Sunday)	Artificial lighting (Monday to Friday)	Artificial lighting (Saturday and Sunday)	*Air-conditioning* (Monday to Friday)	*Air-conditioning* (Saturday and Sunday)
5:00pm to 6:00pm	20%	20%	100%	100%	On	On
6:00pm to 7:00pm	20%	20%	100%	100%	On	On
7:00pm to 8:00pm	70%	70%	100%	100%	On	On
8:00pm to 9:00pm	70%	70%	5%	5%	On	On
9:00pm to 10:00pm	70%	70%	5%	5%	On	On
10:00pm to 11:00pm	70%	70%	5%	5%	On	On
11:00pm to 12:00am	10%	10%	100%	100%	On	On

Table Notes

(1) The occupancy profile is expressed as a percentage of the maximum number of people that can be accommodated in the building.

(2) The artificial lighting profile is expressed as a percentage of the maximum *illumination power density* permitted under Part J7.

(3) The *air-conditioning* profile is expressed as the plant status.

Table S35C2i: Occupancy and operation profiles of a Class 9b conference facility

Hour	Occupancy (Daily)	Artificial lighting and equipment (Daily)	*Air-conditioning* (Monday to Friday)
12:00am to 1:00am	0%	15%	Off
1:00am to 2:00am	0%	15%	Off
2:00am to 3:00am	0%	15%	Off
3:00am to 4:00am	0%	15%	Off
4:00am to 5:00am	0%	15%	Off
5:00am to 6:00am	0%	15%	Off
6:00am to 7:00am	5%	25%	On
7:00am to 8:00am	10%	45%	On
8:00am to 9:00am	20%	45%	On
9:00am to 10:00am	20%	45%	On
10:00am to 11:00am	25%	60%	On
11:00am to 12:00pm	30%	60%	On
12:00pm to 1:00pm	30%	60%	On
1:00pm to 2:00pm	35%	60%	On
2:00pm to 3:00pm	30%	45%	On
3:00pm to 4:00pm	30%	60%	On
4:00pm to 5:00pm	35%	60%	On
5:00pm to 6:00pm	25%	60%	On
6:00pm to 7:00pm	20%	60%	On
7:00pm to 8:00pm	15%	25%	On

Hour	Occupancy (Daily)	Artificial lighting and equipment (Daily)	*Air-conditioning* (Monday to Friday)
8:00pm to 9:00pm	10%	25%	On
9:00pm to 10:00pm	10%	25%	On
10:00pm to 11:00pm	10%	25%	On
11:00pm to 12:00am	5%	25%	Off

Table Notes

(1) The occupancy profile is expressed as a percentage of the maximum number of people that can be accommodated in the building.

(2) The artificial lighting profile is expressed as a percentage of the maximum *illumination power density* permitted under Part J7.

(3) The appliances and equipment profile is expressed as a percentage of the maximum internal heat gain in S35C2I.

(4) The *air-conditioning* profile is expressed as the plant status.

Table S35C2j: Occupancy and operation profiles of a Class 9b school

Time period (local standard time)	Occupancy (Monday to Friday)	Artificial lighting (Monday to Friday)	Appliances and equipment (Monday to Friday)	*Air-conditioning* (Monday to Friday)
12:00am to 1:00am	0%	5%	5%	Off
1:00am to 2:00am	0%	5%	5%	Off
2:00am to 3:00am	0%	5%	5%	Off
3:00am to 4:00am	0%	5%	5%	Off
4:00am to 5:00am	0%	5%	5%	Off
5:00am to 6:00am	0%	5%	5%	Off
6:00am to 7:00am	0%	5%	5%	Off
7:00am to 8:00am	5%	30%	30%	On
8:00am to 9:00am	75%	85%	85%	On
9:00am to 10:00am	90%	95%	95%	On
10:00am to 11:00am	90%	95%	95%	On
11:00am to 12:00pm	90%	95%	95%	On
12:00pm to 1:00pm	50%	80%	70%	On
1:00pm to 2:00pm	50%	80%	70%	On
2:00pm to 3:00pm	90%	95%	95%	On
3:00pm to 4:00pm	70%	90%	80%	On
4:00pm to 5:00pm	50%	70%	60%	On
5:00pm to 6:00pm	20%	20%	20%	Off
6:00pm to 7:00pm	20%	20%	20%	Off
7:00pm to 8:00pm	20%	20%	20%	Off
8:00pm to 9:00pm	10%	10%	10%	Off
9:00pm to 10:00pm	5%	5%	5%	Off
10:00pm to 11:00pm	5%	5%	5%	Off
11:00pm to 12:00am	5%	5%	5%	Off

Table Notes

(1) The occupancy profile is expressed as a percentage of the maximum number of people that can be accommodated in the building.

(2) The artificial lighting profile is expressed as a percentage of the maximum *illumination power density* permitted under Part J7.

(3) The appliances and equipment profile is expressed as a percentage of the maximum internal heat gain in S35C2I.

(4) The *air-conditioning* profile is expressed as the plant status.

(5) Saturday and Sunday profiles are 5% continuous artificial lighting and 5% continuous appliances and equipment, where there is no occupancy and the *air-conditioning* is "off".

Table S35C2k: Occupancy and operation profiles of a Class 9c aged care facility

Time period (local standard time)	Occupancy (Monday to Friday)	Occupancy (Saturday, Sunday and holidays)	Artificial lighting (Daily)	*Air-conditioning* (Monday to Friday)	*Air-conditioning* (Saturday, Sunday and holidays)
12:00am to 1:00am	85%	85%	5%	On	On
1:00am to 2:00am	85%	85%	5%	On	On
2:00am to 3:00am	85%	85%	5%	On	On
3:00am to 4:00am	85%	85%	5%	On	On
4:00am to 5:00am	85%	85%	5%	On	On
5:00am to 6:00am	85%	85%	25%	On	On
6:00am to 7:00am	85%	85%	80%	On	On
7:00am to 8:00am	80%	85%	80%	On	On
8:00am to 9:00am	50%	50%	50%	On	On
9:00am to 10:00am	10%	50%	20%	Off	On
10:00am to 11:00am	10%	20%	20%	Off	Off
11:00am to 12:00pm	10%	20%	20%	Off	Off
12:00pm to 1:00pm	10%	20%	20%	Off	Off
1:00pm to 2:00pm	10%	20%	20%	Off	Off
2:00pm to 3:00pm	10%	20%	20%	Off	Off
3:00pm to 4:00pm	10%	30%	20%	Off	Off
4:00pm to 5:00pm	50%	50%	20%	On	On
5:00pm to 6:00pm	50%	50%	50%	On	On
6:00pm to 7:00pm	70%	50%	50%	On	On
7:00pm to 8:00pm	70%	70%	50%	On	On
8:00pm to 9:00pm	80%	80%	50%	On	On
9:00pm to 10:00pm	85%	80%	50%	On	On
10:00pm to 11:00pm	85%	85%	50%	On	On
11:00pm to 12:00am	85%	85%	5%	On	On

Table Notes

(1) The occupancy profile is expressed as a percentage of the maximum number of people that can be accommodated in the Class 9c building.

(2) The artificial lighting profile is expressed as a percentage of the maximum *illumination power density* permitted

under Part J7.

(3) The *air-conditioning* profile is expressed as the plant status.

Table S35C2l: Internal heat gains for appliances and equipment

Application	Internal sensible heat gain rate
Class 9a building *ward area*	5 W/m^2 averaged for 24 hours per day, 7 days per week, continuous operation
Class 8 laboratory and a Class 9a clinic, day surgery and a procedure unit	15 W/m^2
Class 6 shop and shopping centre, Class 6 cafe and restaurant and Class 9b *school*	5 W/m^2
Other applications	No load
Class 3 (*sole-occupancy unit*)	160 W per room
Class 3 dormitories	No load
Class 5 building	11 W/m^2
Class 9c building	160 W per room
Class 9b (conference facilities only)	150 W per room plus 10 W per person

Table S35C2m: Heated water supply consumption rates

Application	Daily consumption rate at 60°C
Residential part of a hotel or motel	100 L/*sole-occupancy unit*
Dormitory, boarding house, guest house, hostel, lodging house and backpackers accommodation	50 L/person
Residential part of a *school*, accommodation for the aged, children or people with a disability and a *detention centre* or a *health-care building* which accommodates members of staff	
Class 9c building	
Office, laboratory, shop and *assembly building*	4 L/person
Dining room, restaurant and cafe	9 L/meal
Health-care building, *ward area*	70 L/patient
School	7 L/person
Other applications	4 L/person

Table S35C2n: Internal heat gains for occupants and hot meals

Application	Internal heat gains per person
Dining room, restaurant or cafe	80 W *sensible heat gain* and 80 W *latent heat gain*
	The average adjusted metabolic rate for sedentary work from Table 45 of AIRAH-DA09
	The heat emission rate for sedentary work from Table 6.3 of CIBSE Guide A
Other applications	75 W *sensible heat gain* and 55 W *latent heat gain*
	An average adjusted metabolic rate from Table 45 of AIRAH-DA09
	A heat emission rate from Table 6.3 of CIBSE Guide A

Table Notes

(1) The number of people must be calculated in accordance with D2D18.

(2) For a dining room, restaurant or cafe, the internal heat gains per person account for heat gains from both occupants and hot meals.

(3) For other applications, the internal heat gains per person only account for heat gains from occupants.

Specification 36 Material properties

S36C1 Scope

[2019: Spec J1.2: 1]

This Specification lists the thermal properties of some common construction materials.

S36C2 Construction Deemed-to-Satisfy

[2019: Spec J1.2: 2]

(1) Tables S36C2a to S36C2e list the thermal conductivity considered to be achieved by some common construction materials.

(2) For the purposes of Tables S36C2a to S36C2e:

(a) For materials which incorporate cores or hollows in regular patterns (such as cored brickwork, hollow blockwork and cored floor or wall panels), the tabulated material densities and thermal conductivities are based on the gross density (mass divided by external dimensions).

(b) The *R-Value* of a material is determined by dividing the thickness of the material in metres by the thermal conductivity in $Wm^{-1}K^{-1}$.

(3) Tables S36C2f to S36C2m list the *R-Value* considered to be achieved by air films and airspaces.

(4) For an *envelope* that contains a ventilated airspace, the *Total R-Value* of the building *fabric* must be reduced based on the area of ventilation openings in accordance with clause 6.3 of AS/NZS 4859.2.

(5) The requirements of (4) do not apply to a roof with an airspace greater than 300 mm or a pitched roof greater than 5° with a horizontal ceiling.

Table S36C2a: Thermal conductivity of typical framing materials

Description	Density (kg/m^3)	Thermal conductivity ($Wm^{-1}K^{-1}$)
Steel	7850	47.5
Timber – kiln dried hardwood (across the grain)	677	0.16
Timber – Radiata pine (across the grain)	506	0.12

Table S36C2b: Thermal conductivity of typical roof cladding materials

Description	Density (kg/m^3)	Thermal conductivity ($Wm^{-1}K^{-1}$)
Aluminium sheeting	2680	210
Concrete or terra cotta tiles	1922	0.81
Steel sheeting	7850	47.5

Table S36C2c: Thermal conductivity of typical wall cladding materials

Description	Density (kg/m^3)	Thermal conductivity ($Wm^{-1}K^{-1}$)
Aluminium sheeting	2680	210
Autoclaved aerated concrete	350	0.10
	510	0.15
	900	0.27

Description	Density (kg/m^3)	Thermal conductivity (Wm^{-1}K^{-1})
Cement render (1 part cement to 4 parts sand)	1570	0.53
Clay brick: 2.75 kg	1430	0.55
Clay brick: 3.25 kg	1690	0.65
Clay brick: 3.75 kg	1950	0.78
Concrete block: 190 mm dense or 90 mm dense solid	1100/2200	1.1
Concrete block: 140 mm dense or 190 mm lightweight	1250/910	0.85
Concrete block: 90 mm dense hollow or 90 mm lightweight solid	1650 / 1800	0.75
Concrete block: 140 mm lightweight	1050	0.67
Concrete block: 90 mm lightweight	1360	0.55
Fibre-cement	1360	0.25
Gypsum plasterboard	880	0.17
Pine weatherboards	506	0.10
Plywood	530	0.14
Solid concrete	2400	1.44
Steel sheeting	7850	47.5
Prestressed hollow core concrete panel	1680	0.80

Table S36C2d: Thermal conductivity of typical flooring materials

Description	Density (kg/m^3)	Thermal conductivity (Wm^{-1}K^{-1})
Carpet underlay	-	0.04
Carpet	-	0.05
Prestressed hollow core concrete planks	1680	0.80
Particleboard	640	0.12
Plywood	530	0.14
Timber – kiln dried hardwood (across the grain)	677	0.16
Timber – Radiata pine (across the grain)	506	0.10
Solid concrete	2400	1.44
Vinyl floor tiles	2050	0.79

Table S36C2e: Thermal conductivity of other materials not listed in Tables S36C2a to S36C2d

Description	Density (kg/m^3)	Thermal conductivity (Wm^{-1}K^{-1})
Clay soil (10% moisture content)	1300	0.6
PMMA (polymethylmethacrylate)	1180	1.0
Polycarbonates	1200	0.2
Sand (6% moisture content)	1800	1.64
Soda lime glass	2500	1.0

Table S36C2f: Typical R-Values for air films: surfaces other than outdoor surfaces

Position of air film	Direction of heat flow	*R-Value*
On a surface with a pitch of not more than 5°	Up	0.11
	Down	0.16
On a surface with a pitch of more than 5° but not more than 30°	Up	0.11
	Down	0.15
On a surface with a pitch of more than 30° but not more than 45°	Up	0.11
	Down	0.13
On a wall	Horizontal	0.12

Table S36C2g: Typical R-Values for air films: outdoor surfaces

Position of air film	Direction of heat flow	*R-Value*
Any	Any	0.03

Table S36C2h: Typical R-Values for airspaces: non-reflective non-ventilated

Position of airspace	Direction of heat flow	*R-Value*
In a roof airspace 20 mm to 50 mm thick with ceiling parallel to roof (not more than 5° difference in pitch)	Up	0.15
	Down	0.15
In a roof airspace 50 mm to 300 mm with ceiling parallel to roof (not more than 5° difference in pitch)	Up	0.15
	Down	0.17
In a roof airspace greater than 300 mm thick or with a horizontal ceiling and a roof pitch more than 5°	Up	0.18
	Down	0.28
In a wall	Horizontal	0.16

Table Notes

(1) Linear interpolation may be used to calculate the *R-Value* of the airspace in a roof with an intermediate pitch.

(2) A non-ventilated airspace in a roof is one with continuous cover, such as metal or sarked tiles, and no specific provision for ventilation.

(3) *R-Values* are calculated using AS/NZS 4859.2 based on the following:

(a) summer temperatures of 24°C internally and 36°C externally for heat transfer down; and

(b) winter temperatures of 18°C internally and 12°C externally for heat transfer up; and

(c) average of summer and winter results for horizontal heat transfer (e.g. in walls).

(4) A non-ventilated airspace in a wall is one where there is no express provision for airflow through it and openings to the external environment do not exceed more than 500 mm^2 per metre of length in the horizontal direction.

(5) A non-ventilated airspace in a wall for the purposes of Note (4) includes a wall with drainage openings or weepholes that are open vertical joints in the outer leaf of a *cavity* masonry wall, which are not regarded as ventilation openings.

Table S36C2i: Typical R-Values for airspaces: reflective non-ventilated

Position of airspace	Direction of heat flow	*R-Value*
In a wall with an inner reflective surface of 0.05 emittance and a 20 mm to 100 mm airspace to the wall lining	Horizontal	0.61

Position of airspace	Direction of heat flow	*R-Value*
In a wall with a central reflective membrane with an inner surface emittance of 0.05 and a 20 mm to 100 mm airspace from the membrane to the wall lining, and an outer anti-glare emittance of 0.08 and a 20 mm to 100 mm airspace to the wall cladding	Horizontal	1.1
In a wall with an outer anti-glare reflective surface of 0.08 emittance and a 20 mm to 100 mm airspace to the wall cladding	Horizontal	0.53

Table Notes

(1) A non-ventilated airspace in a wall is one where there is no express provision for airflow through it and openings to the external environment do not exceed 500 mm^2 per metre of length in the horizontal direction.

(2) A non-ventilated airspace in a wall for the purposes of Note (1) includes a wall with drainage openings or weepholes that are open vertical joints in the outer leaf of a *cavity* masonry wall, which are not regarded as ventilation openings.

(3) *R-Values* are calculated using AS/NZS 4859.2 based on the following:

(a) summer temperatures of 24°C internally and 36°C externally for heat transfer down; and

(b) winter temperatures of 18°C internally and 12°C externally for heat transfer up; and

(c) average of summer and winter results for horizontal heat transfer (e.g. in walls); and

(d) emittances are normal emittances of bounding surfaces in accordance with AS 4200.1.

Table S36C2j: Typical R-Values for airspaces: non-reflective ventilated

Position of airspace	Direction of heat flow	*R-Value*
In a roof airspace greater than 300 mm thick or with a horizontal ceiling and a pitch more than 5°	Up	Nil
	Down	0.46

Table S36C2k: Typical R-Values for roof spaces with a reflective surface: Roof space > 300 mm thick or pitched roof with a horizontal ceiling

Direction of heat flow	*R-Value* of reflective airspace	
	Ventilated roof space	Non-ventilated roof space
Up	0.34	0.56
Down	1.36	1.09

Table Notes

(1) A non-ventilated airspace in a roof is one with continuous cover, such as metal or sarked tiles, and no specific provision for ventilation.

(2) A reflective surface is a surface with normal emittance of 0.05 or less, in accordance with AS 4200.1.

Table S36C2l: Typical R-Values for non-ventilated roof spaces with a reflective surface: Flat, skillion or pitched roof (≤5°) with horizontal ceiling, roof space not more than 300 mm thick

Emittance of airspace bounding surfaces	Thickness of roof space	Direction of heat flow	*R-Value* of reflective airspace
Surface 1 emittance 0.9, Surface 2 emittance 0.05	≤ 300 mm	Up	0.43
Surface 1 emittance 0.9, Surface 2 emittance 0.05	20 mm	Down	0.60

Emittance of airspace bounding surfaces	Thickness of roof space	Direction of heat flow	*R-Value* of reflective airspace
Surface 1 emittance 0.9, Surface 2 emittance 0.05	60 mm	Down	1.16
Surface 1 emittance 0.9, Surface 2 emittance 0.05	100 mm to ≤ 300 mm	Down	1.30

Table Notes

(1) A non-ventilated airspace in a roof is one with continuous cover, such as metal, and no specific provision for ventilation.

(2) Linear interpolation may be used to calculate the *R-Value* of an airspace of intermediate thickness.

(3) *R-Values* are calculated using AS/NZS 4859.2 based on the following:

(a) summer temperatures of 24°C internally and 36°C externally for heat transfer down; and

(b) winter temperatures of 18°C internally and 12°C externally for heat transfer up; and

(c) emittances are normal emittances of bounding surfaces in accordance with AS 4200.1.

Table S36C2m: Typical R-Values for non-ventilated roof spaces with a reflective surface: Pitched roof with cathedral ceiling, roof space not more than 300 mm thick

Emittance of airspace bounding surfaces	Thickness of roof space	Direction of heat flow	*R-Value* of reflective airspace		
			15° to not more than 25° pitch	more than 25° to not more than 35° pitch	more than 35° to not more than 45° pitch
Surface 1 emittance 0.9, Surface 2 emittance 0.05	< 300 mm	Up	0.43	0.43	0.43
Surface 1 emittance 0.9, Surface 2 emittance 0.05	20 mm	Down	0.59	0.59	0.59
Surface 1 emittance 0.9, Surface 2 emittance 0.05	60 mm	Down	0.91	0.82	0.75
Surface 1 emittance 0.9, Surface 2 emittance 0.05	100 mm to < 300 mm	Down	0.96	0.85	0.76

Table Notes

(1) A non-ventilated airspace in a roof is one with continuous cover, such as metal or sarked tiles, and no specific provision for ventilation.

(2) Linear interpolation may be used to calculate the *R-Value* of the airspace in a roof with an intermediate pitch.

(3) *R-Values* are calculated using AS/NZS 4859.2 based on the following:

(a) summer temperatures of 24°C internally and 36°C externally for heat transfer down; and

(b) winter temperatures of 18°C internally and 12°C externally for heat transfer up; and

(c) emittances are normal emittances of bounding surfaces in accordance with AS 4200.1.

Explanatory Information

Section F of NCC Volume One may require ventilation of roof space in *climate zones* 6, 7 and 8 to manage risks associated with *condensation*.

Specification 37 Calculation of U-Value and solar admittance

S37C1 Scope

[2019: Spec J1.5a: 1]

This specification describes the methods of calculating the U-Value and *solar admittance* of a *wall-glazing construction*.

S37C2 General

[2019: Spec J1.5a: 2]

For determining the aspect of a *wall-glazing construction*—

(a) the northern aspect is at or within 45° of true north; and

(b) the southern aspect is at or within 45° of true south; and

(c) the eastern aspect is within 45° of true east; and

(d) the western aspect is within 45° of true west.

S37C3 U-Value — Method 1 (Single Aspect)

[2019: Spec J1.5a: 3]

(1) For the purposes of this method, a *wall-glazing construction* only includes the walls and *glazing* facing a single aspect.

(2) The *Total System U-Value* of the wall component of a *wall-glazing construction* must be calculated as the inverse of the *Total R-Value*, including allowance for thermal bridging, in accordance with—

(a) AS/NZS 4859.2; or

(b) Specification 38 for *spandrel panels*.

(3) The *Total System U-Value* of a *wall-glazing construction* must be calculated as the area-weighted average of the *Total System U-Value* of each of the components of the *wall-glazing construction*.

(4) The *Total System U-Value* must not exceed the applicable value in J4D6(1).

S37C4 U-Value — Method 2 (Multiple Aspects)

[2019: Spec J1.5a: 4]

(1) For the purposes of this method, a *wall-glazing construction* only includes the walls and *glazing* facing multiple aspects.

(2) The *Total System U-Value* of the wall component of a *wall-glazing construction* must be calculated as the inverse of the *Total R-Value*, including allowance for thermal bridging, in accordance with—

(a) AS/NZS 4859.2; or

(b) Specification 38 for *spandrel panels*.

(3) The *Total System U-Value* of a *wall-glazing construction* must be calculated as the area-weighted average of the *Total System U-Value* of each of the components of the *wall-glazing construction*.

(4) The *Total System U-Value* must not exceed the applicable value in J4D6(1).

