National Construction Code

Volume One
Building Code of Australia

Australian Building Codes Board

2022

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Part B1 Structural provisions

Introduction to this Part

This Part focusses on minimising risk of structural failure in buildings; structural requirements for buildings in flood hazard areas; and, minimising risk of injuries caused by people colliding with glass panels, windows and doors.

Objectives

B1O1 Objective

[2019: BO1]

The Objective of this Part is to—

(a) safeguard people from injury caused by structural failure; and

(b) safeguard people from loss of amenity caused by structural behaviour; and

(c) protect *other property* from physical damage caused by structural failure; and

(d) safeguard people from injury that may be caused by failure of, or impact with, glazing.

Functional Statements

B1F1 Structure

[2019: BF1.1]

A building or structure is to withstand the combination of loads and other actions to which it may be reasonably subjected.

B1F2 Glazing

[2019: BF1.2]

(1) Glazing is to be installed in a building to avoid undue risk of injury to people.

(2) Glazing in a building should not cause injury to people due to its failure or people impacting with it because they did not see it.

Performance Requirements

B1P1 Structural reliability

[2019: BP1.1]

(1) A building or structure, during construction and use, with appropriate degrees of reliability as specified in Table B1P1, 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*,

by resisting the actions to which it may reasonably expect to be subjected.

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

(a) permanent actions (dead loads); 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; and

(p) in a Class 7b building, inclusion of an additional permanent roof load of not less than 0.15 kPa to support the addition of solar photovoltaic panels.

Table B1P1: Maximum acceptable annual probability of structural failure of buildings members and connection (1 in ...)

Building parts, members and connections	Failure behaviour	Resistance paths	Structure Importance Level			
			1	2	3	4
Substantive parts of a building or structure	*Brittle* or *fatigue* or *sudden failure*	N/A	14,000	21,000	N/A	N/A
	Gradualductile failure	N/A	9,000	14,000	32,000	70,000
Members and connections that provide primary building support	*Connections* or *non-transient actions* or *brittle* or *fatigue* or *sudden failure*	*Single*	3,000	4,300	9,000	21,000
		Multiple	2,100	3,000	6,000	14,000
	Members subject to *transient actions* with *gradualductile failure*	*Single*	1,500	2,100	4,300	9,000
		Multiple	1,000	1,500	3,000	6,300
Members and connections that do not provide primary building support	*Connections* or *non-transient actions* or *brittle* or *fatigue* or *sudden failure*	*Single*	900	1,300	2,700	5,600
		Multiple	800	1,200	2,400	5,000
	Members subject to *transient*	*Single*	800	1,100	2,100	4,500

Table Notes

(1) Table B1V1b is applicable for components that exhibit brittle failure similar to concrete as specified in AS 3600.

(2) For components with creep characteristics similar to timber as specified in AS 1720.1, the target reliability index for permanent action must be increased to 5.0.

(3) The above target reliability indices are based on materials or systems that exhibit creep or brittle failure similar to timber or concrete.

(4) Table B1V1b may also be applicable to materials or systems that exhibit creep or brittle failure differently to steel, timber or concrete provided the creep or brittle nature of the material or system are properly accounted for in the design model.

(5) The above target reliability indices are also applicable for materials or systems that exhibit ductile failure characteristics.

B1V2 Structural robustness

[2019: BV2]

(1) Compliance with B1P1(1)(c) is verified for structural robustness if assessment of the structure determines that the building remains stable and the resulting collapse does not extend further than the immediately adjacent *storeys* upon the notional removal in isolation of—

(a) any supporting column; or

(b) any beam supporting one or more columns; or

(c) any segment of a load bearing wall of length equal to the height of the wall.

(2) Where a supporting structural component is relied upon to carry more than 25% of the total structure, then a systematic risk assessment of the building is undertaken and critical high risk components are identified and designed to cope with the identified hazard or protective measures are chosen to minimise the risk.

Deemed-to-Satisfy Provisions

B1D1 Deemed-to-Satisfy Provisions

[2019: B1.0]

(1) Where a *Deemed-to-Satisfy Solution* is proposed, *Performance Requirements* B1P1 to B1P4 are satisfied by complying with B1D2 to B1D6.