S37C5 Solar admittance — Method 1 (Single Aspect)

[2019: Spec J1.5a: 5]

(1) The *solar admittance* of a *wall-glazing construction* must be calculated in accordance with the following formula:

$$SA = \frac{A_{W1} \times S_{W1} \times SHGC_{W1}}{A_{WALL}} + \frac{A_{W2} \times S_{W2} \times SHGC_{W2}}{A_{WALL}} + \ldots$$

(2) In the formula at (1)—

(a) SA

= the *wall-glazing construction solar admittance*; and

(b) $A_{W1}, A_{W2}, \ldots$

= the area of each *glazing* element; and

(c) $S_{W1}, S_{W2}, \ldots$

= the shading multiplier for each *glazing* element in accordance with S37C7; and

(d) $SHGC_{W1,W2,\ldots}$

= the *total system SHGC* of each *glazing* element; and

(e) A_{WALL}

= the total *wall-glazing construction* area.

(3) The *solar admittance* of the *wall-glazing construction* must not exceed the applicable value in J4D6(5).

S37C6 Solar admittance — Method 2 (Multiple Aspects)

[2019: Spec J1.5a: 6]

(1) The *solar admittance* of *wall-glazing construction* must achieve a representative *air-conditioning* energy value less than that achieved by the reference *solar admittance*, when using the following formula:

$$E_R = A_N \alpha_N SA_N + A_E \alpha_E SA_E + A_S \alpha_S SA_S + A_W \alpha_W SA_W$$

(2) In the formula at (1)—

(a) E_R

= the representative *air-conditioning* energy value; and

(b) $A_{N,E,S,W}$

= the area of the *wall-glazing construction* facing each aspect; and

(c) $\alpha_{N,E,S,W}$

= the *solar admittance* weighting coefficient of each aspect equal to—

(i) where the *glazing* area on an aspect is less than 20% of the *wall-glazing construction* area, 0; and

(ii) the values in Table S37C6a and Table S37C6b; and

(d) $SA_{N,E,S,W}$

= the *wall-glazing construction solar admittance* of each aspect—

(i) equal to the applicable value in J4D6(5) in the reference case; and

(ii) calculated in accordance with S37C5(1) in the proposed case.

Table S37C6a: Solar admittance weighting coefficient — Class 2 common area, Class 5, 6, 7, 8 or 9b building or Class 9a building other than a ward area

Aspect	*Climate zone* 1	*Climate zone* 2	*Climate zone* 3	*Climate zone* 4	*Climate zone* 5	*Climate zone* 6	*Climate zone* 7	*Climate zone* 8
Northern	1.47	1.95	1.95	2.05	2.28	2.12	2.40	1.88
Southern	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Aspect	*Climate zone 1*	*Climate zone 2*	*Climate zone 3*	*Climate zone 4*	*Climate zone 5*	*Climate zone 6*	*Climate zone 7*	*Climate zone 8*
Eastern	1.39	1.58	1.63	1.72	1.72	1.62	1.84	1.92
Western	1.41	1.68	1.65	1.69	1.75	1.67	1.92	1.25

Table S37C6b: Solar admittance weighting coefficient — Class 3 or 9c building or Class 9a ward area

Aspect	*Climate zone 1*	*Climate zone 2*	*Climate zone 3*	*Climate zone 4*	*Climate zone 5*	*Climate zone 6*	*Climate zone 7*	*Climate zone 8*
Northern	1.42	1.77	1.72	1.55	1.88	1.52	1.60	1.24
Southern	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Eastern	1.30	1.49	1.48	1.37	1.48	1.28	1.35	1.26
Western	1.37	1.54	1.50	1.36	1.52	1.33	1.40	1.05

S37C7 Shading

[2019: Spec J1.5a: 7]

For the purpose of calculating *solar admittance*, the shading multiplier is—

(a) for shading provided by an external permanent projection that extends horizontally on both sides of the *glazing* for the same projection distance P, as shown in Figure S37C7—

(i) the value in Table S37C7a for shading on the northern, eastern or western aspects; or

(ii) the value in Table S37C7b for shading on the southern aspect; or

(b) 0.35 for shading that is provided by an external shading device such as a shutter, blind, vertical or horizontal building screen with blades, battens or slats, which—

(i) is capable of restricting at least 80% of summer solar radiation; and

(ii) if adjustable, will operate automatically in response to the level of solar radiation.

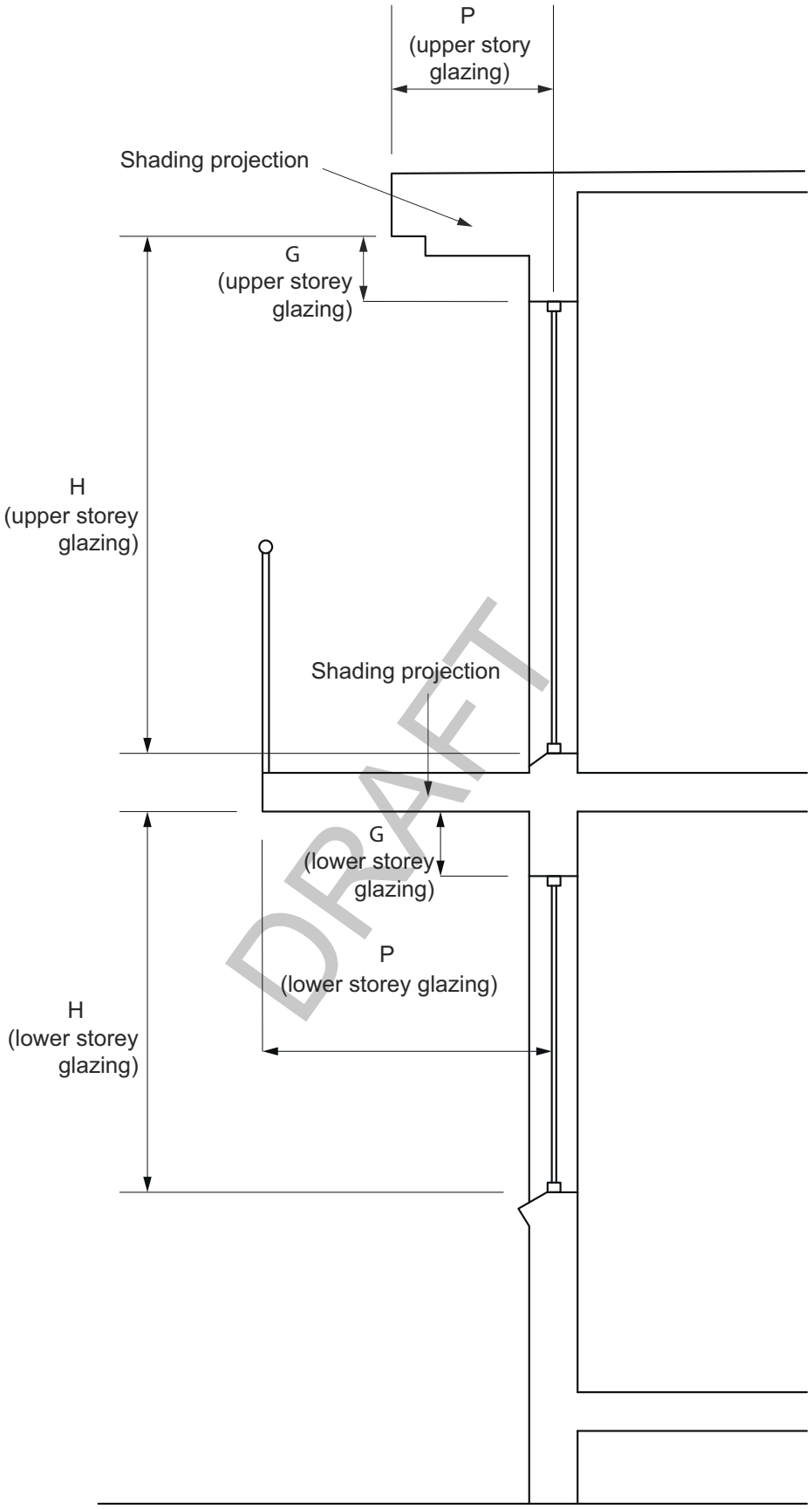
Table S37C7a: Shading multipliers — Northern, eastern and western aspects

G/H	P/H = 0	P/H = 0.1	P/H = 0.2	P/H = 0.3	P/H = 0.4	P/H = 0.5	P/H = 0.6	P/H = 0.7	P/H = 0.8	P/H = 0.9	P/H = 1
0	1.00	0.90	0.80	0.72	0.64	0.57	0.51	0.46	0.41	0.38	0.35
0.1	1.00	0.95	0.89	0.81	0.74	0.66	0.59	0.52	0.47	0.42	0.40
0.2	1.00	0.98	0.94	0.89	0.82	0.75	0.68	0.62	0.56	0.51	0.47
0.3	1.00	1.00	0.97	0.94	0.89	0.84	0.78	0.72	0.66	0.61	0.57
0.4	1.00	1.00	0.99	0.97	0.94	0.90	0.86	0.82	0.77	0.73	0.68
0.5	1.00	1.00	1.00	0.99	0.97	0.95	0.92	0.90	0.86	0.83	0.79

Table S37C7b: Shading multipliers — Southern aspect

G/H	P/H = 0	P/H = 0.1	P/H = 0.2	P/H = 0.3	P/H = 0.4	P/H = 0.5	P/H = 0.6	P/H = 0.7	P/H = 0.8	P/H = 0.9	P/H = 1
0	1.00	0.93	0.87	0.82	0.77	0.73	0.69	0.65	0.62	0.60	0.58
0.1	1.00	0.97	0.93	0.88	0.84	0.79	0.75	0.71	0.67	0.64	0.62
0.2	1.00	0.98	0.96	0.93	0.89	0.85	0.81	0.77	0.73	0.70	0.68
0.3	1.00	0.99	0.98	0.96	0.93	0.90	0.87	0.83	0.80	0.77	0.74
0.4	1.00	1.00	0.99	0.98	0.96	0.94	0.91	0.89	0.86	0.84	0.81
0.5	1.00	1.00	0.99	0.99	0.98	0.96	0.95	0.93	0.91	0.90	0.88

Figure S37C7: **Permanent external shading – measurement of P, G and H**



Specification 38 Spandrel panel thermal performance

S38C1 Scope

[2019: Spec J1.5b: 1]

This Specification describes methods of determining the thermal performance of *spandrel panels*.

S38C2 Spandrel panel R-Value: Calculation method 1

[2019: Spec J1.5b: 2]

Spandrel panels are deemed to have the thermal properties nominated in Table S38C2, where—

(a) Configuration 1 consists of—
  (i) a thermally unbroken (bridged) frame; and
  (ii) a centre of spandrel panel consisting of—
    (A) a single-glazed opaque or clear face; and
    (B) a 100 mm air gap; and
    (C) a 3 mm aluminium, 0.8 mm galvanised steel or zinc back pan; and

(b) Configuration 2 consists of—
  (i) a thermally unbroken (bridged) frame; and
  (ii) a centre of *spandrel panel* consisting of—
    (A) a double-glazed opaque face; and
    (B) a 50 mm air gap; and
    (C) a 3 mm aluminium, 0.8 mm galvanised steel or zinc back pan; and

(c) Configuration 3 consists of—
  (i) a thermally broken (unbridged) frame; and
  (ii) a centre of *spandrel panel* consisting of—
    (A) a double-glazed clear face; and
    (B) a 50 mm air gap; and
    (C) a 3 mm aluminium, 0.8 mm galvanised steel or zinc back pan; and

(d) Configuration 4 consists of—
  (i) a thermally broken (unbridged) frame; and
  (ii) a centre of *spandrel panel* consisting of—
    (A) a double-glazed low-e clear face; and
    (B) a 50 mm air gap; and
    (C) a 3 mm aluminium, 0.8 mm galvanised steel or zinc back pan.

Table S38C2: Achieved Total R-Value of spandrel panels

Type	No insulation	R0.5 insulation	R1.0 insulation	R1.5 insulation	R2.0 insulation
Configuration 1	0.3	0.39	0.42	0.44	0.45
Configuration 2	0.35	0.41	0.43	0.44	0.45
Configuration 3	0.84	0.96	1.03	1.07	1.09
Configuration 4	0.91	1.00	1.05	1.09	1.11

S38C3 Spandrel panel R-Value: Calculation method 2

[2019: Spec J1.5b: 3]

(1) The *Total system U-Value* of a *spandrel panel* is determined in accordance with the following formula:

$$U_{sp} = \frac{U_{cs}A_{cs} + \Sigma U_{es}A_{es} + \Sigma U_{fs}A_{fs}}{A_{cs} + \Sigma A_{es} + \Sigma A_{fs}}$$

(2) In the formula at (1)—

(a) A_{cs}

= the area of the centre region of the *spandrel panel*; and

(b) A_{es}

= the area of the edge region of the *spandrel panel*, where the edge has a defined width of 127 mm; and

(c) A_{fs}

= the area of the frame region of the *spandrel panel*; and

(d) U_{cs}

= the U-value of the centre region of the *spandrel panel*; and

(e) U_{es}

= the U-value of the edge region of the *spandrel panel*, where the edge has a defined width of 127 mm; and

(f) U_{fs}

= the U-value of the frame region of the *spandrel panel*; and

(g) U_{sp}

= the *Total System U-Value* of the *spandrel panel*.

Specification 39 Sub-floor and soil thermal performance

S39C1 Scope

[2019: Spec J1.6: 1]

This Specification describes the thermal performance of sub-floor spaces and soil in direct contact with a floor for the purposes of calculating the *Total R-Value* of a floor.

S39C2 Sub-floor space and soil thermal performance

[2019: Spec J1.6: 2]

(1) Table S39C2a details the *R-Values* considered to be achieved by enclosed sub-floor spaces that are—

(a) mechanically ventilated by not more than 1.5 air changes per hour; or

(b) provided with not more than 150% of the aggregate sub-floor ventilation area *required* by Part F1 and are not mechanically ventilated.

(2) Table S39C2b details the *R-Values* considered to be achieved by the soil for floors that are in direct contact with the ground.

Table S39C2a: R-Value of sub-floor spaces

Ratio of *floor area* (m^2) to floor perimeter (m)	Sub-floor space *R-Value*
1.0	0.10
1.5	0.15
2.0	0.20
2.5	0.25
3.0	0.30
3.5	0.35
4.0	0.40
4.5	0.45
5.0	0.50
5.5	0.55
6.0	0.60
6.5	0.65
7.0	0.70

Table Notes

Where the ratio of *floor area* to floor perimeter is between the values stated, interpolation may be used to determine the sub-floor space *R-Values*.

Table S39C2b: R-Value of soil in contact with a floor

Ratio of *floor area* (m^2) to floor perimeter (m)	Wall thickness of 50 mm	Wall thickness of 100 mm	Wall thickness of 150 mm	Wall thickness of 200 mm	Wall thickness of 250 mm	Wall thickness of 300 mm
1.0	0.4	0.5	0.5	0.6	0.7	0.8
1.5	0.6	0.7	0.7	0.8	0.9	1.0
2.0	0.7	0.8	0.9	1.0	1.1	1.3

Ratio of *floor area* (m^2) to floor perimeter (m)	Wall thickness of 50 mm	Wall thickness of 100 mm	Wall thickness of 150 mm	Wall thickness of 200 mm	Wall thickness of 250 mm	Wall thickness of 300 mm
2.5	0.9	1.0	1.1	1.2	1.3	1.5
3.0	1.0	1.2	1.3	1.4	1.5	1.7
3.5	1.2	1.3	1.5	1.6	1.7	1.9
4.0	1.3	1.5	1.6	1.7	1.9	2.2
4.5	1.5	1.7	1.8	1.9	2.1	2.4
5.0	1.6	1.8	2.0	2.1	2.3	2.6
5.5	1.8	2.0	2.1	2.2	2.4	2.8
6.0	1.9	2.1	2.3	2.4	2.6	2.9
6.5	2.0	2.3	2.4	2.6	2.8	3.1
7.0	2.2	2.4	2.6	2.7	3.0	3.3

Table Notes

(1) Where a wall thickness or ratio of *floor area* to floor perimeter is between the values stated, interpolation may be used to determine the soil *R-Value*.

(2) Wall thickness means the thickness of the *envelope* wall that sits on or around the slab.

Specification 40 Lighting and power control devices

S40C1 Scope

[2019: Spec J6: 1]

This Specification contains the requirements for lighting and power control devices including timers, time switches, motion detectors and daylight control devices.

S40C2 Lighting timers

[2019: Spec J6: 2]

A lighting timer must—

(a) be located within 2 m of every entry door to the space; and

(b) have an indicator light that is illuminated when the artificial lighting is off; and

(c) not control more than—

(i) an area of 100 m^2 with a single push button timer; and

(ii) 95% of the lights in spaces of area more than 25 m^2; and

(d) be capable of maintaining the artificial lighting—

(i) for not less than 5 minutes; and

(ii) for not more than 12 hours if the timer is reset.

S40C3 Time switch

[2019: Spec J6: 3]

(1) A time switch must be—

(a) capable of switching on and off electric power at variable pre-programmed times and on variable pre-programmed days; and

(b) configured so that the lights are switched off at any time the space is designated to be unoccupied.

(2) A time switch for internal lighting must be capable of being overridden by—

(a) a means of turning the lights on, either by—

(i) a manual switch, remote control or an occupant sensing device that on sensing a person's presence, overrides the time switch for a period of up to 2 hours, after which if there is no further presence detected, the time switch must resume control; or

(ii) an occupant sensing device that overrides the time switch upon a person's entry and returns control to the time switch upon the person's exiting, such as a security card reader or remote control; and

(b) a manual "off" switch.

(3) A time switch for external lighting must be—

(a) configured to limit the period the system is switched on to between 30 minutes before sunset and 30 minutes after sunrise is determined or detected including any pre-programmed period between these times; and

(b) capable of being overridden by a manual switch, remote control or a security access system for a period of up to 8 hours, after which the time switch must resume control.

(4) A time switch for boiling water or chilled water storage units must be capable of being overridden by a manual switch or a security access system that senses a person's presence, overrides for a period of up to 2 hours, after which if there is no further presence detected, the time switch must resume control.

S40C4 Motion detectors

[2019: Spec J6: 4]

(1) In a Class 2, 3 or 9c *residential care building* other than within a *sole-occupancy unit*, a motion detector must—

(a) be capable of sensing movement such as by infra-red, ultrasonic or microwave detection or by a combination of these means; and

(b) be capable of detecting a person before they are 1 m into the space; and

(c) other than within a *sole-occupancy unit* of a Class 3 building, not control more than—

(i) an area of 100 m^2; and

(ii) 95% of the lights in spaces of area more than 25 m^2; and

(d) be configured so that the lights are turned off when the space is unoccupied for more than 15 minutes; and

(e) be capable of being overridden by a manual switch only enabling the lights to be turned off.

(2) In a Class 5, 6, 7, 8, 9a or 9b building, a motion detector must—

(a) be capable of sensing movement such as by infra-red, ultrasonic or microwave detection or by a combination of these means; and

(b) be capable of detecting—

(i) a person before they have entered 1 m into the space; and

(ii) movement of 500 mm within the useable part of the space; and

(c) not control more than—

(i) in other than a *carpark*, an area of 500 m^2 with a single sensor or group of parallel sensors; and

(ii) 75% of the lights in spaces using high intensity discharge; and

(d) be configured so that the lights are turned off when the space is unoccupied for more than 15 minutes; and

(e) be capable of being overridden by a manual switch that only enables the lights to be turned off.

(3) When outside a building, a motion detector must—

(a) be capable of sensing movement such as by pressure, infra-red, ultrasonic or microwave detection or by a combination of these means; and

(b) be capable of detecting a person within a distance from the light equal to—

(i) twice the mounting height; or

(ii) 80% of the ground area covered by the light's beam; and

(c) not control more than five lights; and

(d) be operated in series with a photoelectric cell or astronomical time switch so that the light will not operate in daylight hours; and

(e) be configured so that the lights are turned off when the area is unoccupied for more than 15 minutes; and

(f) have a manual override switch which is reset after a maximum period of 4 hours.

(4) When in a *fire-isolated stairway*, *fire-isolated passageway* or *fire-isolated ramp*, a motion detector must—

(a) be capable of sensing movement such as by infra-red, ultrasonic or microwave detection or by a combination of these means; and

(b) be capable of detecting—

(i) movement of 500 mm within the useable part of the space; and

(ii) a person before they have entered 1 m into the space; and

(c) be configured so that the lights dim to a 30% peak power or less when the space is unoccupied for more than 15 minutes.

S40C5 Daylight sensor and dynamic lighting control device

[2019: Spec J6: 5]

(1) A daylight sensor and dynamic control device for artificial lighting must—

(a) for switching on and off—

(i) be capable of having the switching level set point adjusted between 50 and 1000 lux; and

(ii) have—

(A) a delay of more than 2 minutes; and

(B) a differential of more than 100 lux for a sensor controlling high pressure discharge lighting, and 50 lux for a sensor controlling other than high pressure discharge lighting; and

(b) for dimmed or stepped switching, be capable of reducing the power consumed by the controlled lighting in proportion to the incident daylight on the working plane either—

(i) continuously down to a power consumption that is less than 50% of full power; or

(ii) in no less than 4 steps down to a power consumption that is less than 50% of full power.

(2) Where a daylight sensor and dynamic control device has a manual override switch, the manual override switch must not be able to switch the lights permanently on or bypass the lighting controls.

Specification 44 Calculation of heating load limit, cooling load limit and thermal energy load limit

S44C1 Scope

[New for 2022]

This Specification contains the method of calculating the *heating load* limit, *cooling load* limit and *thermal energy load* limit for compliance with J1P2 and H6P1.

S44C2 Heating load limit

[New for 2022]

The *heating load* limit of a space, measured in MJ/m^2.annum, is equal to the greater of—

(a) 4; and

(b) $((0.0044 \times HDH) - 5.9) \times F_H$

, where—

(i) HDH

= the total annual *heating degree hours* of the building location; and

(ii) F_H

= the area adjustment factor for the *heating load* limit, determined in accordance with Table S44C2.

Table S44C2: Area adjustment factors for the heating load limit

Total area of *habitable rooms* (A_H)	Area adjustment factor (F_H)
≤ 50 m^2	1.37
> 50 m^2 to ≤ 350 m^2	$(5.11 \times 10^{-6}){A_H}^2 - (3.82 \times 10^{-3})A_H + 1.55$
> 350 m^2	0.84

S44C3 Cooling load limit

[New for 2022]

(1) The *cooling load* limit of a space, measured in MJ/m^2.annum, is calculated in accordance with the following formula:

$$CLL = (5.4 + 0.00617 \times (CDH + 1.85DGH)) \times F_C$$

(2) In the formula at (1)—

(a) CLL

= the *cooling load* limit (MJ/m^2.annum); and

(b) CDH

= the total annual *cooling degree hours* of the building location; and

(c) DGH

= the total annual *dehumidification gram hours* of the building location; and

(d) F_C

= the area adjustment factor for the *cooling load* limit, determined in accordance with Table S44C3.