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

B1D2 Resistance to actions

[2019: B1.1]

The resistance of a building or structure must be greater than the most critical action effect resulting from different combinations of actions, where—

(a) the most critical action effect on a building or structure is determined in accordance with B1D3 and the general design procedures contained in AS/NZS 1170.0; and

(b) the resistance of a building or structure is determined in accordance with B1D4.

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.

(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 ~~and AS 1170.4~~ 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 (~~i~~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*~~.~~; and
  (x) expected 10 year deflection for structural substrates in Part F1; and
  (xi) in a Class 7b building, an additional permanent roof load of not less than 0.15 kPa to support the addition of solar photovoltaic panels except for—
    (A) buildings with permanently installed on-site solar photovoltaic panels on at least 20% of the roof area; or
    (B) buildings where 100% of the roof area is shaded for more than 70% of daylight hours; or
    (C) buildings with a roof area of not more than 55 m^2; or
    (D) buildings where more than 50% of the roof area is used as a terrace, *carpark*, roof garden, *roof light*

or the like.

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 Levels 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

NT B1D4

QLD B1D4

B1D4 Determination of structural resistance of materials and forms of construction

[2019: B1.4]

The structural resistance of materials and forms of construction must be determined in accordance with the following, as appropriate:

(a) Masonry (including masonry-veneer, unreinforced masonry and reinforced masonry): AS 3700, except—
  (i) '(for piers—isolated or engaged)' is removed from Clause 8.5.1(d); and
  (ii) where Clause 8.5.1 requires design as for unreinforced masonry in accordance with Section 7, the member must also be designed as unreinforced masonry in accordance with Tables 10.3 and 4.1(a)(i)(C) of AS 3700.

(b) Concrete:
  (i) Concrete construction (including reinforced and prestressed concrete): AS 3600.
  (ii) Autoclaved aerated concrete: AS 5146.1.
  (iii) Post-installed and cast-in fastenings: AS 5216.

(c) Steel construction:
  (i) Steel structures: AS 4100.
  (ii) Cold-formed steel structures: AS/NZS 4600.
  (iii) Residential and low-rise steel framing: NASH Standard – Residential and Low-Rise Steel Framing Part 1 or Part 2.

(d) Composite steel and concrete: AS/NZS 2327.

(e) Aluminium construction: AS/NZS 1664.1 or AS/NZS 1664.2.

(f) Timber construction:
  (i) Design of timber structures: AS 1720.1.

Part ~~F6~~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

~~F6O1~~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

~~F6O1~~F8O1 only applies to a Class 2 building or Class 4 part of a building.

Functional Statements

~~F6F1~~F8F1 Condensation

[2019: FF6.1]

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

Performance Requirements

TAS ~~F6P1~~F8P1

~~F6P1~~F8P1 Condensation and water vapour management

[2019: FP6.1]

In a *sole-occupancy unit* of a Class 2 building or a Class 4 part of a building, risks associated with water vapour and *condensation* must be managed to minimise their impact on the health of occupants.

Verification Methods

~~F6V1~~F8V1 Condensation management

[2019: FV6]

(1) Compliance with *Performance Requirement*F8P1 is verified for an *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 interior, exterior or interstitial surfaces of components of the building *fabric*, from the 5th year after construction onwards.

(2) The calculation method for (1) must use input assumptions in accordance with AIRAH DA07.

(3) The calculation method for (1) must use the intermediate method for calculating indoor design humidity in Section 4.3.2 of AIRAH DA07.

~~(1) Compliance with *Performance Requirement* F6~~F8P1 ~~is verified when modelling determines that moisture will not accumulate—~~

~~(a) interior to the primary *water control layer* within a building envelope; or~~

~~(b) on the interior surface of the *water control layer*.~~

~~(2) Modelling used for the purposes of (1) must assess the effects of—~~

~~(a) indoor and outdoor temperature and humidity conditions; and~~

~~(b) heating and cooling set points; and~~

~~(c) rain absorption; and~~

~~(d) wind pressure; and~~

~~(e) solar radiation; and~~

~~(f) material hygrothermal properties.~~

Deemed-to-Satisfy Provisions

~~F6D1~~F8D1 Deemed-to-Satisfy Provisions

[2019: F6.0]

(1) Compliance with *Performance Requirement* F~~6~~8P1 is satisfied by complying with *Deemed-to-Satisfy Provisions* F~~6~~8D2 to F~~6~~8D5.