Table S44C3: Area adjustment factors for the cooling load limit

Total area of the *habitable rooms* (A_H)	Area adjustment factor (F_C)
≤ 50 m^2	1.34
> 50 m^2 and ≤ 200 m^2	$(1.29\times10^{-5})A_H{}^2-(5.55\times10^{-3})A_H+1.58$
> 200 m^2 and ≤ 1000 m^2	$(3.76\times10^{-7})A_H{}^2-(7.82\times10^{-4})A_H+1.12$
> 1000 m^2	0.71

S44C4 Thermal energy load limit

[New for 2022]

(1) The *thermal energy load* limit of a space, measured in MJ/m^2.annum, is calculated in accordance with the following formula:

$$TLL=\frac{19.3HLL+22.6CLL-8.4}{T_r+10.74}-15$$

(2) In the formula at (1)—

(a) TLL
= the *thermal energy load* limit; and

(b) HLL
= the *heating load* limit; and

(c) CLL
= the *cooling load* limit; and

(d) T_r
= the annual average *daily outdoor temperature range*.

Specification 45 Modelling profiles for J1V5

S45C1 Scope

[New for 2022]

This Specification contains the *required* modelling parameters for J1V5.

S45C2 Reference building sole-occupancy unit

[New for 2022]

The *heating loads* and *cooling loads* must be calculated for the *reference building sole-occupancy unit* in accordance with the following:

(a) J3D7, for roofs.

(b) J3D9, for *wall-glazing construction*.

(c) J3D10, for floors.

(d) J4D5, for *roof lights*.

(e) Solar absorptance of 0.6 for *external walls* and roofs.

(f) Open area of 3.8 x 10^{-4} m^2 per m^2 of zone façade area for façade air infiltration, separate to designed natural *ventilation openings*.

S45C3 Proposed building and reference building

[New for 2022]

(1) The *heating load*, *cooling load* and *energy value* for J1V5(1) and (2) must be calculated for both the proposed building and the *reference building sole-occupancy unit* using the same—

(a) *heating load* or *cooling load* limits, calculated using *heating degree hours*, *cooling degree hours* and *dehumidification gram hours* from Table S45C3a; and

(b) *energy value* factors from Tables S45C3b and S45C3c; and

(c) location, in accordance with S34C3(3); and

(d) climatic data, using the Typical Meteorological Year weather files drawn from the years 1990 to 2015 published by CSIRO; and

(e) adjacent structures and features; and

(f) orientation; and

(g) building form, including—

(i) roof geometry; and

(ii) floor plan; and

(iii) number of *storeys*; and

(iv) location, extent and configuration of ground floors and basements; and

(v) the size and location of *glazing*; and

(vi) external doors; and

(vii) walls between or bounding *sole-occupancy units*; and

(viii) balconies; and

(h) testing standards, including for insulation, *glazing*, water heater and unitary *air-conditioning* equipment; and

(i) *fabric* and *glazing*, including—

(i) thermal resistance of air films including any adjustment factors, moisture content of materials and the like;

and

(ii) internal shading devices, including their colour and criteria for operation; and

(j) system configuration and control of *air-conditioning services* and energy sources other than *renewable energy* generated on-site where present; and

(k) capacity and water usage, for on-site domestic *heated water* systems, assuming—

(i) a consumption rate in accordance with Table A.6.2 of AS/NZS 4234 of 10 L plus 1.25 L per m^2 of *floor area* per *sole-occupancy unit* per day; and

(ii) a seasonal load profile in accordance with Table A.6.3 of AS/NZS 4234; and

(iii) a water inlet temperature of the monthly ground temperature in accordance with Table A.8 of AS/NZS 4234; and

(iv) a water outlet temperature of 60°C; and

(v) the same calculation method for standing losses; and

(l) internal *heating loads*, in accordance with Table S45C3d; and

(m) occupancy profiles, in accordance with Tables S45C3e to S45C3l; and

(n) internal zoning, assuming—

(i) daytime air-conditioned zones include at least one living space and one dining space; and

(ii) kitchen zones are a separate zone using virtual wall partitions at all times, and are only air-conditioned if adjacent to an external façade; and

(iii) each bedroom is a night-time air-conditioned zone; and

(iv) all other zones, including pantries, corridors, en-suites, walk-in robes, bathrooms, toilets, laundries and adjacent roof space or basement are unconditioned; and

(o) the same assumptions and means of calculating the temperature difference across *air-conditioning* zone boundaries; and

(p) the same floor coverings, furniture and fittings density; and

(q) the same internal artificial lighting illumination levels.

(2) Where present, the *air-conditioning services*, including all centralised *domestic services* infrastructure, of each *sole-occupancy unit* of both the proposed building and the *reference building* must be modelled with—

(a) in *climate zone* 2 to 8, a heating thermostat setting of—

(i) 20°C for all conditioned zones from 6:00 am to 12:00 am; and

(ii) 18°C at all other times; and

(b) a cooling thermostat setting of—

(i) in *climate zones* 1, 2 and 3, 27°C for all daytime conditioned zones from 6:00 am to 11:00 pm; and

(ii) in *climate zone* 4, 26°C for all daytime conditioned zones from 6:00 am to 11:00 pm; and

(iii) in *climate zone* 5, 25°C for all daytime conditioned zones from 6:00 am to 11:00 pm; and

(iv) in *climate zones* 6 and 7, 24°C for all daytime conditioned from 6:00 am to 11:00pm; and

(v) in *climate zone* 8, 23°C for all daytime conditioned zones from 6:00 am to 11:00 pm; and

(vi) in all *climate zones*, a constant cooling thermostat setting of 24°C for all night-time conditioned zones.

(3) Natural ventilation of each *sole-occupancy unit* of the proposed building and the *reference building* must be modelled with the same—

(a) frequency of data output, being at least hourly; and

(b) opening flow properties in accordance with Table S45C3m; and

(c) wind pressure coefficients in accordance with Tables S45C3n and S45C3o; and

(d) infiltration values, unless building sealing is verified using J1V4, in which case infiltration values equal to the intended building air change rate at 50 Pa divided by 20 may be used for the proposed building only; and

(e) operation settings as follows:

(i) openings must shut when the external dry bulb temperature is less than or equal to a temperature 1°C

higher than the *air-conditioning service* cooling set point; and

(ii) openings must shut when the external dry bulb temperature is greater than or equal to a temperature 1°C lower than the *air-conditioning service* heating set point; and

(iii) openings must remain open for all hours of the year that do not meet the above closing conditions.

Table S45C3a: Annual heating degree hours, cooling degree hours and dehumidification gram hours for various locations

Climate zone	Location	Annual *heating degree hours*	Annual *cooling degree hours*	Annual *dehumidification gram hours*
1	Darwin	0	15770	15364
1	Port Hedland	859	16540	8011
1	Townsville	595	6392	5843
1	Weipa	4	12144	12565
1	Wyndham	126	26975	9184
1	Willis Island	N/A	N/A	N/A
1	Cairns	268	6411	6030
1	Broome	624	14749	14083
2	Rockhampton	3283	6717	1701
2	Amberley	10958	4483	290
2	Brisbane	4744	2228	1415
2	Coffs Harbour	7137	1309	231
2	Mackay	976	3183	5214
2	Gladstone	568	4307	3543
2	Oakey	15392	3979	40
3	Longreach	6002	14634	505
3	Carnarvon	2260	4810	1023
3	Alice Springs	11767	13149	125
3	Charleville	11284	9580	230
3	Halls Creek	611	19571	2109
3	Tennant Creek	1171	18644	1747
3	Mount Isa	3060	15813	1797
3	Newman	6286	15240	645
4	Moree	13986	7291	151
4	Wagga	24833	4678	0
4	Mildura	19003	6300	11
4	Meekatharra	6883	12766	67
4	Oodnadatta	8352	13845	18
4	Kalgoorlie	13048	7763	31
4	Woomera	11754	8434	3
4	Cobar	13663	7616	101
4	Dubbo	20431	5332	36
4	Giles	6259	13082	81
5	Geraldton	6846	6365	10
5	Perth	11024	6084	0
5	Williamtown	11713	2802	276

Climate zone	Location	Annual *heating degree hours*	Annual *cooling degree hours*	Annual *dehumidification gram hours*
5	Adelaide	13066	5132	0
5	Sydney RO (Observatory Hill)	7079	1466	129
5	Bickley	15664	4015	34
5	Swanbourne	6322	3332	63
5	Ceduna	14061	5212	53
5	Mandurah	6081	3131	2
5	Esperance	11009	1884	0
5	Manjimup	20910	2531	0
5	Mascot (Sydney Airport)	6357	1596	110
6	Nowra	14813	2801	56
6	Melbourne RO	14494	2416	0
6	East Sale	27229	1259	0
6	Katanning	21496	3566	14
6	Forrest	15294	8410	14
6	Albany	16131	932	0
6	Mount Lofty	41095	1626	0
6	Tullamarine (Melbourne Airport)	23496	2764	0
6	Mount Gambier	28496	2764	0
6	Moorabbin	20249	2291	0
6	Warnambool	27285	1406	1
6	Cape Otway	19279	960	3
6	Richmond	15607	3917	60
7	Armidale	33374	1039	9
7	Launceston (Ti Tree Bend)	30952	833	0
7	Canberra	35153	2863	0
7	Cabramurra	65831	79	0
7	Hobart	28542	451	0
7	Orange	40325	1192	2
7	Ballarat	37873	2585	2
7	Low Head	26047	80	0
7	Launceston Airport	39444	456	0
7	Learmonth	1646	14048	958
8	Thredbo (Village)	61209	147	0

Table Notes

If location is not listed, use the nearest appropriate.

Table S45C3b: Energy factors based on fuel type

Fuel type	ACT	NSW	NT	Qld	SA	Tas	Vic	WA
Electricity: peak (kWh)	1.55	1.53	1.54	1.53	1.54	1.55	1.53	1.54
Electricity: shoulder (kWh)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Electricity: off-peak (kWh)	0.78	0.79	0.79	0.79	0.78	0.78	0.79	0.79
Electricity: cont. load (kWh)	0.68	0.54	1.11	0.76	0.62	0.70	0.82	0.47
Natural gas (MJ)	0.18	0.14	0.16	0.24	0.13	0.21	0.10	0.16
Electricity: PV export (kWh)	0.42	0.39	1.10	0.51	0.35	0.50	0.53	0.29

Table S45C3c: Electricity usage — timing for categories of usage

Hour	Hour span	Weekday
1	24-1	Off-peak
2	1-2	Off-peak
3	2-3	Off-peak
4	3-4	Off-peak
5	4-5	Off-peak
6	5-6	Off-peak
7	6-7	Off-peak
8	7-8	Peak
9	8-9	Peak
10	9-10	Shoulder
11	10-11	Shoulder
12	11-12	Shoulder
13	12-13	Shoulder
14	13-14	Shoulder
15	14-15	Shoulder
16	15-16	Shoulder
17	16-17	Peak
18	17-18	Peak
19	18-19	Peak
20	19-20	Peak
21	20-21	Shoulder
22	21-22	Shoulder
23	22-23	Off-peak
24	23-24	Off-peak

Table S45C3d: Internal heat loads for lighting, cooking and appliances

Sole-occupancy unit area (excluding garage) (m^2)	Occupancy (m^2/person)	Day time lighting power density (6:00 am to 6:00 pm) (W/m^2)	Night-time lighting power density (6:00 pm to 6:00 am) (W/m^2)	Cooking in kitchen zone only (W/m^2 kitchen area)	Appliances (except oven) in whole *sole-occupancy unit* (W/m^2)
≤ 100	41.2	4.0	4.0	36.2	4.38
> 100 to ≤ 125	44.3	4.0	4.0	34.7	3.52
> 125 to ≤ 150	47.8	4.0	4.0	28.9	2.99
> 150 to ≤ 175	51.7	4.0	4.0	24.8	2.60
> 175 to ≤ 200	55.8	4.0	4.0	25.3	2.26
> 200 to ≤ 225	60.0	4.0	4.0	22.5	2.02
> 225 to ≤ 250	64.4	4.0	4.0	20.2	1.84
> 250 to ≤ 275	68.9	4.0	4.0	18.4	1.68
> 275 to ≤ 300	73.3	4.0	4.0	16.9	1.55
> 300 to ≤ 325	77.5	4.0	4.0	15.6	1.44
> 325 to ≤ 350	81.6	4.0	4.0	14.5	1.34
> 350 to ≤ 375	85.4	4.0	4.0	13.5	1.26
> 375	89.0	4.0	4.0	12.7	1.19

Table S45C3e: Lighting schedules for daytime zones

Time period (local standard time)	December to February	June to August	March to May, September to November
12:00 am to 1:00 am	0%	0%	0%
1:00 am to 2:00 am	0%	0%	0%
2:00 am to 3:00 am	0%	0%	0%
3:00 am to 4:00 am	0%	0%	0%
4:00 am to 5:00 am	0%	0%	0%
5:00 am to 6:00 am	0%	0%	0%
6:00 am to 7:00 am	5%	10%	5%
7:00 am to 8:00 am	5%	10%	5%
8:00 am to 9:00 am	0%	0%	0%
9:00 am to 10:00 am	0%	0%	0%
10:00 am to 11:00 am	0%	0%	0%
11:00 am to 12:00 pm	0%	0%	0%
12:00 pm to 1:00 pm	0%	0%	0%
1:00 pm to 2:00 pm	0%	0%	0%
2:00 pm to 3:00 pm	0%	0%	0%
3:00 pm to 4:00 pm	0%	0%	0%
4:00 pm to 5:00 pm	5%	5%	5%
5:00 pm to 6:00 pm	15%	20%	20%
6:00 pm to 7:00 pm	25%	30%	25%
7:00 pm to 8:00 pm	30%	35%	30%
8:00 pm to 9:00 pm	25%	30%	30%
9:00 pm to 10:00 pm	20%	25%	25%

Time period (local standard time)	December to February	June to August	March to May, September to November
10:00 pm to 11:00 pm	10%	15%	15%
11:00 pm to 12:00 am	0%	0%	0%

Table S45C3f: Lighting schedules for night-time zones

Time period (local standard time)	December to February	June to August	March to May, September to November
12:00 am to 1:00 am	0%	0%	0%
1:00 am to 2:00 am	0%	0%	0%
2:00 am to 3:00 am	0%	0%	0%
3:00 am to 4:00 am	0%	0%	0%
4:00 am to 5:00 am	0%	0%	0%
5:00 am to 6:00 am	0%	0%	0%
6:00 am to 7:00 am	5%	10%	5%
7:00 am to 8:00 am	5%	10%	5%
8:00 am to 9:00 am	0%	0%	0%
9:00 am to 10:00 am	0%	0%	0%
10:00 am to 11:00 am	0%	0%	0%
11:00 am to 12:00 pm	0%	0%	0%
12:00 pm to 1:00 pm	0%	0%	0%
1:00 pm to 2:00 pm	0%	0%	0%
2:00 pm to 3:00 pm	0%	0%	0%
3:00 pm to 4:00 pm	0%	0%	0%
4:00 pm to 5:00 pm	0%	0%	0%
5:00 pm to 6:00 pm	15%	20%	20%
6:00 pm to 7:00 pm	25%	30%	25%
7:00 pm to 8:00 pm	30%	35%	30%
8:00 pm to 9:00 pm	25%	30%	30%
9:00 pm to 10:00 pm	20%	25%	25%
10:00 pm to 11:00 pm	10%	15%	10%
11:00 pm to 12:00 am	0%	0%	0%

Table S45C3g: Cooking schedules

Time period (local standard time)	December to February	June to August	March to May, September to November
12:00 am to 1:00 am	0%	0%	0%
1:00 am to 2:00 am	0%	0%	0%
2:00 am to 3:00 am	0%	0%	0%
3:00 am to 4:00 am	0%	0%	0%
4:00 am to 5:00 am	0%	0%	0%
5:00 am to 6:00 am	0%	0%	0%
6:00 am to 7:00 am	0%	0%	0%
7:00 am to 8:00 am	5%	5%	5%
8:00 am to 9:00 am	10%	10%	10%

Time period (local standard time)	December to February	June to August	March to May, September to November
9:00 am to 10:00 am	15%	15%	15%
10:00 am to 11:00 am	10%	15%	10%
11:00 am to 12:00 pm	15%	15%	15%
12:00 pm to 1:00 pm	15%	20%	20%
1:00 pm to 2:00 pm	15%	25%	20%
2:00 pm to 3:00 pm	15%	20%	20%
3:00 pm to 4:00 pm	15%	15%	15%
4:00 pm to 5:00 pm	20%	25%	20%
5:00 pm to 6:00 pm	30%	50%	40%
6:00 pm to 7:00 pm	60%	100%	80%
7:00 pm to 8:00 pm	70%	90%	80%
8:00 pm to 9:00 pm	40%	40%	40%
9:00 pm to 10:00 pm	20%	20%	20%
10:00 pm to 11:00 pm	10%	10%	10%
11:00 pm to 12:00 am	5%	5%	5%

Table S45C3h: Appliance schedule for all zones

Time period (local standard time)	December to February	June to August	March to May, September to November
12:00 am to 1:00 am	45%	45%	45%
1:00 am to 2:00 am	40%	40%	40%
2:00 am to 3:00 am	35%	40%	35%
3:00 am to 4:00 am	35%	40%	35%
4:00 am to 5:00 am	35%	40%	35%
5:00 am to 6:00 am	40%	40%	40%
6:00 am to 7:00 am	50%	55%	50%
7:00 am to 8:00 am	60%	75%	65%
8:00 am to 9:00 am	50%	55%	50%
9:00 am to 10:00 am	45%	50%	50%
10:00am to 11:00 am	45%	55%	50%
11:00 am to 12:00 pm	45%	50%	45%
12:00 pm to 1:00 pm	45%	50%	45%
1:00 pm to 2:00 pm	45%	50%	45%
2:00 pm to 3:00 pm	45%	50%	45%
3:00 pm to 4:00 pm	45%	50%	45%
4:00 pm to 5:00 pm	70%	85%	75%
5:00 pm to 6:00 pm	85%	100%	90%
6:00 pm to 7:00 pm	75%	85%	80%
7:00 pm to 8:00 pm	60%	70%	65%
8:00 pm to 9:00 pm	65%	75%	70%
9:00 pm to 10:00 pm	60%	70%	65%
10:00 pm to 11:00 pm	55%	60%	55%
11:00 pm to 12:00 am	50%	55%	50%

Table S45C3i: Occupancy schedules

Time period (local standard time)	Weekdays	Weekends
12:00 am to 1:00 am	0%	0%
1:00 am to 2:00 am	0%	0%
2:00 am to 3:00 am	0%	0%
3:00 am to 4:00 am	0%	0%
4:00 am to 5:00 am	0%	0%
5:00 am to 6:00 am	0%	0%
6:00 am to 7:00 am	30%	30%
7:00 am to 8:00 am	30%	30%
8:00 am to 9:00 am	100%	30%
9:00 am to 10:00 am	100%	100%
10:00 am to 11:00 am	50%	100%
11:00 am to 12:00 pm	50%	100%
12:00 pm to 1:00 pm	50%	100%
1:00 pm to 2:00 pm	50%	50%
2:00 pm to 3:00 pm	50%	50%
3:00 pm to 4:00 pm	50%	50%
4:00 pm to 5:00 pm	100%	50%
5:00 pm to 6:00 pm	100%	50%
6:00 pm to 7:00 pm	100%	100%
7:00 pm to 8:00 pm	100%	100%
8:00 pm to 9:00 pm	100%	100%
9:00 pm to 10:00 pm	30%	100%
10:00 pm to 11:00 pm	30%	30%
11:00 pm to 12:00 am	0%	0%

Table S45C3j: Heating, ventilation and air-conditioning schedules for daytime zones

Time period (local standard time)	Heating, ventilation and *air-conditioning* on/off
12:00 am to 1:00 am	Off
1:00 am to 2:00 am	Off
2:00 am to 3:00 am	Off
3:00 am to 4:00 am	Off
4:00 am to 5:00 am	Off
5:00 am to 6:00 am	Off
6:00 am to 7:00 am	On
7:00 am to 8:00 am	On
8:00 am to 9:00 am	On
9:00 am to 10:00 am	On
10:00 am to 11:00 am	On
11:00 am to 12:00 pm	On
12:00 pm to 1:00 pm	On
1:00 pm to 2:00 pm	On
2:00 pm to 3:00 pm	On

Time period (local standard time)	Heating, ventilation and *air-conditioning* on/off
3:00 pm to 4:00 pm	On
4:00 pm to 5:00 pm	On
5:00 pm to 6:00 pm	On
6:00 pm to 7:00 pm	On
7:00 pm to 8:00 pm	On
8:00 pm to 9:00 pm	On
9:00 pm to 10:00 pm	On
10:00 pm to 11:00 pm	On
11:00 pm to 12:00 am	Off

Table Notes

If windows are open in accordance with S45C3(3)(e), the heating, ventilation and air-conditioning schedule must be Off.

Table S45C3k: Occupancy schedules for night-time zones

Time period (local standard time)	Weekdays	Weekends
12:00 am to 1:00 am	100%	100%
1:00 am to 2:00 am	100%	100%
2:00 am to 3:00 am	100%	100%
3:00 am to 4:00 am	100%	100%
4:00 am to 5:00 am	100%	100%
5:00 am to 6:00 am	100%	100%
6:00 am to 7:00 am	50%	50%
7:00 am to 8:00 am	50%	50%
8:00 am to 9:00 am	50%	50%
9:00 am to 10:00 am	0%	0%
10:00 am to 11:00 am	0%	0%
11:00 am to 12:00 pm	0%	0%
12:00 pm to 1:00 pm	0%	0%
1:00 pm to 2:00 pm	0%	0%
2:00 pm to 3:00 pm	0%	0%
3:00 pm to 4:00 pm	0%	0%
4:00 pm to 5:00 pm	0%	0%
5:00 pm to 6:00 pm	0%	0%
6:00 pm to 7:00 pm	50%	50%
7:00 pm to 8:00 pm	50%	50%
8:00 pm to 9:00 pm	50%	50%
9:00 pm to 10:00 pm	100%	100%
10:00 pm to 11:00 pm	100%	100%
11:00 pm to 12:00 am	100%	100%

Table S45C3l: Heating, ventilation and air-conditioning schedules for night-time zones

Time period (local standard time)	All days, heating, ventilation and *air-conditioning* on/off
12:00 am to 1:00 am	On

Time period (local standard time)	All days, heating, ventilation and *air-conditioning* on/off
1:00 am to 2:00 am	On
2:00 am to 3:00 am	On
3:00 am to 4:00 am	On
4:00 am to 5:00 am	On
5:00 am to 6:00 am	On
6:00 am to 7:00 am	On
7:00 am to 8:00 am	On
8:00 am to 9:00 am	On
9:00 am to 10:00 am	Off
10:00 am to 11:00 am	Off
11:00 am to 12:00 pm	Off
12:00 pm to 1:00 pm	Off
1:00 pm to 2:00 pm	Off
2:00 pm to 3:00 pm	Off
3:00 pm to 4:00 pm	Off
4:00 pm to 5:00 pm	Off
5:00 pm to 6:00 pm	Off
6:00 pm to 7:00 pm	On
7:00 pm to 8:00 pm	On
8:00 pm to 9:00 pm	On
9:00 pm to 10:00 pm	On
10:00 pm to 11:00 pm	On
11:00 pm to 12:00 am	On

Table Notes

If windows are open in accordance with S45C3(3)(e), the Heating, ventilation and air-conditioning schedule must be Off.

Table S45C3m: Window opening area percentage

Window type	Opening area
Any *window* with restricted opening due to safety requirements	10%
Sliding and double hung	45%
Casement, awning, louvre, bi-fold, pivot, tilt and turn and French	90%

Table S45C3n: Wind pressure coefficients for natural ventilation of low-rise buildings (total height less than 12 m)

Exposure type	Façade component	Wind direction (0° perpendicular to face)				
		0	45	90	135	180
Exposed	Wall	0.70	035	-0.50	-0.40	-0.20
	Roof pitch < 10 degrees	-0.80	-0.70	-0.60	-0.50	-0.40
	Roof pitch 10 to 30 degrees	-0.40	-0.50	-0.60	-0.50	-0.40

Exposure type	Façade component	Wind direction (0° perpendicular to face)				
		0	45	90	135	180
	Roof pitch > 30 degrees	0.30	-0.40	-0.60	-0.40	-0.50
Semi-exposed	Wall	0.40	0.10	-0.30	-0.35	-0.20
	Roof pitch < 10 degrees	-0.60	-0.50	-0.40	-0.50	-0.60
	Roof pitch 10 to 30 degrees	-0.35	-0.45	-0.55	-0.45	-0.35
	Roof pitch > 30 degrees	0.30	-0.50	-0.60	-0.50	-0.50
Sheltered	Wall	0.20	0.05	-0.25	-0.30	-0.25
	Roof pitch < 10 degrees	-0.50	-0.50	-0.40	-0.50	-0.50
	Roof pitch 10 to 30 degrees	-0.30	-0.40	-0.50	-0.40	-0.30
	Roof pitch > 30 degrees	0.25	-0.30	-0.50	-0.30	-0.40

Table Notes

Pressure coefficient exposure categories are defined as follows:

(a) Exposed – no obstructions surrounding the building (e.g. open fields or bodies of water).

(b) Semi-exposed – some obstructions comparable to the height of the building on some but not all sides.

(c) Sheltered – obstructions comparable to the height of the building on all sides.

Table S45C3o: Wind pressure coefficients for natural ventilation of high-rise building (total height more than 12 m)

Exposure type	Façade component	Wind direction (0° perpendicular to face)				
		0	45	90	135	180
Exposed	Wall h/H = 0.0	0.30	0.22	-0.23	-0.43	-0.24
	Wall h/H = 0.2	0.32	0.22	-0.43	-0.44	-0.25
	Wall h/H = 0.4	0.39	0.16	-0.56	-0.43	-0.27
	Wall h/H = 0.6	0.55	0.24	-0.62	-0.41	-0.29
	Wall h/H = 0.8	0.65	0.32	-0.65	-0.39	-0.28
	Wall h/H = 1.0	0.40	0.15	-0.65	-0.38	-0.26
	Flat roof h/H = 0.0	-0.23	-0.23	-0.23	-0.23	-0.23
	Flat roof h/H = 0.2	-0.43	-0.43	-0.43	-0.43	-0.43
	Flat roof h/H = 0.4	-0.56	-0.56	-0.56	-0.56	-0.56
	Flat roof h/H = 0.6	-0.62	-0.62	-0.62	-0.62	-0.62
	Flat roof h/H = 0.8	-0.65	-0.65	-0.65	-0.65	-0.65
	Flat roof h/H = 1.0	-0.65	-0.65	-0.65	-0.65	-0.65

Exposure type	Façade component	Wind direction (0° perpendicular to face)				
		0	45	90	135	180
Semi-exposed	Wall h/H = 0.0	0.19	0.08	-0.15	-0.28	-0.15
	Wall h/H = 0.2	0.20	0.08	-0.28	-0.29	-0.16
	Wall h/H = 0.4	0.25	0.10	-0.36	-0.28	-0.18
	Wall h/H = 0.6	0.36	0.16	-0.40	-0.27	-0.19
	Wall h/H = 0.8	0.42	0.20	-0.42	-0.25	-0.18
	Wall h/H = 1.0	0.26	0.10	-0.42	-0.25	-0.17
	Flat roof h/H = 0.0	-0.15	-0.15	-0.15	-0.15	-0.15
	Flat roof h/H = 0.2	-0.28	-0.28	-0.28	-0.28	-0.28
	Flat roof h/H = 0.4	-0.36	-0.36	-0.36	-0.36	-0.36
	Flat roof h/H = 0.6	-0.40	-0.40	-0.40	-0.40	-0.40
	Flat roof h/H = 0.8	-0.42	-0.42	-0.42	-0.42	-0.42
	Flat roof h/H = 1.0	-0.42	-0.42	-0.42	-0.42	-0.42
Sheltered	Wall h/H = 0.0	0.10	0.04	-0.08	-0.15	-0.08
	Wall h/H = 0.2	0.11	0.04	-0.15	-0.15	-0.08
	Wall h/H = 0.4	0.13	0.05	-0.19	-0.15	-0.09
	Wall h/H = 0.6	0.19	0.08	-0.21	-0.14	-0.10
	Wall h/H = 0.8	0.22	0.11	-0.22	-0.13	-0.09
	Wall h/H = 1.0	0.32	0.05	-0.22	-0.13	-0.09
	Flat roof h/H = 0.0	-0.08	-0.08	-0.08	-0.08	-0.08
	Flat roof h/H = 0.2	-0.15	-0.15	-0.15	-0.15	-0.15
	Flat roof h/H = 0.4	-0.19	-0.19	-0.19	-0.19	-0.19
	Flat roof h/H = 0.6	-0.21	-0.21	-0.21	-0.21	-0.21
	Flat roof h/H = 0.8	-0.22	-0.22	-0.22	-0.22	-0.22
	Flat roof h/H = 1.0	-0.22	-0.22	-0.22	-0.22	-0.22

Table Notes

(1) Pressure coefficient exposure categories are defined as follows:

(a) Exposed – no obstructions surrounding the building (e.g. open fields or bodies of water).

(b) Semi-exposed – some obstructions comparable to the height of the building on some but not all sides.

(c) Sheltered – obstructions comparable to the building height on all sides.

(2) h = height of natural ventilation opening above ground.

(3) H = height of roof of building above ground.

Schedule 1 Definitions

Abbreviations

Symbols

Glossary

Abbreviations

Abbreviation	Definitions
ABCB	Australian Building Codes Board
AC	Alternating Current
ACC	Acrylic conformal coating
ACL	Acrylic latex
ACP	Aluminium Composite Panel
AIRAH	Australian Institute of Refrigeration, Air conditioning and Heating
ANSI	American National Standards Institute
AS	Australian Standard
ASET	Available Safe Egress Time
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASTM	American Society for Testing and Materials
BCA	Building Code of Australia
BE	Fire blocks evacuation route
CAN	National Standard of Canada
CCT	Correlated Colour Temperature
CF	Challenging fire
CHF	Critical Heat Flux
CIBSE	Chartered Institution of Building Services Engineers
CRF	Critical Radiant Flux
CRI	Colour Rendering Index
CS	Fire starts in a concealed space
C_{SHGC}	Constant for solar heat gain
CSIRO	Commonwealth Scientific and Industrial Research Organisation
C_U	Constant for conductance
DC	Direct Current
FED	Fractional Effective Dose
FI	Fire brigade intervention
FRL	Fire Resistance Level
FZ	Flame Zone
GEMS	Greenhouse and Energy Minimum Standards
GRP	Glass fibre reinforced polyester
HDG	Hot dip galvanising
HRR	Heat Release Rate
HS	Horizontal fire spread
IS	Rapid fire spread involving internal surface linings
ISO	International Organisation for Standardisation
IZS	Inorganic zinc silicate
LED	Light-Emitting Diode
MEPS	Minimum Energy Performance Standards
NABERS	National Australian Built Environment Rating System

Abbreviation	Definitions
NASH	National Association of Steel-Framed Housing
NATA	National Association of Testing Authorities Australia
NatHERS	Nationwide House Energy Rating Scheme
NCC	National Construction Code
NSF	National Sanitation Foundation
PBDB	Performance-based design brief
PCA	Plumbing Code of Australia
PMV	Predicted Mean Vote
ppm	parts per million
PUR	Polyurethane
PVC	Polyvinyl chloride
RC	Robustness check
RSET	Required Safe Egress Time
R_W	Weighted sound reduction index
SF	Smouldering fire
SHGC	Solar Heat Gain Coefficient
SL	Square mesh
SS	Structural stability and other property
STC	Sound Transmission Class
TM	Trench mesh
UF	Unexpected catastrophic failure
UPVC	Unplasticized polyvinyl chloride
UT	Fire in normally unoccupied room threatening occupants of other rooms
U-Value	Thermal transmittance
VS	Vertical fire spread involving external cladding or external openings

Symbols

Symbols	Definitions
°	degree(s)
°C	degree(s) Celsius
°CDB	degree(s) Celsius Dry Bulb
°CWB	degree(s) Celsius Wet Bulb
-e/MJ	equivalent per Megajoule(s)
µm	micrometre
µg/N.s	Micrograms per newton-second
dB(A)	decibels “A” scale weighting network
f’c	Characteristic compressive strength of concrete at 28 days
f’y	Yield stress used in design
G	Permanent load
J	Joule(s)
J/kg.K	Joules per kilogram degree Kelvin
J/s.m^2	Joules per second square metre
K	Kelvin(s)
kg	kilogram(s)
kg/m	kilogram(s) per metre
kg/m^2	kilogram(s) per square metre
kg/m^3	kilogram(s) per cubic metre
kJ/m^2.hour	kilojoules per square metre hour
km	kilometre(s)
kPa	kilopascal(s)
kW/m^2	kilowatt(s) per square metre
kW$_{heating}$	kilowatt(s) of heating
kWr	kilowatt(s) of refrigeration
L	litre(s)
L/min	litre(s) per minute
L/s	litre(s) per second
L/s.m^2	litre(s) per second square metre
Lumens/W	Lumens per Watt
lx	lux
m	metre(s)
m/s	metre(s) per second
m^2	square metre(s)
m^2.K/W	square metre Kelvin(s) per Watt
m^3	cubic metre(s)
m^3/hour	cubic metre(s) per hour
m^3/s	cubic metre(s) per second
mcd/m^2	millicandelas per square metre
min	minute(s)

Symbols	Definitions
MJ/hour	Megajoules per hour
MJ/m^2.annum	Megajoules per square metre annum
mm	millimetre(s)
mm^2	square millimetre(s)
MW	megawatt(s)
N	newton(s)
N/m	Newton(s) per metre
Pa	pascal(s)
Pa/m	pascal(s) per metre
Q	Imposed load
s	second(s)
ULS	Ultimate limit state
V	Volt(s)
W	Watt(s)
$W_{input\ power}$	Watts of input power
$Wr/W_{input\ power}$	Watts of thermal refrigeration per watt of input power
W/kW_{rej}	Watts per kilowatt of heat rejected
$Wm^{-1}K^{-1}$	Watts per metre degree Kelvin
W/m^2	Watts per square metre
°south	degree south
%	percent
>	greater than
<	less than
≤	less than or equal to
≥	equal to or more than

Glossary

Above ground rainwater tank: A rainwater tank that is not in any way set into the ground.

Accessible: Having features to enable use by people with a disability.

Accessway: A continuous *accessible* path of travel (as defined in AS 1428.1) to, into or within a building.

Accredited Testing Laboratory: One of the following:

(a) An organisation accredited by the National Association of Testing Authorities Australia (NATA) to undertake the relevant tests.

(b) An organisation outside Australia accredited to undertake the relevant tests by an authority recognised by NATA through a mutual recognition agreement.

(c) An organisation recognised as being an Accredited Testing Laboratory under legislation at the time the test was undertaken.

Activity support level: The degree to which occupants can undertake activities with respect to the likely *activity traits* and *occupant traits*.

Explanatory Information

This term is used to articulate whether the height of a room or space is sufficient and by what degree. This is achieved by having regard to the room or space's intended use by occupants, through consideration of the defined terms '*activity traits*' and '*occupant traits*'.

Activity traits: For the purposes of—

(a) Volume One, the features of the activities that will be undertaken in a *habitable room* or space; or

(b) Volume Two, the features of the activities that will be undertaken in a room or space.

Explanatory Information

This term is used to describe the characteristics of the activities that will be undertaken in a room or space.

For example, the activities likely to be undertaken in a bedroom, and the associated features are—

- sleeping — a person laying horizontally; and
- resting — a person laying horizontally or sitting upright on the bed; and
- leisure activities, such as reading a book — a person sitting upright on the bed, with enough space to stretch their arms vertically; and
- dressing/changing clothes — a person standing with enough space to stretch their arms vertically.

Administering body: The body responsible for administering the *WaterMark Certification Scheme*.

Aged care building: A Class 9c building for residential accommodation of aged persons who, due to varying degrees of incapacity associated with the ageing process, are provided with *personal care services* and 24 hour staff assistance to evacuate the building during an emergency.

NSW Aisle

SA Agriculture

Air-conditioning: For the purposes of Section J of Volume One, a *service* that actively cools or heats the air within a space, but does not include a *service* that directly—

(a) cools or heats cold or hot rooms; or

(b) maintains specialised conditions for equipment or processes, where this is the main purpose of the *service*.

Alarm zone: For the purposes of Specification 23, an area of a building protected by one or more smoke alarms connected to one alarm circuit.

Alpine area: An area given in Figure 1 and in Table 1 for specific locations, and is—

(a) likely to be subject to significant snowfalls; and

(b) in New South Wales, the ACT or Victoria more than 1200 m above the Australian Height Datum; and

(c) in Tasmania more than 900 m above the Australian Height Datum.

Table 1: Alpine areas where snow loads are significant

Location	Map identifier
Kiandra (NSW)	1
Mount Kosciuszko (NSW)	2
Perisher Valley (NSW)	3
Thredbo (NSW)	4
Cabramurra (NSW)	5
Charlotte Pass Village (NSW)	6
Diggers Creek (NSW)	7
Guthega Village (NSW)	8
Mount Blue Cow (NSW)	9
Mount Selwyn (NSW)	10
Perisher Range (NSW)	11
Rules Point (NSW)	12
Sawpit Creek (NSW)	13
Smiggin Holes (NSW)	14
Smiggin Range (NSW)	15
Three Mile Dam (NSW)	16
Wilsons Valley (NSW)	17
Falls Creek (Vic.), including Summit Area, Sun Valley and Village Bowl	18
Mount Baw Baw (Vic.)	19
Mount Buffalo (Vic.), including Chalet, Dingo Dell and Tatra	20
Mount Buller (Vic.), including Baldy and Village	21
Mount Hotham (Vic.), including Davenport and Village Centre	22
Dinner Plain (Vic.)	23
Lake Mountain (Vic.)	24
Mount Stirling (Vic.)	25
Ben Lomond Ski Field (Tas.)	26
Cradle Valley (Tas.)	27
Great Lake Area (Tas.)	28
Mount Field Ski Field (Tas.)	29

Figure 1: Alpine areas

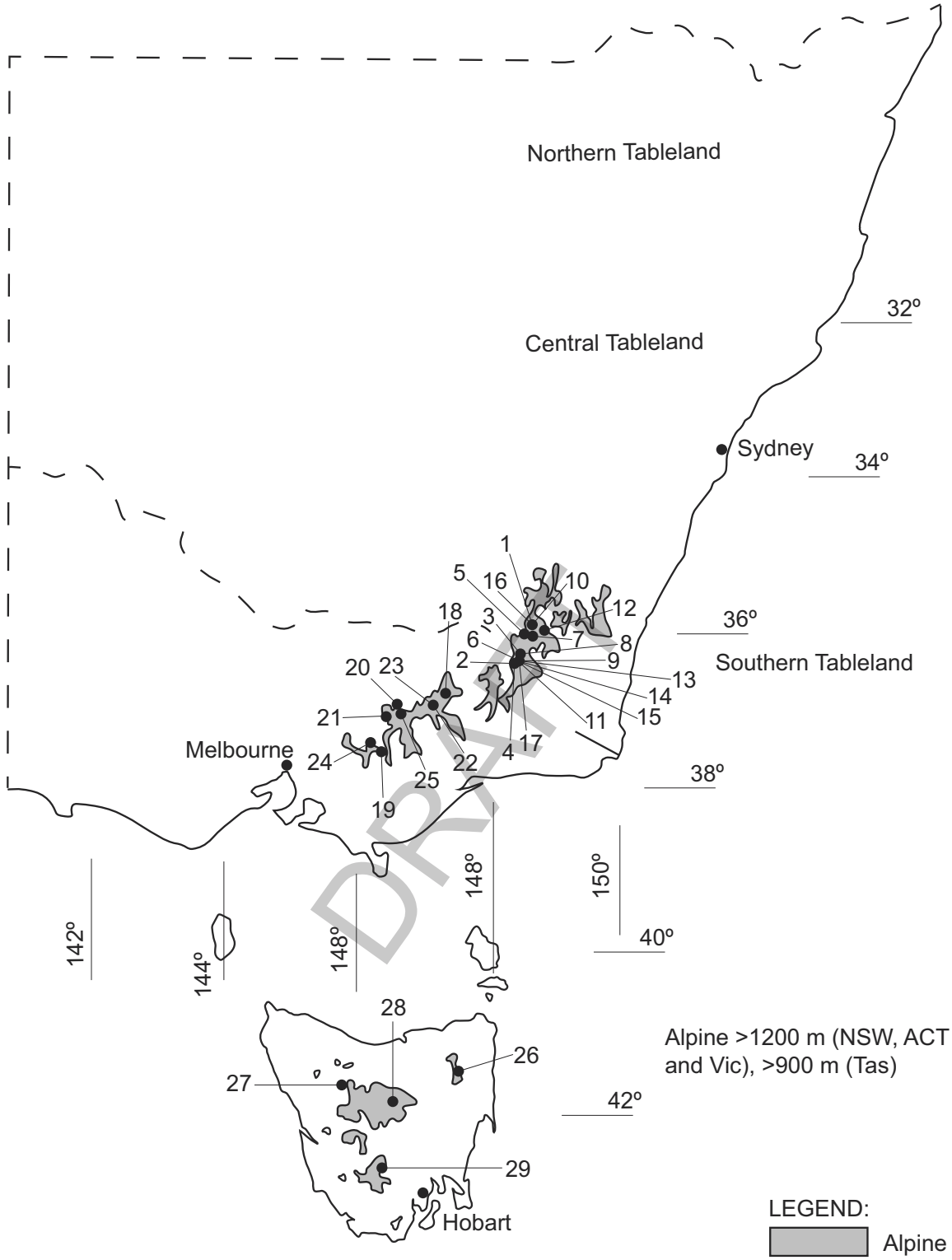


Figure Notes

This map is approximate only and altitude above Australian Height Datum must be used to determine whether the building falls into an *alpine area* region.

Explanatory Information

Alpine areas are located in New South Wales, Victoria and Tasmania.

Alpine areas are areas 1200 m or more above Australian Height Datum (AHD) for New South Wales, Australian Capital Territory and Victoria, and 900 m or more above AHD for Tasmania, as shown in Figure 1.

Alpine areas are considered to receive significant snowfalls (snowfalls that result in an average snow accumulation on

the ground of 175 mm or greater). Regions in New South Wales, the Australian Capital Territory and Victoria between 600 – 1200 m AHD are considered to be sub-alpine areas and may receive significant snowfalls, however unlike alpine areas the snow is unlikely to accumulate.

It is recommended that the *appropriate authority* be consulted to determine whether the building is located in an alpine area. AS/NZS 1170.3 also contains further detail in the identification of alpine areas and the altitude of the alpine regions of Australia.

In the Australian Capital Territory, Canberra is not designated as an alpine areas as snow loads are not considered significant.

Alteration: In relation to a building, includes an addition or extension to a building.

Aluminium Composite Panel (ACP): Flat or profiled aluminium sheet material in composite with any type of materials.

Amenity: An attribute which contributes to the health, physical independence, comfort and well-being of people.

Ancillary element: An element that is secondary to and not an integral part of another element to which it is attached.

Annual exceedance probability: The probability that a given rainfall total accumulated over a given duration will be exceeded in any one year.

Annual greenhouse gas emissions: The theoretical amount of greenhouse gas emissions attributable to the energy used annually by a building's *services*, excluding kitchen exhaust and the like.

Appropriate authority: For the purposes of the Fire Safety Verification Method, means the relevant authority with the statutory responsibility to determine the particular matter satisfies the relevant *Performance Requirement*.

Explanatory Information

The *Appropriate Authority* is typically the building surveyor or building certifier charged with the statutory responsibility to determine building compliance and issue the building permit / approval and occupancy certificate / approval.

NSW Appropriate authority

Appropriate authority: The relevant authority with the statutory responsibility to determine the particular matter.

Appropriately qualified person: A person recognised by the *appropriate authority* as having qualifications and/or experience in the relevant discipline in question.

Approved disposal system: A system for the disposal of sewage, sullage or stormwater approved by an authority having jurisdiction.

Articulated masonry: Masonry construction in which special provisions have been made for movement by articulation.

NSW Assembly building

SA Assembly building

Assembly building: A building where people may assemble for—

(a) civic, theatrical, social, political or religious purposes including a library, theatre, public hall or place of worship; or

(b) educational purposes in a *school*, *early childhood centre*, preschool, or the like; or

(c) entertainment, recreational or sporting purposes including—

(i) a discotheque, nightclub or a bar area of a hotel or motel providing live entertainment or containing a dance floor; or

(ii) a cinema; or

(iii) a sports stadium, sporting or other club; or

(d) transit purposes including a bus station, railway station, airport or ferry terminal.