(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 installation of a *condensation* management system may not prevent *condensation* from occurring.

~~F6D2~~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.

~~F6D3~~F8D3 ~~Pliable building membrane~~Wall construction

[2019: F6.2]

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

(a) comply with AS/NZS 4200.1; and

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

(c) ~~be a vapour permeable membrane for *climate zones* 6, 7 and 8; and~~

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

(2) Where *pliable building membranes*, *sarking-type materials* or insulation layers are installed on the exterior side of the primary insulation layer of an *external wall* they must have a *vapour permeance* of no 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.

(~~2~~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.

~~F6D4~~F8D4 ~~Flow rate and discharge of e~~Exhaust systems

[2019: F6.3]

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

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

(i) 25 L/s where operated on demand; or

(ii) 10 L/s where operated continuously; and

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

(i) 40 L/s where operated on demand; or

(ii) 12 L/s where operated continuously.

(2) Exhaust from a kitchen, kitchen range hood, bathroom, *sanitary compartment*, or a vented clothes dryer must be discharged directly or via a shaft or duct to *outdoor air*.

(3) An exhaust system serving a bathroom or sanitary compartment that is not naturally ventilated must—

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

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

(4) A bathroom, *sanitary compartment* or room with a venting clothes dryer that is not naturally ventilated must be provided with make-up air in accordance with Table F8D4.

(~~3~~) ~~Exhaust from a bathroom, *sanitary compartment*, or laundry must be discharged—~~

(a) ~~directly or via a shaft or duct to *outdoor air*; or~~

(b) ~~to a roof space that is ventilated in accordance with F6~~8~~D5.~~

Table F8D4: Make-up air requirements

Exhaust airflow rate (L/s)	Make-up air requirement
≤ 20	10 mm door undercut
> 20 and ≤ 40	20 mm door undercut
> 40 and ≤ 60	30 mm door undercut
> 60 and ≤ 80	40 mm door undercut
> 80 and ≤ 100	50 mm door undercut
> 100	In accordance with section 3.8 of AS 1668.2

~~F6D5~~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 immediately above the primary insulation layer; 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 the sarking of a tiled roof where the sarking has a *vapour permeance* of

not less than 1.14 µg/N.s.

(2) The requirements of (1) do not apply to a roof that is subject to Bushfire Attack Level FZ requirements.

(~~1~~) ~~Where an exhaust system covered by F68D4 discharges directly or via a shaft or duct into a roof space, the roof space must be ventilated to *outdoor air* through evenly distributed openings.~~

(~~2~~) ~~Openings *required* by (1) must have a total unobstructed area of 1/300 of the respective ceiling area if the roof pitch is greater than 22°, or 1/150 of the respective ceiling area if the roof pitch is less than or equal to 22°.~~

(~~3~~) ~~30% of the total unobstructed area *required* by (2) must be located not more than 900 mm below the ridge or highest point of the roof space, measured vertically, with the remaining *required* area provided by eave vents.~~

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

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J1F1 Reducing greenhouse gas emissions

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

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J2D1 Deemed-to-Satisfy Provisions

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Deemed-to-Satisfy Provisions

~~J3D1~~J4D1 Deemed-to-Satisfy Provisions

~~J3D2~~J4D2 Application of Part

~~J3D3~~J4D3 Thermal construction — general

~~J3D4~~J4D4 Roof and ceiling construction

~~J3D5~~J4D5 Roof lights

~~J3D6~~J4D6 Walls and glazing

~~J3D7~~J4D7 Floors

Part ~~J4~~J5 Building sealing

Deemed-to-Satisfy Provisions

~~J4D1~~J5D1 Deemed-to-Satisfy Provisions

~~J4D2~~J5D2 Application of Part

~~J4D3~~J5D3 Chimneys and flues

~~J4D4~~J5D4 Roof lights

~~J4D5~~J5D5 Windows and doors

~~J4D6~~J5D6 Exhaust fans

~~J4D7~~J5D7 Construction of ceilings, walls and floors

~~J4D8~~J5D8 Evaporative coolers

Part ~~J5~~J6 Air-conditioning and ventilation

Part J1 Energy efficiency performance requirements

Introduction to this Part

This Part is intended to reduce greenhouse gas emissions from buildings. It addresses greenhouse gas emissions that occur as result of the how the building uses energy, and through the source of the energy used.

Objectives

J1O1 Objective

[2019: JO1]

The Objective of this Section is to ~~reduce greenhouse gas emissions.~~use energy efficiently in order to—

(a) reduce energy consumption; and

(b) reduce greenhouse gas emissions; and

(c) improve occupant health and amenity; and

(d) improve the resilience of a building to extreme weather and blackouts.

Functional Statements

J1F1 ~~Reducing greenhouse gas emissions~~Energy efficiency

[2019: JF1]

To ~~reduce greenhouse gas emissions, to~~ the degree necessary, a building, including its *fabric* and *services*, is to contribute to the efficient use of energy to—

(a) ~~a building, including its *services*, is to be capable of efficiently using energy; and~~

(b) ~~a building's *services* are to obtain their energy from—~~

(i) ~~a low greenhouse gas intensity source; or~~

(ii) ~~an on-site *renewable energy* source; or~~

(iii) ~~another process, such as reclaimed energy.~~

(c) reduce energy consumption; and

(d) reduce greenhouse gas emissions; and

(e) improve occupant health and amenity; and

(f) improve the resilience of a building to extreme weather and blackouts.

Performance Requirements

J1P1 Energy use

[2019: JP1]

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, other than a *sole-occupancy unit* of a Class 2 building or a Class 4 part of a building, 15 kJ/m².hr.

J1P2 Building fabric of sole-occupancy units of a Class 2 building or Class 4 part

[New for 2022]

(1) The total *heating load* of the *habitable rooms* 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* 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* 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 sole-occupancy unit of a Class 2 building or a Class 4 part

[New for 2022]

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 spaces that are provided with lighting.

J1P4 Renewable energy and electric vehicle charging

[New for 2022]

A building must have features that facilitate incorporation of renewable energy and electric vehicle charging equipment.

Verification Methods

J1V1 NABERS Energy ~~for Offices~~

[2019: JV1]

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

(a) a minimum 5.5-star *NABERS Energy for Offices* 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 common areas in Class 2 buildings with over 25 sole-occupancy units, compliance with J1P1 is verified when— ~~The calculation method for (1) must comply with ANSI/ASHRAE Standard 140.~~

(a) *NABERS Energy for Apartment Buildings* Commitment Agreement is obtained; and

(b) the energy model *required* for (a) demonstrates, when the emissions allowance is recalculated to remove allowances for car parking spaces, gyms, centrally serviced *sole-occupancy units* and pools, that the building's common area greenhouse gas emissions are not more than or equal to—, for a *conditioned space*, 86% of the 4.5-star level; and

(c) the energy model *required* for (a) removes energy associated with—

(i) external lighting; and

(ii) carpark services; and

(iii) services for *sole-occupancy units*; and

(iv) heated water supply for *sole-occupancy units*; and

(v) plug loads of common area equipment (e.g. in gyms); and

(vi) *swimming pool* heating and pumping; and

(vii) services for an indoor space with a *swimming pool* or spa; and

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

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

(a) a *NABERS Energy for Hotels* Commitment Agreement is obtained; and

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

(i) demonstrates the building's greenhouse gas emissions are below 65% of the maximum 4.5-star level allowance when the emissions budget is recalculated to remove allowances for function room seats, laundry servicing and *swimming pool*s; and

(ii) removes energy associated with—

(A) external lighting; and

(B) carpark services; and

(C) plug loads; and

(D) process loads; and

(E) laundry services; and

(F) *swimming pool* heating and pumping; and

(c) 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 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.