Assessment Method: A method that can be used for determining that a *Performance Solution* or *Deemed-to-Satisfy Solution* complies with the *Performance Requirements*.

Assumed cooling thermostat set point: The cooling thermostat set point used to calculate *cooling degree hours*, and equal to $17.8 + 0.31T_m$, where T_m

is the mean January outdoor air temperature measured in degrees Celsius.

Atrium: A space within a building that connects 2 or more *storeys* and—

(a) is enclosed at the top by a floor or roof (including a glazed roof structure); and

(b) includes any adjacent part of the building not separated by an appropriate barrier to fire; but

(c) does not include a stairwell, rampwell or the space within a *shaft*; and

(d) for the purposes of (a) a space is considered enclosed if the area of the enclosing floor or roof is greater than 50% of the area of the space, measured in plan, of any of the *storeys* connected by the space.

Atrium well: A space in an *atrium* bounded by the perimeter of the openings in the floors or by the perimeter of the floors and the *external walls*.

NSW Auditorium

Automatic: Designed to operate when activated by a heat, smoke or fire sensing device.

Available safe egress time (ASET)

(1) The time between ignition of a fire and the onset of untenable conditions in a specific part of a building.

(2) The time referred to in (1) is the calculated interval between the time of ignition of a fire and the time at which conditions become such that the occupant is unable to take effective action to escape to a place of safety.

Average daylight factor: The ratio of the illumination level within a room provided by daylight to the level of daylight outside the building during overcast conditions.

Average specific extinction area: The average specific extinction area for smoke as determined by AS 5637.1.

Backflow prevention device: An air gap, break tank or mechanical device that is designed to prevent the unplanned reversal of flow of water or *contaminants* into the water service or a *Network Utility Operator's* water supply.

Backpressure: A reversal of water flow caused by the downstream pressure becoming greater than the supply pressure.

Backsiphonage: A reversal of flow of water caused by negative pressure in the distributing pipes of a water service or supply.

Backstage: A space associated with, and adjacent to, a *stage* in a Class 9b building for scenery, props, equipment, dressing rooms, or the like.

Battery system: One or more chemical cells connected in series, parallel or a combination of the two for the purpose of electrical energy storage.

Blockage: An obstruction within a water service or sanitary *plumbing* or *drainage* system.

Boiler: A vessel or an arrangement of vessels and interconnecting parts, wherein steam or other vapour is generated, or water or other liquid is heated at a pressure above that of the atmosphere, by the application of fire, the products of combustion, electrical power, or similar high temperature means, and—

(a) includes superheaters, reheaters, economisers, boiler piping, supports, mountings, valves, gauges, fittings, controls, the boiler settings and directly associated equipment; but

(b) excludes a fully flooded or pressurised system where water or other liquid is heated to a temperature lower than the normal atmospheric boiling temperature of the liquid.

Bond breaker: A material used as part of a *waterproofing system* that prevents the *membrane* bonding to the substrate, bedding or lining.

Breaking surf: Any area of salt water in which waves break on an average of at least 4 days per week but does not include white caps or choppy water.

Explanatory Information

Breaking surf normally occurs in areas exposed to the open sea. Breaking surf does not normally occur in sheltered areas, such as that which occurs around Port Phillip Bay, Sydney Harbour, Swan River, Derwent River and similar locations.

Building complexity criteria: Are used to determine the building complexity level of all or part of a building in accordance with Table 2, where building complexity criteria are as follows:

(a) Attributes — the building is designed or constructed with any of the following sub-criteria:

(i) An *effective height* of more than 25 m.

(ii) One or more *Performance Solutions* are used to demonstrate compliance with the *Performance Requirements* relating to material and systems for structural safety.

(iii) One or more *Performance Solutions* are used to demonstrate compliance with the *Performance Requirements* relating to material and systems for fire safety.

(iv) Is located in an area prone to natural disaster or adverse environmental conditions.

(b) Class 2 — all or part of the building is Class 2 of three or more *storeys*.

(c) Occupant numbers — the building is to be occupied by more than 100 people determined in accordance with D2D18.

(d) Occupant characteristics — the building is to be occupied by more than 10 people who will require assistance to evacuate the building in an emergency.

(e) Importance Level — the building is determined to be Importance Level 4 or 5.

Notes

The NCC currently does not include corresponding technical requirements relating to the defined term 'building complexity criteria' and the various building complexity levels. It is intended that these terms will be integrated into future editions of the NCC.

Table 2: Building complexity level

Building complexity level	Criteria
Low	The building meets only one of the following *building complexity criteria*: (a) (Attributes), (b) (Class 2), (c) (Occupant numbers) or (d) (Occupant characteristics)
Medium	The building meets two of the following *building complexity criteria*: (a) (Attributes), (b) (Class 2), (c) (Occupant numbers) or (d) (Occupant characteristics)
High	The building meets three of the following *building complexity criteria*: (a) (Attributes), (b) (Class 2), (c) (Occupant numbers) or (d) (Occupant characteristics)
Very high	The building meets all of the following *building complexity criteria*: (a) (Attributes), (b) (Class 2), (c) (Occupant numbers) and (d) (Occupant characteristics); or (e) (Building Importance Level 4 or 5)

Buried rainwater tank: A rainwater tank that is set into and completely covered by earth.

Burnout: Exposure to fire for a time that includes *fire growth*, full development, and decay in the absence of intervention or automatic suppression, beyond which the fire is no longer a threat to building elements intended to perform *loadbearing* or fire separation functions, or both.

SA Brush fence

SA Bulk grain storage facility

Carpark: A building that is used for the parking of motor vehicles but is neither a *private garage* nor used for the servicing of vehicles, other than washing, cleaning or polishing.

Cavity: A void between 2 leaves of masonry, or in masonry veneer construction, a void between a leaf of masonry and the supporting frame.

Cavity wall: For the purposes of F3V1 and H2V1, a wall that incorporates a drained cavity.

SA Cell type silo

TAS Centre-based care class 4 facility

Certificate of Accreditation: A certificate issued by a State or Territory accreditation authority stating that the properties and performance of a building material or method of construction or design fulfil specific requirements of the NCC.

Certificate of Conformity: A certificate issued under the ABCB scheme for products and systems certification stating that the properties and performance of a building material or method of construction or design fulfil specific requirements of the NCC.

Certification body: A person or organisation operating in the field of material, product, form of construction or design certification that has been accredited by the Joint Accreditation System of Australia and New Zealand (JAS-ANZ), and is accredited for a purpose other than as part of the CodeMark Australia Certification Scheme or *WaterMark Certification Scheme*.

Characteristic: The occupant data to be used in the modelling of access solutions which define how an occupant interacts with a building, i.e. occupant movement speeds, turning ability, reach capability, perception of luminance contrast and hearing threshold.

VIC Children's service

Clad frame: Timber or metal frame construction with exterior timber or sheet wall cladding that is not sensitive to minor movement and includes substructure masonry walls up to 1.5 m high.

Climate zone: An area defined in Figure 2 and in Table 3 for specific locations, having energy efficiency provisions based on a range of similar climatic characteristics.

Table 3: Climate zones for thermal design

State	Location	*Climate zone*
ACT	Canberra	7
NSW	Albury	4
NSW	Armidale	7
NSW	Batemans Bay	6
NSW	Bathurst	7
NSW	Bega	6
NSW	Bellingen Shire - Dorrigo Plateau	7
NSW	Bellingen Shire - Valley & seaboard	2
NSW	Bourke	4
NSW	Broken Hill	4
NSW	Byron Bay	2
NSW	Cobar	4
NSW	Coffs Harbour	2
NSW	Dubbo	4
NSW	Goulburn	7
NSW	Grafton	2
NSW	Griffith	4
NSW	Ivanhoe	4
NSW	Lismore	2
NSW	Lord Howe Island	2
NSW	Moree	4
NSW	Newcastle	5
NSW	Nowra	6
NSW	Orange	7
NSW	Perisher - Smiggins	8
NSW	Port Macquarie	5
NSW	Sydney East	5
NSW	Sydney West	6
NSW	Tamworth	4
NSW	Thredbo	8
NSW	Wagga Wagga	4
NSW	Williamtown	5

State	Location	*Climate zone*
NSW	Wollongong	5
NSW	Yass	6
NT	Alice Springs	3
NT	Darwin	1
NT	Elliot	3
NT	Katherine	1
NT	Renner Springs	3
NT	Tennant Creek	3
QLD	Birdsville	3
QLD	Brisbane	2
QLD	Bundaberg	2
QLD	Cairns	1
QLD	Cooktown	1
QLD	Cunnamulla	3
QLD	Gladstone	2
QLD	Hervey Bay	2
QLD	Hughenden	3
QLD	Longreach	3
QLD	Mackay	2
QLD	Mount Isa	3
QLD	Normanton	1
QLD	Rockhampton	2
QLD	Roma	3
QLD	Southport	2
QLD	Toowoomba	5
QLD	Townsville	1
QLD	Warwick	5
QLD	Weipa	1
SA	Adelaide	5
SA	Bordertown	6
SA	Ceduna	5
SA	Cook	4
SA	Elliston	5
SA	Kingscote	6
SA	Leigh Creek	5
SA	Lobethal	6
SA	Loxton	5
SA	Naracoorte	6
SA	Marree	4
SA	Mount Gambier	6
SA	Murray Bridge	6
SA	Oodnadatta	4
SA	Port Augusta	4
SA	Port Lincoln	5

State	Location	*Climate zone*
SA	Renmark	5
SA	Tarcoola	4
SA	Victor Harbour	6
SA	Whyalla	4
TAS	Burnie	7
TAS	Bicheno	7
TAS	Deloraine	7
TAS	Devonport	7
TAS	Flinders Island	7
TAS	Hobart	7
TAS	Huonville	7
TAS	King Island	7
TAS	Launceston	7
AS	New Norfolk	7
TAS	Oatlands	7
TAS	Orford	7
TAS	Rossarden	7
TAS	Smithton	7
TAS	St Marys	7
TAS	Zeehan	7
VIC	Anglesea	6
VIC	Ararat	7
VIC	Bairnsdale	6
VIC	Ballarat	7
VIC	Benalla	6
VIC	Bendigo	6
VIC	Bright	7
VIC	Colac	6
VIC	Dandenong	6
VIC	Echuca	4
VIC	Geelong	6
VIC	Hamilton	7
VIC	Horsham	6
VIC	Melbourne	6
VIC	Mildura	4
VIC	Portland	6
VIC	Sale	6
VIC	Shepparton	4
VIC	Swan Hill	4
VIC	Traralgon	6
VIC	Wangaratta	7
VIC	Warrnambool	6
VIC	Wodonga	6
WA	Albany	6

State	Location	*Climate zone*
WA	Balladonia	4
WA	Broome	1
WA	Bunbury	5
WA	Carnarvon	3
WA	Christmas Island	1
WA	Cocos Island	1
WA	Derby	1
WA	Esperance	5
WA	Exmouth	1
WA	Geraldton	5
WA	Halls Creek	3
WA	Kalgoorlie-Boulder	4
WA	Karratha	1
WA	Meekatharra	4
WA	Northam	4
WA	Pemberton	6
WA	Perth	5
WA	Port Hedland	1
WA	Wagin	4
WA	Wyndham	1

Figure 2: Climate zones for thermal design

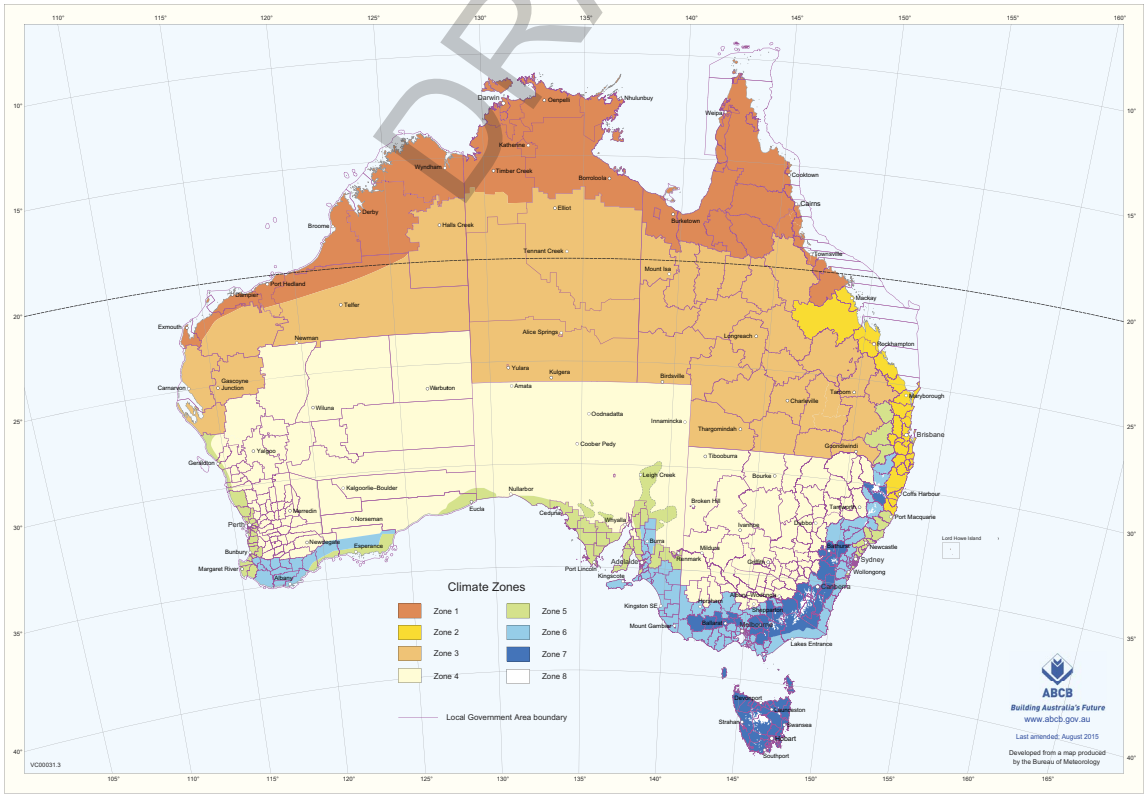


Figure Notes

(1) This map can be viewed in enlargeable form on the ABCB website at abcb.gov.au.

(2) A Zone 4 area in South Australia, other than a council area, at an altitude greater than 300 m above the

Australian Height Datum is to be considered as Zone 5.

(3) The areas referred to in (2) have been defined in an enlarged format on the following maps produced by the Department of Planning, Transport and Infrastructure (these maps can be viewed on the Government of South Australia website at www.sa.gov.au):

(a) Adelaide Hills Climate Zone Map.

(b) Barossa Council Climate Zone Map.

(c) Regional Council of Goyder Climate Zone Map.

(4) Locations in *climate zone* 8 are in *alpine areas*.

Combustible: Applied to—

(a) a material — means combustible as determined by AS 1530.1; and

(b) construction or part of a building — means constructed wholly or in part of combustible materials.

Common wall: For the purposes of—

(a) Volume One, a wall that is common to adjoining buildings.

(b) Volume Two and the ABCB Housing Provisions, a wall that is common to adjoining buildings other than Class 1 buildings.

Condensation: The formation of moisture on the surface of a building element or material as a result of moist air coming into contact with a surface which is at a lower temperature.

Conditioned space: For the purposes of—

(a) Volume One, a space within a building, including a ceiling or under-floor supply air plenum or return air plenum, where the environment is likely, by the intended use of the space, to have its temperature controlled by *air-conditioning*; or

(b) Volume Two, a space within a building that is heated or cooled by the building's *domestic services*, excluding a non-*habitable room* in which a heater with a capacity of not more than 1.2 kW or 4.3 MJ/hour is installed.

Construction activity actions: Actions due to stacking of building materials or the use of equipment, including cranes and trucks, during construction or actions which may be induced by floor to floor propping.

Containment protection: The installation of a *backflow prevention device* at the *point of connection* of a *Network Utility Operator's* water supply to a site.

Contaminant: Any substance (including gases, liquids, solids or micro-organisms), energy (excluding noise) or heat, that either by itself or in combination with the same, similar or other substances, energy or heat, changes or is likely to change the physical, chemical or biological condition of water.

NSW Continental seating

Controlled fill: Material that has been placed and compacted in layers with compaction equipment (such as a vibrating plate) within a defined moisture range to a defined density requirement.

Cooling degree hours: For any one hour when the mean outdoor air temperature is above the *assumed cooling thermostat set point*, the degree Celsius air temperature difference between the mean outdoor air temperature and the *assumed cooling thermostat set point*.

Cooling load: The calculated amount of energy removed from the cooled spaces of the building annually by artificial means to maintain the desired temperatures in those spaces.

Critical radiant flux (CRF): The critical heat flux at extinguishment (CHF in kW/m^2) as determined by AS ISO 9239.1.

Cross-connection: Any actual or potential connection between a water supply and any *contaminant*.

NSW Cross-over

Curtain wall: A non-*loadbearing external wall* that is not a *panel wall*.

Daily outdoor temperature range: The difference between the maximum and minimum temperatures that occur in a day.

Damp-proof course (DPC): A continuous layer of impervious material placed in a masonry wall or pier, or between a wall or pier and a floor, to prevent the upward or downward migration of water.

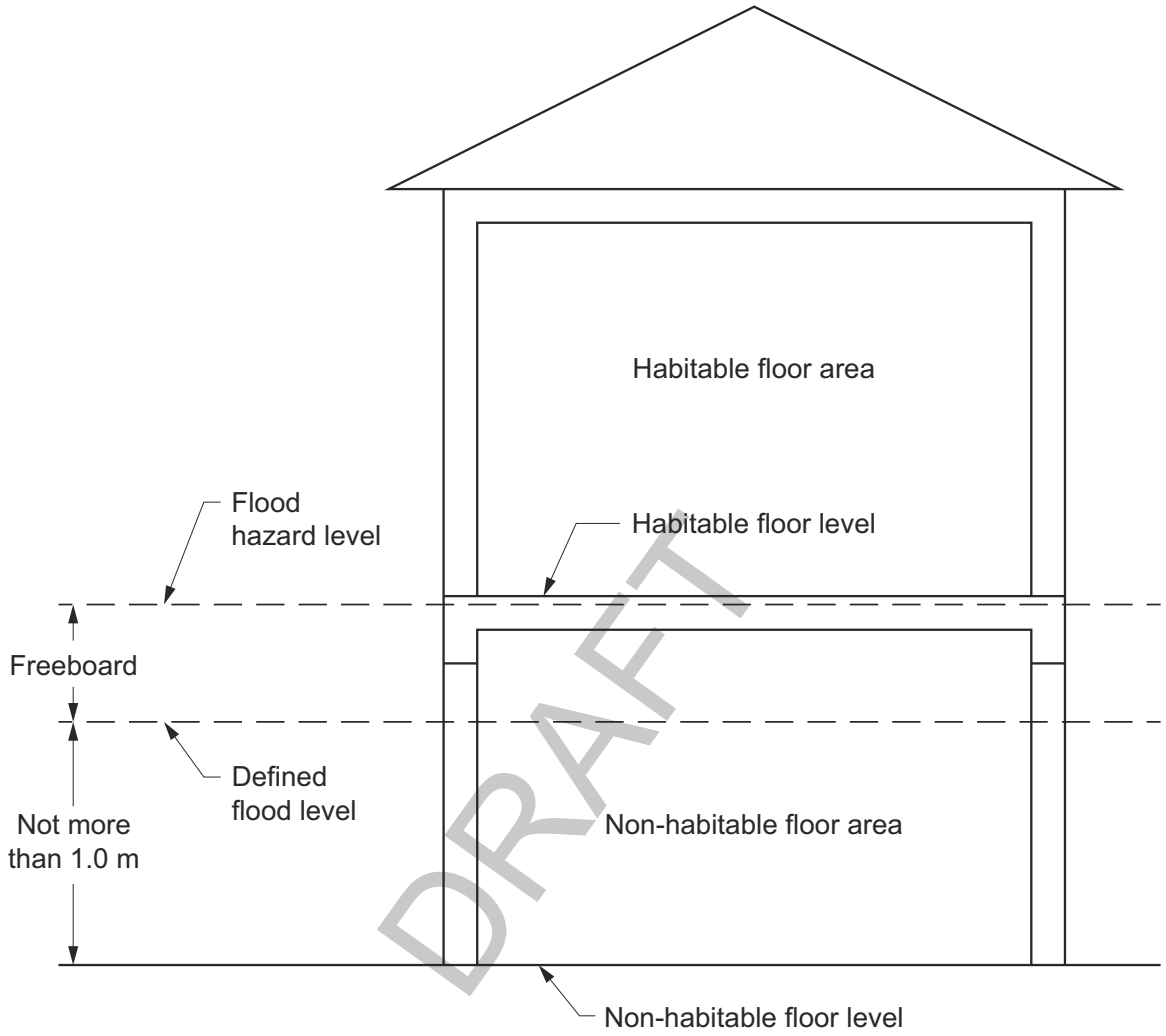
Deemed-to-Satisfy Provisions: Provisions which are deemed to satisfy the *Performance Requirements*.

Deemed-to-Satisfy Solution: A method of satisfying the *Deemed-to-Satisfy Provisions*.

Defined flood event (DFE): The flood event selected for the management of flood hazard for the location of specific development as determined by the *appropriate authority*.

Defined flood level (DFL): The flood level associated with a *defined flood event* relative to a specified datum (see Figure 3).

Figure 3: Identification of defined flood level, flood hazard level and freeboard



Dehumidification gram hours: For any one hour when the mean humidity is more than 15.7g/kg, the grams per kilogram of absolute humidity difference between the mean outdoor absolute humidity and 15.7g/kg.

NSW Designated bushfire prone area

Designated bushfire prone area: Land which has been designated under a power of legislation as being subject, or likely to be subject, to bushfires.

Design bushfire: The characteristics of a bushfire, its initiation, spread and development, which arises from weather conditions, topography and fuel (vegetation) in a given setting, used to determine *fire actions*.

Design fire: The quantitative description of a representation of a fire within the *design scenario*.

Design scenario: The specific scenario of which the sequence of events is quantified and a *fire safety engineering* analysis is conducted against.

WA Design wind speed

Design wind speed: The design gust wind speed for the area where the building is located, calculated in accordance with AS/NZS 1170.2 or AS 4055 (see Table 4 for wind classes).

Table 4: Wind classes

Non-cyclonic Region A and B	Cyclonic Region C and D
N1, N2, N3	C1
N4, N5, N6 (these wind classes are covered in the ABCB Housing Provisions Part 2.2).	C2, C3, C4 (these wind classes are covered in the ABCB Housing Provisions Part 2.2).

Table Notes

(1) Wind classification map identifying wind regions is contained in ABCB Housing Provisions Part 2.2 (see Figure 2.2.3).