(4) For a Class 6 shopping centre with a *floor area* of more than 15,000m^2, compliance with J1P1 is verified when—

(a) A *NABERS Energy for Shopping Centres* Commitment Agreement is obtained; and

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

(i) demonstrates the building's greenhouse gas emissions are below 80% of the maximum 4.5-star allowance when the emissions budget is recalculated to remove allowances for car parking spaces and multi-storey

centres; and

(ii) removes energy associated with—

(A) external lighting; and

(B) carpark services; and

(C) plug loads; and

(D) process loads; and

(c) 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 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.

(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.

(a) ~~ANSI/ASHRAE Standard 140; and~~~~Specification 34.~~

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 Building envelope sealing

[2019: JV4]

(1) Compliance with J1P1(e) is verified 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 change rate of not more than 5 air changes per hour at 50 Pa reference pressure is achieved—

(a) the building must be provided with a mechanical ventilation system 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 building (m^2); and

(C) N = the number bedrooms in the building; and

(D) p = the fraction of time within each four 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 the 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 5601.1; and

(ii) clause 6.4.5 of AS 5601.1.

(3) For the purposes of (2)(c), the volume of the space is considered to be 0 m^3 for determining ventilation requirements.

J1V5 Verification using a reference building for a Class 2 building

[New for 2022]

(1) For a Class 2 building, compliance with J1P2 is verified when each *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 the *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 the *reference building*; and

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

(c) complies with the additional requirements in Specification 34.

(2) Compliance with J1P3 is determined when the *energy value* of the *domestic services* of a proposed building is less than that of a *reference building* when each *sole-occupancy unit* of a *reference building* has—

(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 *heated water*; and

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

(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*.

(4) The *reference building* for (1)(a) and (b) must, for reducing *heating loads* and *cooling loads*, comply with—

(a) for *wall-glazing construction*—

(i) J3D9; or

(ii) J3D8 and J3D11 to J3D13; and

(b) for roofs, J4D4; and

(c) for *roof lights*, J4D5; and

(d) for floors, J4D7.

(5) The *reference building* for (1)(b) must—

(a) for *external walls* and roofs, have a solar absorptance of 0.6; and

(b) for air infiltration, have a rate of—

(i) 0.4 air changes per hour applied continuously to all zones, except for—

(A) basement *carparks*, where an air infiltration rate of 0.6 air changes per hour must be used; and

(B) unoccupied roof spaces, where an air infiltration rate of 3 air changes per hour must be used; or

(ii) equal to the intended building air change rate at 50 Pa divided by 20 when—

(A) in intended building air change rate of 50 Pa is specified; and

(B) additional building sealing provisions in Part J5 are specified; and

(C) building sealing is verified using J1V4.

(6) The *heating load*, *cooling load* and *energy value* must be calculated for both the proposed building and the *reference building* using the same—

(a) *energy value* factors from Tables J1V5j and J1V5k; and

(b) location, in accordance with S34C3(3); and

(c) adjacent structures and features; and

(d) orientation; and

(e) 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

(f) testing standards, including for insulation, *glazing*, water heater and unitary *air-conditioning* equipment; and

(g) *fabric* and *glazing*, including—

(i) thermal resistance of air films including any adjustment factors, moisture content of materials and the like; and

(ii) dimensions of *external walls*, *internal walls* and separating walls; and

(iii) internal shading devices, including their colour and criteria for operation; and

(h) range and type of *air-conditioning* services and energy sources other than *renewable energy* generated on-site where they are present; and

(i) capacity, and system configuration, for on-site domestic *heated water* systems, assuming—

(i) a consumption rate as per Table A4 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 as per Table A5 of AS/NZS 4234; and

(iii) a water inlet temperature of monthly ground temperature as per Table A6 of AS 4234; and

(iv) a water outlet temperature of 60°C; and

(v) the same calculation method for standing losses; and

(j) internal *heating loads*, in accordance with Table J1V5a; and

(k) occupancy profiles, in accordance with Tables J1V5b to J1V5i; and

(l) 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 pantry, corridors, en-suites, walk-in robes, bathrooms, toilets, laundry and any adjacent roof space or basement are unconditioned.