(2) Information on wind classes for particular areas may be available from the *appropriate authority*.

(3) "N" = non-cyclonic winds and "C" = cyclonic winds.

Detention centre: A building in which persons are securely detained by means of the built structure including a prison, remand centre, juvenile detention centre, holding cells or psychiatric detention centre.

NSW Development consent

Direct fix cladding wall: For the purposes of F3V1 and H2V1, means a wall with cladding attached directly to the wall framing without the use of a drained cavity.

Discontinuous construction: Means—

(a) a wall having a minimum 20 mm cavity between 2 separate leaves, and—

(i) for masonry, where wall ties are used to connect leaves, the ties are of the resilient type; and

(ii) for other than masonry, there is no mechanical linkage between the leaves, except at the periphery; and

(b) a staggered stud wall is not deemed to be discontinuous construction.

Display glazing: *Glazing* used to display retail goods in a shop or showroom directly adjacent to a walkway or footpath, but not including that used in a café or restaurant.

Domestic services: The basic engineering systems that use energy or control the use of energy; and—

(a) includes—

(i) heating, *air-conditioning*, mechanical ventilation and artificial lighting; and

(ii) pumps and heaters for *swimming pools* and spa pools; and

(iii) heated water systems; and

(iv) on-site *renewable energy* equipment; but

(b) excludes cooking facilities and portable appliances.

Drainage: Any part of—

(a) a sanitary drainage system, including any liquid trade waste drainage; or

(b) a stormwater drainage system.

Drainage flange: A flange connected to a waste pipe, at the point at which it passes through the floor substrate, to prevent leakage and which enables tile bed drainage into the waste pipe.

Drainage riser: A waste pipe between the floor waste and the drainage system.

Drinking water: Water intended primarily for human consumption but which has other domestic uses.

Explanatory Information

See also the Australian Drinking Water Guidelines produced by the National Health and Medical Research Council.

TAS Early childhood centre

VIC Early childhood centre

Early childhood centre: Any premises or part thereof providing or intending to provide a centre-based education and care service within the meaning of the Education and Care Services National Law Act 2010 (Vic), the Education and Care Services National Regulations and centre-based services that are licensed or approved under State and Territory children's services law, but excludes education and care primarily provided to school aged children in outside school

hours settings.

Effective height: The vertical distance between the floor of the lowest *storey* included in the calculation of *rise in storeys* and the floor of the topmost *storey* (excluding the topmost *storey* if it contains only heating, ventilating, lift or other equipment, water tanks or similar service units).

Efficacy: The degree to which a system achieves a design objective given that it performs to a level consistent with the system specification during the relevant fire scenario.

Electricity network substation: A building in which high voltage supply is converted or transformed and which is controlled by a licensed network service provider designated under a power of legislation.

Electric passenger lift: A power-operated lift for raising or lowering people in a car in which the motion of the car is obtained from an electric motor mechanically coupled to the hoisting mechanism.

Electrohydraulic passenger lift: A power-operated lift for raising or lowering people in a car in which the motion of the car is obtained from the action of liquid under pressure acting on a piston or ram, the pressure being generated by a pump driven by an individual electric motor.

Energy value: The net cost to society including, but not limited to, costs to the building user, the environment and energy networks.

Engaged pier: A pier bonded to a masonry wall by course bonding of masonry units or by masonry ties.

NSW Entertainment venue

Envelope: For the purposes of—

(a) Section J in NCC Volume One, the parts of a building's *fabric* that separate a *conditioned space* or *habitable room* from—

(i) the exterior of the building; or

(ii) a non-*conditioned space* including—

(A) the floor of a rooftop plant room, lift-machine room or the like; and

(B) the floor above a *carpark* or warehouse; and

(C) the *common wall* with a *carpark*, warehouse or the like; or

(b) Part H6 in NCC Volume Two and Section 13 of the ABCB Housing Provisions, the parts of a building's *fabric* that separate artificially heated or cooled spaces from—

(i) the exterior of the building; or

(ii) other spaces that are not artificially heated or cooled.

Equivalent: Equivalent to the level of health, safety and amenity provided by the *Deemed-to-Satisfy Provisions*.

Evacuation route: The continuous path of travel (including *exits*, *public corridors* and the like) from any part of a building, including within a *sole-occupancy unit* in a Class 2 or 3 building or Class 4 part, to a *safe place*.

Evacuation time: The time calculated from when the emergency starts for the occupants of the building to evacuate to a *safe place*.

Exit: Means—

(a) Any, or any combination of the following if they provide egress to a road or *open space*:

(i) An internal or external stairway.

(ii) A ramp.

(iii) A *fire-isolated passageway*.

(iv) A doorway opening to a road or *open space*; or

(b) A *horizontal exit* or a *fire-isolated passageway* leading to a *horizontal exit*.

TAS Expert judgement

Expert judgement: The judgement of an expert who has the qualifications and experience to determine whether a *Performance Solution* or *Deemed-to-Satisfy Solution* complies with the *Performance Requirements*.

Explanatory Information

Contemporary and relevant qualifications and/or experience are necessary to determine whether a *Performance*

Solution complies with the *Performance Requirements*. The level of qualification and/or experience may differ depending on the complexity of the proposal and the requirements of the regulatory authority. Practitioners should seek advice from the authority having jurisdiction or *appropriate authority* for clarification as to what will be accepted.

External wall: For the purposes of—

(a) Volume One, an outer wall of a building which is not a *common wall*; or

(b) Volume Two, an outer wall of a building which is not a *separating wall*.

Extra-low voltage: A *voltage* not exceeding 50 V AC or 120 V ripple-free DC.

Fabric: The basic building structural elements and components of a building including the roof, ceilings, walls, glazing and floors.

SA Farm building

Farm building: A Class 7 or 8 building located on land primarily used for *farming*—

(a) that is—

(i) used in connection with *farming*; or

(ii) used primarily to store one or more *farm vehicles*; or

(iii) a combination of (i) and (ii); and

(b) in which the total number of persons accommodated at any time does not exceed one person per 200 m² of floor area or part thereof, up to a maximum of 8 persons; and

(c) with a total *floor area* of not more than 3500 m².

Farming: Includes—

(a) cultivating, propagating and harvesting plants or fungi or their products or parts, including seeds, spores, bulbs or the like, but does not include forestry; or

(b) maintaining animals in any physical environment for the purposes of—

(i) breeding them; or

(ii) selling them; or

(iii) acquiring and selling their bodily produce such as milk, wool, eggs or the like; or

(c) a combination of (a) and (b),

but does not include forestry or maintaining animals for sport or recreational purposes.

Farm shed: A single *storey* Class 7 or 8 building located on land primarily used for *farming*—

(a) that is—

(i) used in connection with *farming*; or

(ii) used primarily to store one or more *farm vehicles*; or

(iii) a combination of (i) and (ii); and

(b) occupied neither frequently nor for extended periods by people; and

(c) in which the total number of persons accommodated at any time does not exceed 2; and

(d) with a total *floor area* of more than 500 m² but not more than 2000 m².

Farm vehicle: A vehicle used in connection with *farming*.

NSW Film

Finished ground level: The ground level adjacent to footing systems at the completion of construction and landscaping.

Fire actions: Each of the following:

(a) airborne embers; and

(b) burning debris and/or accumulated embers adjacent to building elements; and

(c) heat transfer from combustible materials within the site; and

(d) radiant heat from a bushfire front; and

(e) flame contact from a bushfire front; and

(f) the period of time post fire front subject to collapsing vegetation due to persistent combustion.

Fire brigade: A statutory authority constituted under an Act of Parliament having as one of its functions, the protection of life and property from fire and other emergencies.

Fire brigade station: For the purposes of E1D2(1)(b) and I3D9, means a state or territory government operated premises which is a station for a *fire brigade*.

Fire compartment: Either—

(a) the total space of a building; or

(b) when referred to in—

(i) the *Performance Requirements* — any part of a building separated from the remainder by barriers to fire such as walls and/or floors having an appropriate resistance to the spread of fire with any openings adequately protected; or

(ii) the *Deemed-to-Satisfy Provisions* — any part of a building separated from the remainder by walls and/or floors each having an FRL not less than that *required* for a *fire wall* for that type of construction and where all openings in the separating construction are protected in accordance with the *Deemed-to-Satisfy Provisions* of the relevant Part.

Fire growth: The stage of fire development during which the *heat release rate* and the temperature of the fire are generally increasing.

Fire hazard: The danger in terms of potential harm and degree of exposure arising from the start and spread of fire and the smoke and gases that are thereby generated.

Fire hazard properties: The following properties of a material or assembly that indicate how they behave under specific fire test conditions:

(a) *Average specific extinction area*, *critical radiant flux* and *Flammability Index*, determined as defined in Schedule 1.

(b) *Smoke-Developed Index*, *smoke development rate* and *Spread-of-Flame Index*, determined in accordance with Specification 3.

(c) *Group number* and *smoke growth rate index* ($SMOGRA_{RC}$), determined in accordance with Specification 7.

Fire intensity: The rate of release of calorific energy in watts, determined either theoretically or empirically, as applicable.

Fire-isolated passageway: A corridor, hallway or the like, of *fire-resisting construction*, which provides egress to or from a *fire-isolated stairway* or *fire-isolated ramp* or to a road or *open space*.

Fire-isolated ramp: A ramp within a *fire-resisting* enclosure which provides egress from a *storey*.

Fire-isolated stairway: A stairway within a *fire-resisting shaft* and includes the floor and roof or top enclosing structure.

Fire load: The sum of the net calorific values of the *combustible* contents which can reasonably be expected to burn within a *fire compartment*, including furnishings, built-in and removable materials, and building elements.

Notes

The calorific values must be determined at the ambient moisture content or humidity (the unit of measurement is MJ).

Fire-protected timber: *Fire-resisting* timber building elements that comply with Specification 10.

Fire-protective covering: Any one or more of the following:

(a) 13 mm fire-protective grade plasterboard.

(b) 12 mm cellulose cement flat sheeting complying with AS/NZS 2908.2 or ISO 8336.

(c) 12 mm fibrous plaster reinforced with 13 mm x 13 mm x 0.7 mm galvanised steel wire mesh located not more than 6 mm from the exposed face.

(d) Other material not less fire-protective than 13 mm fire-protective grade plasterboard, fixed in accordance with the normal trade practice for a fire-protective covering.

Fire-resistance level (FRL): The grading periods in minutes determined in accordance with Specifications 1 and 2, for the following criteria—

(a) *structural adequacy*; and

(b) *integrity*; and

(c) *insulation*,

and expressed in that order.

Notes

A dash means there is no requirement for that criterion. For example, 90/–/– means there is no requirement for an FRL for *integrity* and *insulation*, and –/–/– means there is no requirement for an FRL.

Fire-resisting construction: For the purposes of Volume One, means one of the Types of construction referred to in Part C2 of Volume One.

Fire-resisting: For the purposes of—

(a) Volume One, applied to a building element, having an FRL appropriate for that element; or

(b) Volume Two, applied to a *structural member* or other part of a building, having the FRL *required* for that *structural member* or other part.

Fire safety engineering: Application of engineering principles, rules and *expert judgement* based on a scientific appreciation of the fire phenomenon, often using specific *design scenario*, of the effects of fire and of the reaction and behaviour of people in order to—

(a) save life, protect property and preserve the environment and heritage from destructive fire; and

(b) quantify the hazards and risk of fire and its effects; and

(c) mitigate fire damage by proper design, construction, arrangement and use of buildings, materials, structures, industrial processes and transportation systems; and

(d) evaluate analytically the optimum protective and preventive measures, including design, installation and maintenance of active and passive fire and life safety systems, necessary to limit, within prescribed levels, the consequences of fire.

Fire safety system: One or any combination of the methods used in a building to—

(a) warn people of an emergency; or

(b) provide for safe evacuation; or

(c) restrict the spread of fire; or

(d) extinguish a fire,

and includes both active and passive systems.

Fire-source feature: Any one or more of the following:

(a) The far boundary of a road, river, lake or the like adjoining the allotment.

(b) A side or rear boundary of the allotment.

(c) An *external wall* of another building on the allotment which is not a Class 10 building.

Fire wall: A wall with an appropriate resistance to the spread of fire that divides a *storey* or building into *fire compartments*.

Fixed wired: For the purposes of Specification 23, a system of electrical wiring (either AC or DC), in which cables are fixed or supported in position.

Flammability Index: The index number as determined by AS 1530.2.

VIC Flashing

Flashing: A strip or sleeve of impervious material dressed, fitted or built-in to provide a barrier to water movement, or to divert the travel of water, or to cover a joint where water would otherwise penetrate to the interior of a building, and includes the following:

(a) Perimeter flashing: a flashing used at the floor-wall junction.

(b) Vertical flashing: a flashing used at wall junctions within *shower areas*.

Flashover: In relation to *fire hazard properties*, means a *heat release rate* of 1 MW.

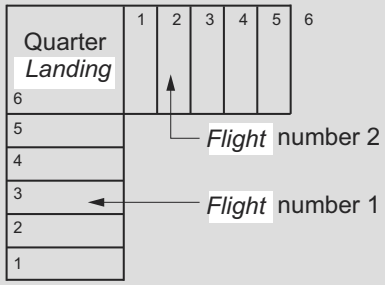
Flight: That part of a stair that has a continuous series of *risers*, including *risers* of *winders*, not interrupted by a *landing* or floor.

Explanatory Information

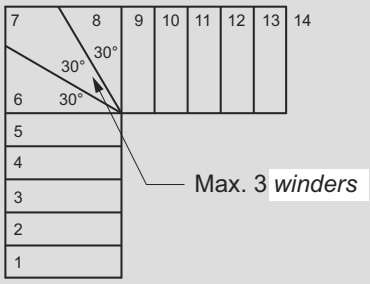
A *flight* is the part of a stair that has a continuous slope created by the nosing line of treads. The length of a *flight* is limited to restrict the distance a person could fall down a stair.

Quarter *landings*, as shown in Explanatory Figure 1, are considered sufficient to halt a person's fall and therefore are considered for the purposes of NCC Volume Two and the ABCB Housing Provisions not to be part of the *flight*.

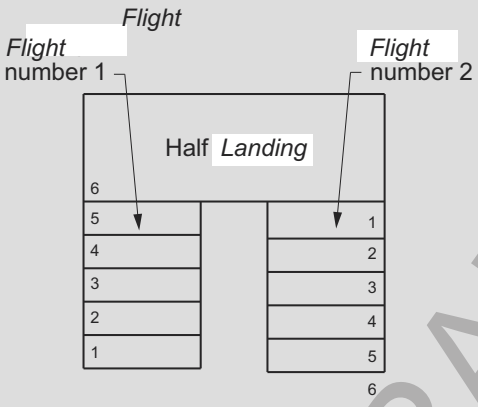
Figure 1 (explanatory): Identification of stair flights — Plan view



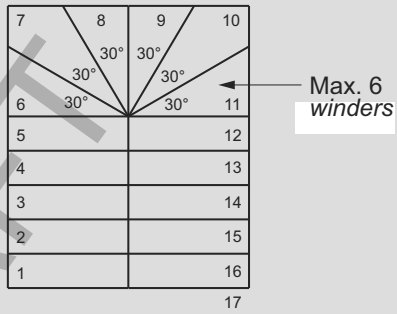
(a) Quarter landing stairway – 2 flights



(b) Continuous stairway – 1 flight (90º change in direction)



(c) Half landing stairway – 2 flights



(d) Continuous stairway – 1 flight (180º change in direction)

VIC Flood hazard area

Flood hazard area: The *site* (whether or not mapped) encompassing land lower than the *flood hazard level* which has been determined by the *appropriate authority*.

Flood hazard level (FHL): The flood level used to determine the height of floors in a building and represents the *defined flood level* plus the *freeboard* (see Figure 3).

Floor area: For the purposes of—

(1) Volume One—

(a) in relation to a building — the total area of all *storeys*; and

(b) in relation to a *storey* — the area of all floors of that *storey* measured over the enclosing walls, and includes—

(i) the area of a *mezzanine* within the *storey*, measured within the finished surfaces of any *external walls*; and

(ii) the area occupied by any *internal wall* or partitions, any cupboard, or other built-in furniture, fixture or fitting; and

(iii) if there is no enclosing wall, an area which has a use that contributes to the *fire load* or impacts on the safety, health or amenity of the occupants in relation to the provisions of the BCA; and

(c) in relation to a room — the area of the room measured within the internal finished surfaces of the walls, and includes the area occupied by any cupboard or other built-in furniture, fixture or fitting; and

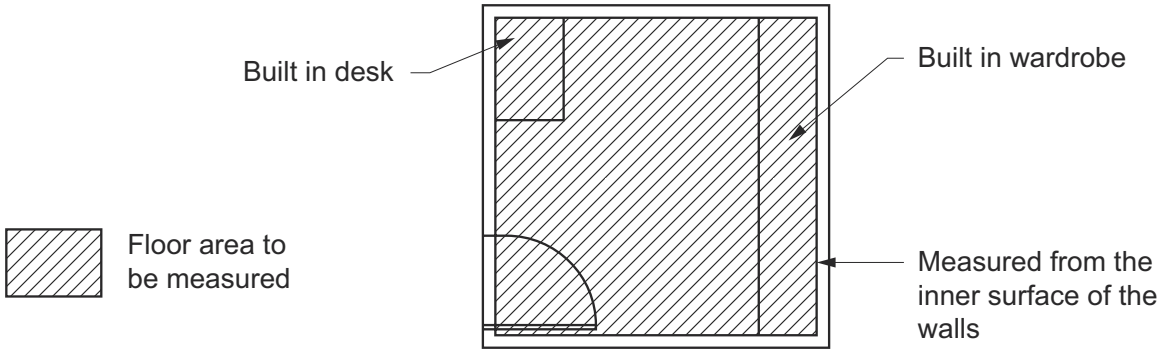
(d) in relation to a *fire compartment* — the total area of all floors within the *fire compartment* measured within the finished internal surfaces of the bounding construction, and if there is no bounding construction, includes an area which has a use which contributes to the *fire load*; and

(e) in relation to an *atrium* — the total area of all floors within the *atrium* measured within the finished surfaces

of the bounding construction and if no bounding construction, within the *external walls*.

(2) Volume Two and the ABCB Housing Provisions, in relation to a room, the area of the room measured within the finished surfaces of the walls, and includes the area occupied by any cupboard or other built-in furniture, fixture or fitting (see Figure 4).

Figure 4: Identification of floor area of a room

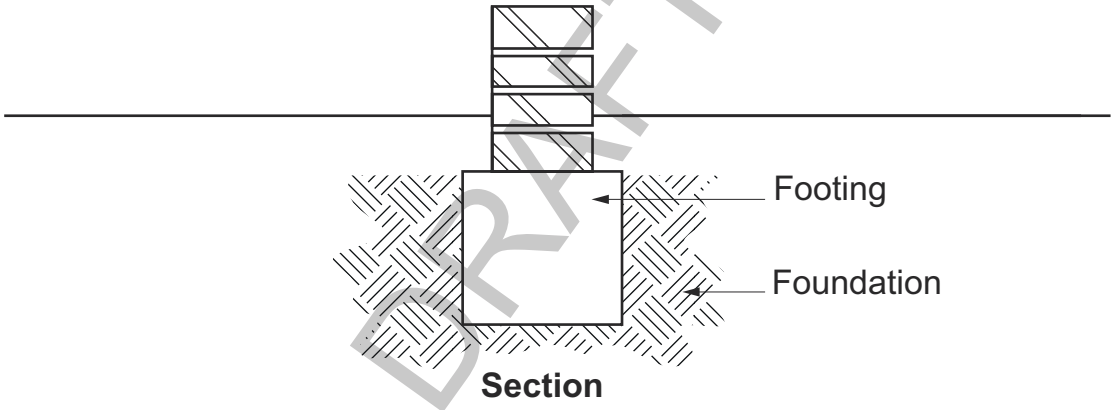


Floor waste: A grated inlet within a graded floor intended to drain the floor surface.

NSW Flying scenery

Foundation: The ground which supports the building (see Figure 5).

Figure 5: Identification of foundation



Fractional effective dose (FED): The fraction of the dose (of thermal effects) that would render a person of average susceptibility incapable of escape.

Explanatory Information

The definition for FED has been modified from the ISO definition to be made specific for the Fire Safety *Verification Method*. The use of CO or CO_2 as part of FED is not part of that *Verification Method*. This is because the ability to measure CO in a repeatable test varies by two orders of magnitude for common cellosic fuel.

VIC Freeboard

Freeboard: The height above the *defined flood level* as determined by the *appropriate authority*, used to compensate for effects such as wave action and localised hydraulic behaviour.

Fully developed fire: The state of total involvement of the majority of available combustible materials in a fire.

NSW Garage top dwelling

Glazing: For the purposes of—

(a) Section J of Volume One, except for a *sole-occupancy unit* of a Class 2 building or a Class 4 part of a building—

(i) a transparent or translucent element and its supporting frame located in the *envelope*; and

(ii) includes a *window* other than a *roof light*; or

(b) Section J of NCC Volume One, for a *sole-occupancy unit* of a Class 2 building or a Class 4 part of a building—

(i) a translucent element and its supporting frame located in the external *fabric* of the building; and

(ii) includes a *window* other than a *roof light*; or

(c) Part H6 of NCC Volume Two and Section 13 of the ABCB Housing Provisions—

(i) a transparent or translucent element and its supporting frame located in the external *fabric* of the building; and

(ii) includes a *window* other than a *roof light*.

Going: The horizontal dimension from the front to the back of a tread less any overhang from the next tread or *landing* above (see Figure 11.2.2f in the ABCB Housing Provisions).

Green Star: The building sustainability rating scheme managed by the Green Building Council of Australia.

NSW Grid

Group number: The number of one of 4 groups of materials used in the regulation of *fire hazard properties* and applied to materials used as a finish, surface, lining, or attachment to a wall or ceiling.

Habitable room: A room used for normal domestic activities, and—

(a) includes a bedroom, living room, lounge room, music room, television room, kitchen, dining room, sewing room, study, playroom, family room, home theatre and sunroom; but

(b) excludes a bathroom, laundry, water closet, pantry, walk-in wardrobe, corridor, hallway, lobby, photographic darkroom, clothes-drying room, and other spaces of a specialised nature occupied neither frequently nor for extended periods.

Hazard Rating: A level of potential toxicity that may cause contamination in a *drinking water* system, having a rating of *Low Hazard*, *Medium Hazard* or *High Hazard*, determined in accordance with NCC Volume Three.