(7) Where present, the *air-conditioning* services of each *sole-occupancy unit* of both the proposed building and the *reference building* must be modelled with—

(a) a heating thermostat setting of—

(i) 20°C for all conditioned zones in *climate zones* 2 to 8 from 6 am to 12 am; and

(ii) 18°C in *climate zones* 2 to 8 at all other times; and

(b) a cooling thermostat setting of—

(i) 26°C for all daytime conditioned zones in *climate zones* 5, 6, 7 and 8 at all times; and

(ii) 27°C for all daytime conditioned zones in *climate zones* 1, 2, 3 and 4 at all times; and

(c) a constant cooling thermostat setting of 24°C for all night time conditioned zones in all *climate zones*; and

(d) the same assumptions and means of calculating the temperature difference across *air-conditioning* zone boundaries; and

(e) the same floor coverings and fittings density; and

(f) the same internal artificial lighting illumination levels.

Table J1V5a: Internal heat loads for lighting, cooking and appliances in sole-occupancy units of a Class 2 building

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

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)
> 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 J1V5b: Lighting schedules for daytime zones in sole-occupancy units of a Class 2 building

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	7%	8%	7%
7:00 am to 8:00 am	7%	8%	7%
8:00 am to 9:00 am	1%	2%	1%
9:00 am to 10:00 am	1%	1%	1%
10:00 am to 11:00 am	1%	1%	1%
11:00 am to 12:00 pm	1%	1%	1%
12:00 pm to 1:00 pm	1%	1%	1%
1:00 pm to 2:00 pm	1%	1%	1%
2:00 pm to 3:00 pm	1%	1%	1%
3:00 pm to 4:00 pm	1%	1%	1%
4:00 pm to 5:00 pm	3%	3%	3%
5:00 pm to 6:00 pm	17%	19%	18%
6:00 pm to 7:00 pm	25%	29%	27%
7:00 pm to 8:00 pm	29%	33%	31%
8:00 pm to 9:00 pm	27%	30%	28%
9:00 pm to 10:00 pm	22%	25%	23%
10:00 pm to 11:00 pm	12%	14%	13%
11:00 pm to 12:00 am	0%	0%	0%

Table J1V5c: Lighting schedules for night-time zones in sole-occupancy units of a Class 2 building

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	7%	8%	7%
7:00 am to 8:00 am	7%	8%	7%
8:00 am to 9:00 am	1%	1%	1%
9:00 am to 10:00 am	0%	1%	1%
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	17%	19%	18%
6:00 pm to 7:00 pm	25%	29%	27%
7:00 pm to 8:00 pm	29%	33%	31%
8:00 pm to 9:00 pm	27%	30%	28%
9:00 pm to 10:00 pm	22%	25%	23%
10:00 pm to 11:00pm	12%	13%	12%
11:00 pm to 12:00 am	0%	0%	0%

Table J1V5d: Cooking schedules for sole-occupancy units in a Class 2 building

Time period (local standard time)	December to February	June to August	March to May, September to November
12:00 am to 1:00 am	2%	2%	2%
1:00 am to 2:00 am	2%	2%	2%
2:00 am to 3:00 am	1%	1%	1%
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	2%	2%	2%
7:00 am to 8:00 am	6%	6%	6%
8:00 am to 9:00 am	9%	10%	10%
9:00 am to 10:00 am	13%	17%	15%
10:00 am to 11:00 am	11%	13%	12%
11:00 am to 12:00 pm	13%	17%	15%
12:00 pm to 1:00 pm	17%	21%	19%

Time period (local standard time)	December to February	June to August	March to May, September to November
1:00 pm to 2:00 pm	17%	23%	20%
2:00 pm to 3:00 pm	15%	21%	18%
3:00 pm to 4:00 pm	15%	17%	16%
4:00 pm to 5:00 pm	19%	255	22%
5:00 pm to 6:00 pm	30%	50%	39%
6:00 pm to 7:00 pm	60%	100%	79%
7:00 pm to 8:00 pm	72%	88%	79%
8:00 pm to 9:00 pm	38%	42%	40%
9:00 pm to 10:00 pm	19%	21%	20%
10:00 pm to 11:00 pm	9%	10%	10%
11:00 pm to 12:00 am	4%	4%	4%