Health-care building: A building whose occupants or patients undergoing medical treatment generally need physical assistance to evacuate the building during an emergency and includes—

(a) a public or private hospital; or

(b) a nursing home or similar facility for sick or disabled persons needing full-time care; or

(c) a clinic, day surgery or procedure unit where the effects of the predominant treatment administered involve patients becoming non-ambulatory and requiring supervised medical care on the premises for some time after the treatment.

Heated water: Water that has been intentionally heated; normally referred to as hot water or warm water.

Heating degree hours: For any one hour when the mean outdoor air temperature is less than 15°C, the degrees Celsius temperature difference between the mean outdoor air temperature and 15°C.

Heating load: The calculated amount of energy delivered to the heated spaces of the building annually by artificial means to maintain the desired temperatures in those spaces.

Heat release: The thermal energy produced by combustion (measured in kJ).

Heat release rate (HRR): The rate of thermal energy production generated by combustion, measured in kW (preferred) or MW.

High Hazard: Any condition, device or practice which, in connection with a water supply, has the potential to cause death.

High wind area: A region that is subject to *design wind speed* more than N3 or C1 (see Table 4).

Hob: The upstand at the perimeter of a *shower area*.

Horizontal exit: A *required* doorway between 2 parts of a building separated from each other by a *fire wall*.

VIC Hotel offering shared accommodation

Hours of operation: The number of hours when the occupancy of the building is greater than 20% of the peak occupancy.

House energy rating software: For the purposes of—

(a) Volume One, software accredited under the Nationwide House Energy Rating Scheme (NatHERS); or

(b) Volume Two—

(i) applied to H6V2—software accredited or previously accredited under the Nationwide House Energy Rating Scheme (NatHERS) and the additional functionality provided in non-regulatory mode; and

(ii) applied to Specification 42—software accredited under the Nationwide House Energy Rating Scheme (NatHERS).

Explanatory Information

The Nationwide House Energy Rating Scheme (NatHERS) refers to the Australian Governments' scheme that facilitates consistent energy ratings from software tools which are used to assess the potential thermal efficiency of dwelling envelopes.

Illuminance: The luminous flux falling onto a unit area of surface.

Illumination power density: The total of the power that will be consumed by the lights in a space, including any lamps, ballasts, current regulators and control devices other than those that are plugged into socket outlets for intermittent use such as floor standing lamps, desk lamps or work station lamps, divided by the area of the space, and expressed in W/m^2.

Explanatory Information

Illumination power density relates to the power consumed by the lighting system and includes the light source or luminaire and any control device. The power for the lighting system is the illumination power load. This approach is more complicated than the *lamp power density* approach but provides more flexibility for a dwelling with sophisticated control systems.

The area of the space refers to the area the lights serve. This could be considered a single room, open plan space, verandah, balcony or the like, or the total area of all these spaces.

Inclined lift: A power-operated device for raising or lowering people within a carriage that has one or more rigid guides on an inclined plane.

Individual protection: The installation of a *backflow prevention device* at the point where a water service connects to a single fixture or appliance.

NSW Information and education facility

Insulation: In relation to an FRL, the ability to maintain a temperature on the surface not exposed to the furnace below the limits specified in AS 1530.4.

Integrity: In relation to an FRL, the ability to resist the passage of flames and hot gases specified in AS 1530.4.

Internal wall: For the purposes of—

(a) Volume One, excludes a *common wall* or a party wall; or

(b) Volume Two, excludes a *separating wall*, *common wall* or party wall.

Interstitial condensation: The *condensation* of moisture on surfaces between material layers inside the building component.

Irrigation system: An irrigation system of the following types:

(a) Type A— all permanently open outlets and piping more than 150 mm above finished surface level, not subject to ponding or *backpressure* and not involving injection systems.

(b) Type B— irrigation systems in domestic or residential buildings with piping or outlets installed less than 150 mm above finished surface level and not involving injection systems.

(c) Type C— irrigation systems in other than domestic or residential buildings with piping outlets less than 150 mm above finished surface level and not involving injection systems.

(d) Type D— irrigation systems where fertilizers, herbicides, nematicides or the like are injected or siphoned into the system.

JAS-ANZ: The Joint Accreditation System of Australia and New Zealand.

Lamp power density: The total of the maximum power rating of the lamps in a space, other than those that are plugged into socket outlets for intermittent use such as floor standing lamps, desk lamps or work station lamps, divided by the area of the space, and expressed in W/m^2.

Explanatory Information

Lamp power density is a simple means of setting energy consumption at an efficient level for Class 1 and associated Class 10a buildings.

Lamp refers to the globe or globes that are to be installed in a permanently wired light fitting. The maximum power of

a lamp is usually marked on the fitting as the maximum allowable wattage.

The area of the space refers to the area the lights serve. This could be considered a single room, open plan space, verandah, balcony or the like, or the total area of all these spaces.

Landing: An area at the top or bottom of a *flight* or between two *flights*.

Latent heat gain: The heat gained by the vapourising of liquid without change of temperature.

Lateral support: A support (including a footing, buttress, cross wall, beam, floor or braced roof structure) that effectively restrains a wall or pier at right angles to the face of the wall or pier.

Lead free: Where a plumbing product or material in contact with *drinking water* has a *weighted average* lead content of not more than 0.25%.

NSW Licensed premises

WA Licensed premises

Lightweight construction: Construction which incorporates or comprises—

(a) sheet or board material, plaster, render, sprayed application, or other material similarly susceptible to damage by impact, pressure or abrasion; or

(b) concrete and concrete products containing pumice, perlite, vermiculite, or other soft material similarly susceptible to damage by impact, pressure or abrasion; or

(c) masonry having a width of less than 70 mm.

Loadbearing: Intended to resist vertical forces additional to those due to its own weight.

Loadbearing wall: For the purposes of H1D4 and H2D3 of NCC Volume Two and Section 4 of the ABCB Housing Provisions, means any wall imposing on the footing a load greater than 10 kN/m.

Loss: Physical damage, financial loss or loss of *amenity*.

Low Hazard: Any condition, device or practice which, in connection with a water supply, would constitute a nuisance by colour, odour or taste but does not have the potential to injure or endanger health.

Low rainfall intensity area: An area with a 5 minute rainfall intensity for an *annual exceedance probability* of 5% of not more than 125 mm/hour.

Explanatory Information

Rainfall intensity figures can be obtained from Tables 7.4.3d in the ABCB Housing Provisions.

Low-rise, low-speed constant pressure lift: A power-operated low-rise, low-speed device for raising or lowering people with limited mobility on a carriage that is controlled by the application of constant pressure to a control.

Low-rise platform lift: A power-operated device for raising or lowering people with limited mobility on a platform, that is controlled automatically or by the application of constant pressure to a control.

Low voltage: A *voltage* exceeding *extra-low voltage*, but not exceeding 1000 V AC or 1500 V DC.

Luminance contrast: The light reflected from one surface or component, compared to the light reflected from another surface or component.

Main water heater: The domestic hot water unit in a dwelling that is connected to at least one shower and the largest number of hot water outlets.

Main space conditioning: Either—

(a) the heating or cooling equipment that serves at least 70% of the *conditioned space* of a dwelling, or

(b) if no one heating or cooling equipment serves at least 70% of the *conditioned space* of the dwelling, the equipment that results in the highest net equivalent energy usage when calculated in accordance with J3D14(1)(a) of NCC Volume One or 13.6.2(1)(a) of the ABCB Housing Provisions.

Notes

(1) If a multi-split *air-conditioning* unit is installed, it is considered to be a single heating or cooling *service*.

(2) A series of separate heaters or coolers of the one type can be considered a single heater or cooler type with a performance level of that of the unit with the lowest efficiency.

Explanatory Information

The purpose of defining for main space conditioning is to provide criteria upon which the heating or cooling equipment should be selected when showing compliance with J3D14(1)(a) of NCC Volume One and 13.6.2(1)(a) of the ABCB Housing Provisions when more than one type and efficiency of equipment is present. In J3D14(1)(a) the formula that determines E_R allows the selection of only one heating or cooling system. This definition requires that if any one system serves at least 70% of the *floor area* that is heated or cooled it should be used as the basis of determining E_R. If, however, no one system serves at least 70% of the *floor area*, then the appliance that results in the highest net equivalent energy usage, when calculated in accordance with J3D14(1)(a)/13.6.2(1)(a), should be selected.

Massive timber: An element not less than 75 mm thick as measured in each direction formed from solid and laminated timber.

Maximum retained water level: The point where surface water will start to overflow out of the *shower area*.

Medium Hazard: Any condition, device or practice which, in connection with a water supply, has the potential to injure or endanger health.

Membrane: A barrier impervious to moisture.

Explanatory Information

A barrier may be a single or multi-part system.

Mezzanine: An intermediate floor within a room.

Minimum Energy Performance Standards (MEPS): The Minimum Energy Performance Standards for equipment and appliances established through the Greenhouse and Energy Minimum Standards Act 2012.

NSW Minimum lateral clearance

Mixed construction: A building consisting of more than one form of construction, particularly in double-storey buildings.

Mould: A fungal growth that can be produced from conditions such as dampness, darkness, or poor ventilation.

NABERS Energy: The National Australian Built Environment Rating Systems for energy efficiency, which is managed by the New South Wales Government.

Network Utility Operator: A person who—

(a) undertakes the piped distribution of *drinking water* or *non-drinking water* for supply; or

(b) is the operator of a sewerage system or a stormwater *drainage* system.

Explanatory Information

A Network Utility Operator in most States and Territories is the water and sewerage authority licensed to supply water and receive sewage and/or stormwater. The authority operates or proposes to operate a network that undertakes the distribution of water for supply and undertakes to receive sewage and/or stormwater drainage. This authority may be a licensed utility, local government body or council.

Non-combustible: Applied to—

(a) a material — means not deemed *combustible* as determined by AS 1530.1 — Combustibility Tests for Materials; or

(b) construction or part of a building — means constructed wholly of materials that are not deemed *combustible*.

Non-drinking water: Water which is not intended primarily for human consumption.

Occupant traits: For the purposes of—

(a) Volume One, the features, needs and profile of the occupants in a *habitable room* or space; or

(b) Volume Two, the features, needs and profile of the occupants in a room or space.

Explanatory Information

For the purpose of Volume Two, this term is used to describe the characteristics of the occupants and their associated requirements in relation to a room or space.

For example, in relation to a bedroom, the following occupant characteristics and associated requirements should be

considered:

- Characteristics: height, mobility and how often the space will be used.
- Requirements: a sleeping space and a space to undertake leisure activities.

Occupiable outdoor area: A space on a roof, balcony or similar part of a building—

(a) that is open to the sky; and

(b) to which access is provided, other than access only for maintenance; and

(c) that is not *open space* or directly connected with *open space*.

VIC On-site wastewater management system

On-site wastewater management system: A system that receives and/or treats wastewater generated and discharges the resulting effluent to an *approved disposal system* or re-use system.

Open-deck carpark: A carpark in which all parts of the parking *storeys* are cross-ventilated by permanent unobstructed openings in not fewer than 2 opposite or approximately opposite sides, and—

(a) each side that provides ventilation is not less than $^{1}/_{6}$ of the area of any other side; and

(b) the openings are not less than ½ of the wall area of the side concerned.

Open space: A space on the allotment, or a roof or similar part of a building adequately protected from fire, open to the sky and connected directly with a public road.

Open spectator stand: A tiered stand substantially open at the front.

Other property: All or any of the following—

(a) any building on the same or an adjoining allotment; and

(b) any adjoining allotment; and

(c) a road.

Outdoor air: Air outside the building.

Outdoor air economy cycle: A mode of operation of an *air-conditioning* system that, when the *outdoor air* thermodynamic properties are favourable, increases the quantity of *outdoor air* used to condition the space.

Outfall: That part of the disposal system receiving *surface water* from the *drainage* system and may include a natural water course, kerb and channel, or soakage system.

Overflow device: A device that provides relief to a water service, sanitary *plumbing* and *drainage* system, *rainwater service* or stormwater system to avoid the likelihood of *uncontrolled discharge*.

Panel wall: A non-*loadbearing external wall*, in frame or similar construction, that is wholly supported at each *storey*.

Partially buried rainwater tank: A rainwater tank that is not completely covered by earth but is partially set into the ground.

Patient care area: A part of a *health-care building* normally used for the treatment, care, accommodation, recreation, dining and holding of patients including a *ward area* and *treatment area*.

Performance-based design brief (PBDB): The report that defines the scope of work for the performance-based analysis, the technical basis for analysis, and the criteria for acceptance of any relevant *Performance Solution* as agreed by stakeholders.

Performance Requirement: A requirement which states the level of performance which a *Performance Solution* or *Deemed-to-Satisfy Solution* must meet.

Performance Solution: A method of complying with the *Performance Requirements* other than by a *Deemed-to-Satisfy Solution*.

Perimeter of building: For the purposes of Section 8 of the Housing Provisions, means the external envelope of a building.

TAS Permit Authority

Personal care services: Any of the following:

(a) The provision of nursing care.

(b) Assistance or supervision in—

(i) bathing, showering or personal hygiene; or

(ii) toileting or continence management; or

(iii) dressing or undressing; or

(iv) consuming food.

(c) The provision of direct physical assistance to a person with mobility problems.

(d) The management of medication.

(e) The provision of substantial rehabilitative or development assistance.

Piping: For the purposes of Section J in Volume One or Part H6 in Volume Two, and Section 13 of the Housing Provisions, means an assembly of pipes, with or without valves or other fittings, connected together for the conveyance of liquids and gases.

NSW Planning for Bush Fire Protection

Pliable building membrane: A water barrier as classified by AS 4200.1.

VIC Plumbing

Plumbing: Any water service plumbing or sanitary plumbing system.

Plumbing or Drainage Solution: A solution which complies with the *Performance Requirement* and is a—

(a) Performance Solution; or

(b) Deemed-to-Satisfy Solution; or

(c) combination of (a) and (b).

Point of connection: Any of the following:

(a) For a cold water service, means the point where the cold water service connects to—

(i) the *Network Utility Operator's* water supply system; or

(ii) the point of isolation to an alternative water source where there is no *Network Utility Operator's* water supply available or is not utilised.

(b) For a *heated water* service, means the point where the water heater connects to the cold water service downstream of the isolation valve.

(c) For sanitary *drainage*, means the point where the on-site sanitary *drainage* system connects to—

(i) the *Network Utility Operator's* sewerage system; or

(ii) an *on-site wastewater management system*.

(d) For sanitary *plumbing*, means the point where the sanitary *plumbing* system connects to the sanitary *drainage* system.

(e) For a *rainwater service*, means the point where the *rainwater service*—

(i) connects to the point of isolation for the *rainwater storage*; or

(ii) draws water from the *rainwater storage*.

(f) For stormwater disposal, means the point where the on-site stormwater *drainage* system connects to—

(i) the *Network Utility Operator's* stormwater system; or

(ii) an approved on-site disposal system.

(g) For a fire-fighting water service, means the point where the service connects to—

(i) a cold water service, downstream of a *backflow prevention device*; or

(ii) the *Network Utility Operator's* water supply system; or

(iii) the point of isolation to an alternative water source.

Notes

A domestic fire sprinkler service conforming to FPAA101D is considered part of the cold water service.

Explanatory Information

The *point of connection* is usually determined by the *Network Utility Operator* according to the water and sewerage

Acts, Regulations and codes that apply within the *Network Utility Operator's* licensed area and/or jurisdiction.

WA Potable water

Predicted Mean Vote (PMV): The Predicted Mean Vote of the thermal perception of building occupants determined in accordance with ANSI/ASHRAE Standard 55.

Preformed shower base: A preformed, prefinished *vessel* installed as the finished floor of a shower compartment, and which is provided with a connection point to a sanitary *drainage* system.

Explanatory Information

Preformed shower bases are commonly made of plastics, composite materials, vitreous enamelled pressed steel, or stainless steel.

Pressure vessel: A vessel subject to internal or external pressure, including interconnected parts and components, valves, gauges and other fittings up to the first point of connection to connecting piping, and—

(a) includes fire heaters and gas cylinders; but

(b) excludes—

(i) any vessel that falls within the definition of a *boiler*; and

(ii) storage tanks and equipment tanks intended for storing liquids where the pressure at the top of the tank is not exceeding 1.4 kPa above or 0.06 kPa below atmospheric pressure; and

(iii) domestic-type hot water supply heaters and tanks; and

(iv) pressure vessels installed for the purposes of fire suppression or which serve a fire suppression system.

QLD Primary building element

Primary building element: For the purposes of—

(a) Volume One, a member of a building designed specifically to take part of the loads specified in B1D3 and includes roof, ceiling, floor, stairway or ramp and wall framing members including bracing members designed for the specific purpose of acting as a brace to those members; or

(b) Part 3.4 of the ABCB Housing Provisions, a member of a building designed specifically to take part of the building loads and includes roof, ceiling, floor, stairway or ramp and wall framing members including bracing members designed for the specific purpose of acting as a brace to those members.

Explanatory Information

The loads to which a building may be subjected are dead, live, wind, snow and earthquake loads. Further information on building loads can be found in the AS 1170 series of Standards.

Primary insulation layer: The most interior insulation layer of a wall or roof construction.

Private bushfire shelter: A structure associated with, but not attached to, or part of a Class 1a dwelling that may, as a last resort, provide shelter for occupants from immediate life threatening effects of a bushfire.

Private garage: For the purposes of—

(a) Volume One—

(i) any garage associated with a Class 1 building; or

(ii) any single *storey* of a building of another Class containing not more than 3 vehicle spaces, if there is only one such *storey* in the building; or

(iii) any separate single *storey* garage associated with another building where such garage contains not more than 3 vehicle spaces; or

(b) Volume Two—

(i) any garage associated with a Class 1 building; or

(ii) any separate single *storey* garage associated with another building where such garage contains not more than 3 vehicle spaces.

Product: *Plumbing* and *drainage* items within the scope of Volume Three including but not limited to—

(a) materials, fixtures and components used in a *plumbing* or *drainage* installation; and

(b) appliances and equipment connected to a *plumbing* or *drainage* system.

Product Technical Statement: A form of documentary evidence stating that the properties and performance of a building material, product or form of construction fulfil specific requirements of the NCC, and describes—

(a) the application and intended use of the building material, product or form of construction; and

(b) how the use of the building material, product or form of construction complies with the requirements of the NCC Volume One and Volume Two; and

(c) any limitations and conditions of the use of the building material, product or form of construction relevant to (b).

Professional engineer: A person who is—

(a) if legislation is applicable — a registered professional engineer in the relevant discipline who has appropriate experience and competence in the relevant field; or

(b) if legislation is not applicable—

(i) registered in the relevant discipline on the National Engineering Register (NER) of the Institution of Engineers Australia (which trades as 'Engineers Australia'); or

(ii) eligible to become registered on the Institution of Engineers Australia's NER and has appropriate experience and competence in the relevant field.

NSW Projection suite

TAS Public

WA Public building

Public corridor: An enclosed corridor, hallway or the like which—

(a) serves as a means of egress from 2 or more *sole-occupancy units* to a *required exit* from the *storey* concerned; or

(b) is *required* to be provided as a means of egress from any part of a *storey* to a *required exit*.

Rainwater service: A water service which distributes water from the isolation valve of the rainwater storage to the rainwater points of discharge for purposes such as for clothes washing, urinal and water closet flushing and external hose cocks.

Rainwater storage: Any storage of rainwater collected from a roof catchment area which is used to supply water for the primary purposes of drinking, personal hygiene or other uses.

Explanatory Information

Generally this applies to alternative water sources not supplied by a *Network Utility Operator*. This does not include *rainwater storage* for non-drinking purposes.

SA Rainwater tank

Rapid roller door: A door that opens and closes at a speed of not less than 0.5 m/s.

Recognised expert: A person with qualifications and experience in the area of *plumbing* or *drainage* in question recognised by the authority having jurisdiction.

Explanatory Information

A *recognised expert* is a person recognised by the authority having jurisdiction as qualified to provide evidence under A5G4(5). Generally, this means a hydraulic consultant or engineer, however the specific requirements are determined by the authority having jurisdiction.

Under A5G4(5), a report from a *recognised expert* may be used as evidence of suitability that a *product* listed on the *WaterMark Schedule of Excluded Products*, or a *plumbing* or *drainage* system, complies with a *Performance Requirement* or *Deemed-to-Satisfy Provisions*.

Reference building: For the purposes of—

(a) Volume One, a hypothetical building that is used to calculate the maximum allowable—

(i) *annual greenhouse gas emissions* for the common area of a Class 2 building or a Class 3 to 9 building; or

(ii) *heating load*, *cooling load* and *energy value* for a *sole-occupancy unit* of a Class 2 building or a Class 4 part of a building; or

(b) Volume Two, a hypothetical building that is used to determine the maximum allowable *heating load* and *cooling load* for the proposed building.

Reflective insulation: A building membrane with a reflective surface such as a reflective foil laminate, reflective barrier, foil batt or the like capable of reducing radiant heat flow.

Explanatory Information

For Volume Two:

- Typical *R-Values* achieved by adding *reflective insulation* are given in the explanatory information accompanying Section 13 of the ABCB Housing Provisions. Information on specific products may be obtained from *reflective insulation* manufacturers.
- The surface of *reflective insulation* may be described in terms of its emittance (or infra-red emittance) or in terms of its reflectance (or solar reflectance). Generally, for the surface of a particular *reflective insulation*: emittance + reflectance = 1.
- Some types of *reflective insulation* may also serve the purposes of waterproofing or vapour proofing.

Regulated energy: The energy consumed by a building's *services* minus the amount of *renewable energy* generated and used on *site*.

Reinforced masonry: Masonry reinforced with steel reinforcement that is placed in a bed joint or grouted into a core to strengthen the masonry.

Reliability: The probability that a system performs to a level consistent with the system specification.

Renewable energy: Energy that is derived from sources that are regenerated, replenished, or for all practical purposes cannot be depleted and the energy sources include, but are not limited to, solar, wind, hydroelectric, wave action and geothermal.

Required: Required to satisfy a *Performance Requirement* or a *Deemed-to-Satisfy Provision* of the NCC as appropriate.

Required safe egress time (RSET): The time required for safe evacuation of occupants to a place of safety prior to the onset of untenable conditions.

Residential aged care building: A Class 3 or 9a building whose residents, due to their incapacity associated with the ageing process, are provided with physical assistance in conducting their daily activities and to evacuate the building during an emergency.

Residential care building: A Class 3, 9a or 9c building which is a place of residence where 10% or more of persons who reside there need physical assistance in conducting their daily activities and to evacuate the building during an emergency (including any *aged care building* or *residential aged care building*) but does not include a hospital.

VIC Residential care building (Vic)

Resident use area: Part of a Class 9c building normally used by residents, and—

(a) includes *sole-occupancy units*, lounges, dining areas, activity rooms and the like; but

(b) excludes offices, storage areas, commercial kitchens, commercial laundries and other spaces not for the use of residents.

Resistance to the incipient spread of fire: In relation to a ceiling membrane, means the ability of the membrane to insulate the space between the ceiling and roof, or ceiling and floor above, so as to limit the temperature rise of materials in this space to a level which will not permit the rapid and general spread of fire throughout the space.

Explanatory Information

Resistance to the incipient spread of fire refers to the ability of a ceiling to prevent the spread of fire and thermally insulate the space between the ceiling and the roof or floor above. "Resistance to the incipient spread of fire" is superior to "fire-resistance" because it requires a higher standard of heat insulation.

The definition is used in Volume Two for separating floors/ceilings for a Class 1a dwelling located above a non-appurtenant *private garage*.

Rise in storeys: The greatest number of *storeys* calculated in accordance with C2D3 of Volume One.

Riser: The height between consecutive treads and between each *landing* and continuous tread.

VIC Restricted children's service

Rolled fill: Material placed in layers and compacted by repeated rolling by an excavator.

SA Roof catchment area

Roof light: For the purposes of Section J and Part F4 in NCC Volume One, Part H6 in NCC Volume Two, and Part 10.5 and Section 13 of the ABCB Housing Provisions, a skylight, *window* or the like installed in a roof—

(a) to permit natural light to enter the room below; and

(b) at an angle between 0 and 70 degrees measured from the horizontal plane.

NSW Row

R-Value: The thermal resistance of a component calculated by dividing its thickness by its thermal conductivity, expressed in m^2.K/W.

Safe place: Either—

(a) a place of safety within a building—

(i) which is not under threat from a fire; and

(ii) from which people must be able to safely disperse after escaping the effects of an emergency to a road or *open space*; or

(b) a road or *open space*.

Sanitary compartment: A room or space containing a closet pan or urinal (see Figures 6a and 6b).

Figure 6a: Identification of a sanitary compartment (diagram a)

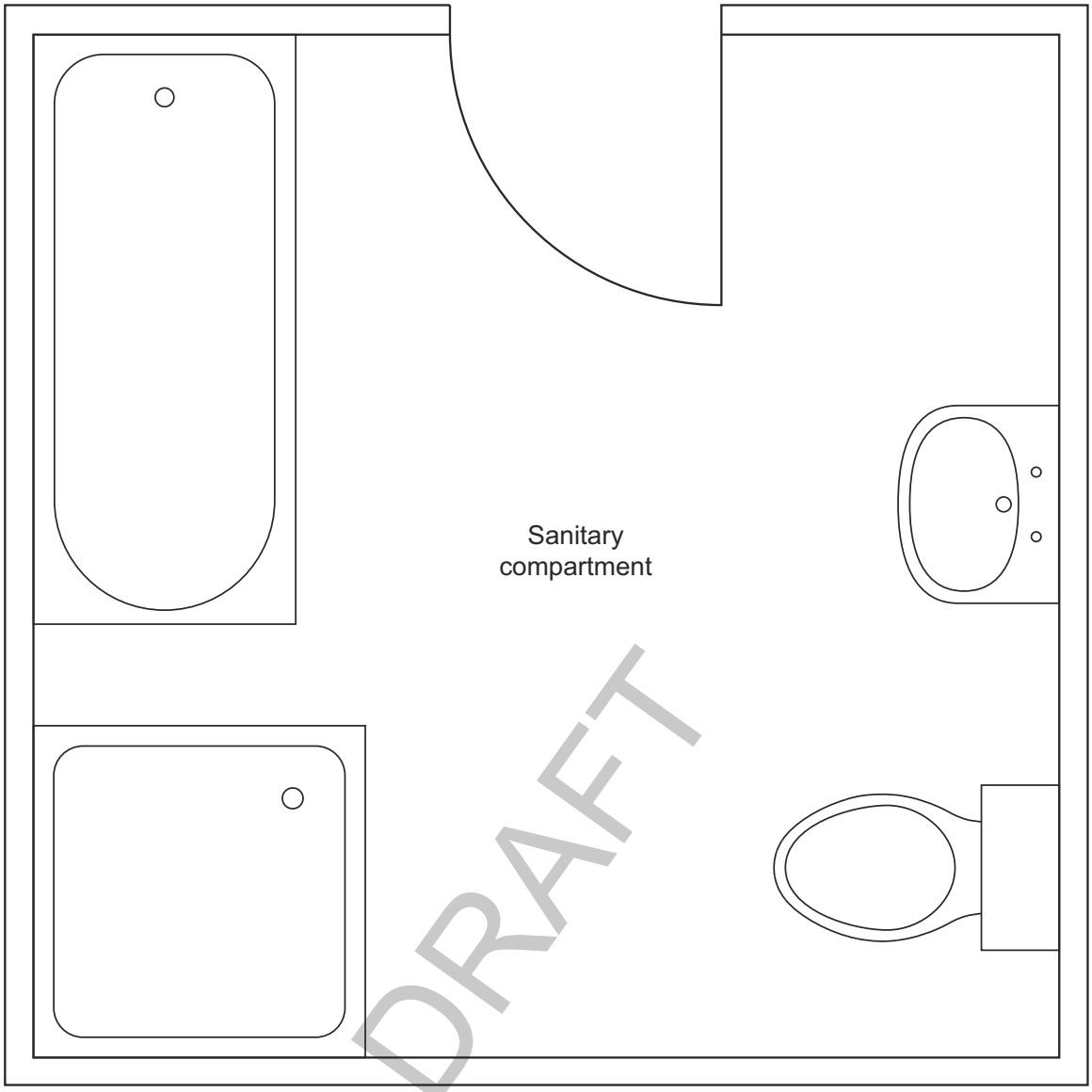
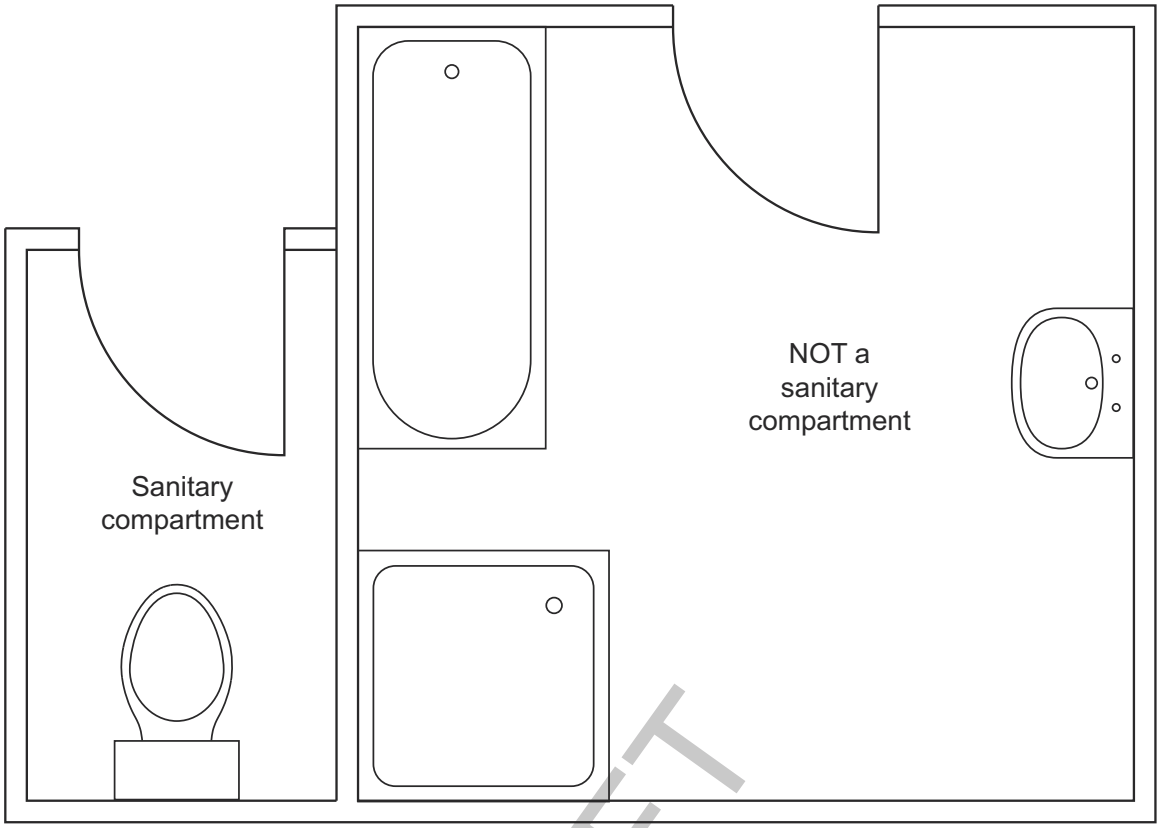


Figure 6b: Identification of a sanitary compartment (diagram b)



Sarking-type material: A material such as a *reflective insulation* or other flexible membrane of a type normally used for a purpose such as waterproofing, vapour management or thermal reflectance.

School: Includes a primary or secondary school, college, university or similar educational establishment.

TAS School age care facility

Screed: A layer of material (usually cement based) which sets in situ between a structural base and the finished floor material.

Self-closing: For the purposes of—

(a) Volume One, applied to a door, means equipped with a device which returns the door to the fully closed position immediately after each opening; or

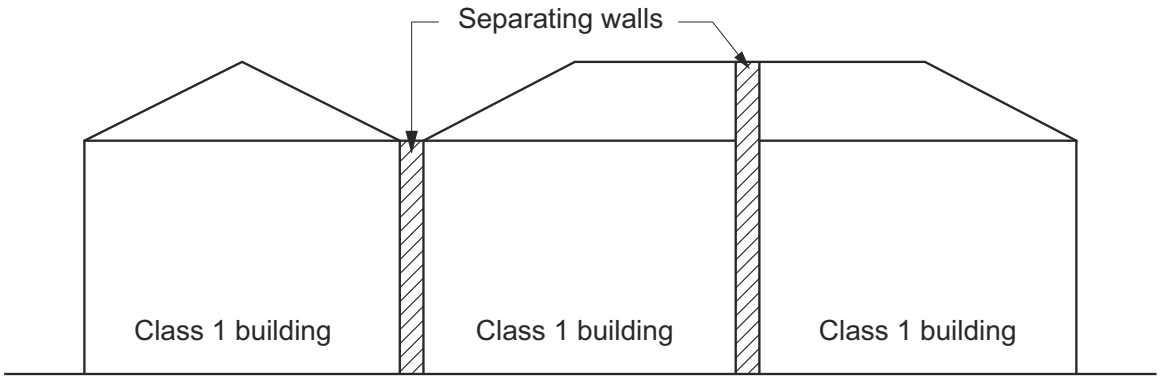
(b) Volume Two, applied to a door or *window*, means equipped with a device which returns the door or *window* to the fully closed and latched position immediately after each manual opening.

Sensible heat gain: The heat gained which causes a change in temperature.

Separating element: A barrier that exhibits fire *integrity*, *structural adequacy*, *insulation*, or a combination of these for a period of time under specified conditions (often in accordance with AS 1530.4).

Separating wall: A wall that is common to adjoining Class 1 buildings (see Figure 7).

Figure 7: Separating wall



Elevation

Figure Notes

In Volume Two a separating wall may also be known as a party wall and typically is *required* to be *fire-resisting* construction (see ABCB Housing Provisions Parts 9.2 and 9.3).

Service: For the purposes of Section J in Volume One, means a mechanical or electrical system that uses energy to provide *air-conditioning*, mechanical ventilation, heated water supply, artificial lighting, vertical transport and the like within a building, but which does not include—

(a) systems used solely for emergency purposes; and

(b) cooking facilities; and

(c) portable appliances.

Service station: A garage which is not a *private garage* and is for the servicing of vehicles, other than only washing, cleaning or polishing.

Shaft: The walls and other parts of a building bounding—

(a) a well, other than an *atrium well*; or

(b) a vertical chute, duct or similar passage, but not a chimney or flue.

Shower area: The area affected by water from a shower, including a shower over a bath and for a shower area that is—

(a) Enclosed – the area enclosed by walls or screens including hinged or sliding doors that contain the spread of water to within that space; or

(b) Unenclosed – the area where, under normal use, water from the shower rose is not contained within the shower area.

Shower screen: The panels, doors or windows enclosing or partially enclosing a *shower area*.

Single leaf masonry: Outer walls constructed with a single thickness of masonry unit.

Site: The part of the allotment of land on which a building stands or is to be erected.

Sitework: Work on or around a *site*, including earthworks, preparatory to or associated with the construction, *alteration*, demolition or removal of a building.

NSW Small live music or arts venue

SA Small arts venue

Small-scale Technology Certificate: A certificate issued under the Commonwealth Government's Small-scale Renewable Energy Scheme.

Small-sized, low-speed automatic lift: A restricted use power-operated device for the infrequent raising or lowering of people with limited mobility on a platform that is controlled automatically but has the capability of being electrically isolated by a key-lockable control.

Smoke-and-heat vent: A vent, located in or near the roof for smoke and hot gases to escape if there is a fire in the building.

Smoke-Developed Index: The index number for smoke as determined by AS/NZS 1530.3.

Smoke development rate: The development rate for smoke as determined by testing flooring materials in accordance with AS ISO 9239.1.

Smoke growth rate index (SMOGRA$_{RC}$): The index number for smoke used in the regulation of *fire hazard properties* and applied to materials used as a finish, surface, lining or attachment to a wall or ceiling.

Solar admittance: The fraction of incident irradiance on a *wall-glazing construction* that adds heat to a building's space.

Sole-occupancy unit: A room or other part of a building for occupation by one or joint owner, lessee, tenant, or other occupier to the exclusion of any other owner, lessee, tenant, or other occupier and includes—

(a) a dwelling; or

(b) a room or suite of rooms in a Class 3 building which includes sleeping facilities; or

(c) a room or suite of associated rooms in a Class 5, 6, 7, 8 or 9 building; or

(d) a room or suite of associated rooms in a Class 9c building, which includes sleeping facilities and any area for the exclusive use of a resident.

NSW Spa pool

Spandrel panel: For the purposes of Section J, means the opaque part of a façade in curtain wall construction which is commonly adjacent to, and integrated with, *glazing*.

NSW Special fire protection purpose

Spiral stairway: A stairway with a circular plan, winding around a central post with steps that radiate from a common centre or several radii (see Figures 11.2.2d and 11.2.2e in the ABCB Housing Provisions).

Spread-of-Flame Index: The index number for spread of flame as determined by AS/NZS 1530.3.

Sprinkler alarm switch: For the purposes of Specification 23, a device capable of sending an electrical signal to activate an alarm when a residential sprinkler head is activated (e.g. a flow switch).

Stack bonded pier: A pier where the overlap of a masonry unit is not more than 25% of the length of the masonry unit below.

Stage: A floor or platform in a Class 9b building on which performances are presented before an audience.

Stairway platform lift: A power-operated device for raising or lowering people with limited mobility on a platform (with or without a chair) in the direction of a stairway.

Standard Fire Test: The Fire-resistance Tests of Elements of Building Construction as described in AS 1530.4.

SA Storage shed

Storey: A space within a building which is situated between one floor level and the floor level next above, or if there is no floor above, the ceiling or roof above, but not—

(a) a space that contains only—

(i) a lift *shaft*, stairway or meter room; or

(ii) a bathroom, shower room, laundry, water closet, or other *sanitary compartment*; or

(iii) accommodation intended for not more than 3 vehicles; or

(iv) a combination of the above; or

(b) a *mezzanine*.

Structural adequacy: In relation to an FRL, means the ability to maintain stability and adequate *loadbearing* capacity as determined by AS 1530.4.

Structural member: A component or part of an assembly which provides vertical or lateral support to a building or structure.

Surface water: All naturally occurring water, other than sub-surface water, which results from rainfall on or around the *site* or water flowing onto the *site*.

Swimming pool: Any excavation or structure containing water and principally used, or that is designed, manufactured or adapted to be principally used for swimming, wading, paddling, or the like, including a bathing or wading pool, or spa.

Tapered tread: A stair tread with a walking area that grows smaller towards one end.

NSW Temporary structure

TAS Temporary structure

Thermal comfort level: The level of thermal comfort in a building expressed as a *PMV* sensation scale.

Thermal energy load: The sum of the *heating load* and the *cooling load*.

Total R-Value: The sum of the *R-Values* of the individual component layers in a composite element including any building material, insulating material, airspace, thermal bridging and associated surface resistances, expressed in m^2.K/W.

Total System Solar Heat Gain Coefficient (SHGC): For the purposes of—

(a) Volume One, the fraction of incident irradiance on a *wall-glazing construction* or a *roof light* that adds heat to a building's space; or

(b) Volume Two, the fraction of incident irradiance on *glazing* or a *roof light* that adds heat to a building's space.

Total System U-Value: The thermal transmittance of the composite element allowing for the effect of any airspaces, thermal bridging and associated surface resistances, expressed in W/m^2.K.

Treatment area: An area within a *patient care area* such as an operating theatre and rooms used for recovery, minor procedures, resuscitation, intensive care and coronary care from which a patient may not be readily moved.

Uncontrolled discharge: Any unintentional release of fluid from a *plumbing* and *drainage* system and includes leakage and seepage.

Unique wall: For the purposes of F3V1 in Volume One and H2V1 in Volume Two, a wall which is neither a *cavity wall* nor a *direct fix cladding wall*.

Unobstructed opening: For the purposes of Section 8 of the ABCB Housing Provisions, a glazed area that a person could mistake for an open doorway or clearway and walk into the glazed panel.

Unprotected water service: Unprotected water service means that the water service may be contaminated from a surrounding hazard.

Unreinforced masonry: Masonry that is not reinforced.

Vapour permeance: The degree that water vapour is able to diffuse through a material, measured in µg/N.s and tested in accordance with the ASTM-E96 Procedure B – Water Method at 23°C 50% relative humidity.

Vapour pressure: The pressure at which water vapour is in thermodynamic equilibrium with its condensed state.

Ventilation opening: An opening in the *external wall*, floor or roof of a building designed to allow air movement into or out of the building by natural means including a permanent opening, an openable part of a *window*, a door or other device which can be held open.

Verification Method: A test, inspection, calculation or other method that determines whether a *Performance Solution* complies with the relevant *Performance Requirements*.

Vessel: For the purposes of Volume One and Part 10.2 of the ABCB Housing Provisions, an open, pre-formed, pre-finished concave receptacle capable of holding water, usually for the purpose of washing, including a basin, sink, bath, laundry tub and the like.

Visibility: The maximum distance at which an object of defined size, brightness and contrast can be seen and recognised.

Voltage: A difference of potential, measured in Volts (V) and includes *extra-low voltage* and *low voltage*.

Volume: In relation to—

(a) a building — the volume of the total space of the building measured above the lowest floor (including, for a suspended floor, any subfloor space), over the enclosing walls, and to the underside of the roof covering; or

(b) a *fire compartment* — the volume of the total space of the *fire compartment* measured within the inner finished surfaces of the enclosing *fire-resisting* walls and/or floors, and—

(i) if there is no *fire-resisting* floor at the base of the *fire compartment*, measured above the finished surface of the lowest floor in the *fire compartment*; and

(ii) if there is no *fire-resisting* floor at the top of the *fire compartment*, measured to the underside of the roof covering of the *fire compartment*; and

(iii) if there is no *fire-resisting* wall, measured over the enclosing wall and if there is no enclosing wall, includes any space within the *fire compartment* that has a use which contributes to the *fire load*; or

(c) an *atrium* — the volume of the total space of the *atrium* measured within the finished surfaces of the bounding construction and if there is no bounding construction, within the *external walls*.

Waffle raft: A stiffened raft with closely spaced ribs constructed on the ground and with slab panels supported between ribs.

Wall-glazing construction: For the purposes of Section J in Volume One, the combination of wall and *glazing* components comprising the *envelope* of a building, excluding—

(a) *display glazing*; and

(b) opaque non-glazed openings such as doors, vents, penetrations and shutters.

Ward area: That part of a *patient care area* for resident patients and may contain areas for accommodation, sleeping, associated living and nursing facilities.

Water control layer: A *pliable building membrane* or the exterior cladding when no *pliable building membrane* is present.

WaterMark Certification Scheme: The ABCB scheme for certifying and authorising *plumbing* and *drainage products*.

WaterMark Conformity Assessment Body (WMCAB): A conformity assessment body registered with and accredited by the *JAS-ANZ* to conduct evaluations leading to *product* certification and contracted with the *administering body* to issue the *WaterMark Licence*.

WaterMark Licence: A licence issued by a *WaterMark Conformity Assessment Body*.

WaterMark Schedule of Excluded Products: The list maintained by the *administering body* of *products* excluded from the *WaterMark Certification Scheme*.

WaterMark Schedule of Products: The list maintained by the *administering body* of *products* included in the *WaterMark Certification Scheme*, and the specifications to which the *products* can be certified.

Explanatory Information

The *WaterMark Schedule of Products* and the *WaterMark Schedule of Excluded Products* can be viewed on the ABCB website at www.abcb.gov.au.

Waterproof: The property of a material that does not allow water to penetrate through it.

Waterproofing system: A combination of elements that are *required* to achieve a *waterproof* barrier as *required* by H4D2 and H4D3 including substrate, *membrane*, bond breakers, sealants, finishes and the like.

Water resistant: The property of a system or material that restricts water movement and will not degrade under conditions of water.

Water sensitive materials: Materials that have an inherent capacity to absorb water vapour and include timber, plasterboard, plywood, oriented strand board and the like.

Waterstop: A vertical extension of the *waterproofing system* forming a barrier to prevent the passage of water in a floor or other horizontal surfaces.

Watertight: Will not allow water to pass from the inside to the outside of the component or joint and vice versa.

Weighted average: Is calculated across the *wetted surface area* of a pipe, pipe fitting or plumbing fixture.

WA WELS

Wet area: An area within a building supplied with water from a water supply system, which includes bathrooms, showers, laundries and *sanitary compartments* and excludes kitchens, bar areas, kitchenettes or domestic food and beverage preparation areas.

Wetted surface area: Is calculated by the total sum of diameter (D) in contact with *drinking water*.

Winders: Treads within a straight *flight* that are used to change direction of the stair (see Explanatory Figure 1).

Window: includes a *roof light*, glass panel, glass block or brick, glass louvre, glazed sash, glazed door, or other device which transmits natural light directly from outside a building to the room concerned when in the closed position.

Yield: The mass of a combustion product generated during combustion divided by the mass loss of the test specimen as specified in the *design fire*.

Zone protection: The installation of a *backflow prevention device* at the point where a water service is connected to multiple fixtures or appliances, with no *backflow prevention device* installed as *individual protection* downstream of this point.

abcb.gov.au