Table J1V5e: Appliance schedule for all zones in sole-occupancy units of a Class 2 building

Time period (local standard time)	December to February	June to August	March to May, September to November
12:00 am to 1:00 am	43%	45%	44%
1:00 am to 2:00 am	38%	39%	38%
2:00 am to 3:00 am	37%	38%	37%
3:00 am to 4:00 am	37%	38%	37%
4:00 am to 5:00 am	37%	38%	37%
5:00 am to 6:00 am	39%	42%	40%
6:00 am to 7:00 am	48%	54%	50%
7:00 am to 8:00 am	61%	73%	66%
8:00 am to 9:00 am	48%	55%	51%
9:00 am to 10:00 am	47%	52%	49%
10:00am to 11:00 am	46%	53%	48%
11:00 am to 12:00 pm	45%	51%	47%
12:00 pm to 1:00 pm	43%	49%	45%
1:00 pm to 2:00 pm	44%	48%	45%
2:00 pm to 3:00 pm	44%	49%	46%
3:00 pm to 4:00 pm	45%	51%	47%
4:00 pm to 5:00 pm	68%	84%	75%
5:00 pm to 6:00 pm	84%	100%	91%
6:00 pm to 7:00 pm	76%	85%	79%
7:00 pm to 8:00 pm	59%	70%	63%
8:00 pm to 9:00 pm	64%	76%	68%
9:00 pm to 10:00 pm	61%	71%	65%
10:00 pm to 11:00 pm	53%	59%	55%
11:00 pm to 12:00 am	50%	55%	51%

Table J1V5f: Occupancy schedules for sole-occupancy units in a Class 2 building

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 J1V5g: Heating, ventilation and air-conditioning schedules for daytime zones in sole-occupancy units of a Class 2 building

Time period (local standard time)	Heating, ventilation and air-conditioning on/off	Cooling thermostat setting - *climate zones* 1 to 4 (°C)	Cooling thermostat setting - *climate zones* 5 to 8 (°C)	Heating thermostat setting - *climate zones* 2 to 8 (°C)
12:00 am to 1:00 am	Off	N/A	N/A	N/A
1:00 am to 2:00 am	Off	N/A	N/A	N/A
2:00 am to 3:00 am	Off	N/A	N/A	N/A
3:00 am to 4:00 am	Off	N/A	N/A	N/A
4:00 am to 5:00 am	Off	N/A	N/A	N/A
5:00 am to 6:00 am	Off	N/A	N/A	N/A
6:00 am to 7:00 am	On	27	26	20
7:00 am to 8:00 am	On	27	26	20
8:00 am to 9:00 am	On	27	26	20
9:00 am to 10:00 am	On	27	26	20
10:00 am to 11:00 am	On	27	26	20
11:00 am to 12:00 pm	On	27	26	20

Time period (local standard time)	Heating, ventilation and air-conditioning on/off	Cooling thermostat setting - *climate zones* 1 to 4 (°C)	Cooling thermostat setting - *climate zones* 5 to 8 (°C)	Heating thermostat setting - *climate zones* 2 to 8 (°C)
12:00 pm to 1:00 pm	On	27	26	20
1:00 pm to 2:00 pm	On	27	26	20
2:00 pm to 3:00 pm	On	27	26	20
3:00 pm to 4:00 pm	On	27	26	20
4:00 pm to 5:00 pm	On	27	26	20
5:00 pm to 6:00 pm	On	27	26	20
6:00 pm to 7:00 pm	On	27	26	20
7:00 pm to 8:00 pm	On	27	26	20
8:00 pm to 9:00 pm	On	27	26	20
9:00 pm to 10:00 pm	On	27	26	20
10:00 pm to 11:00 pm	On	27	26	20
11:00 pm to 12:00 am	Off	N/A	N/A	N/A

Table J1V5h: Occupancy schedules for night-time zones in sole-occupancy units of a Class 2 building

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 J1V5i: Heating, ventilation and air-conditioning schedules for night-time zones in sole-occupancy units of a Class 2 building

Time period (local standard time)	All days, heating, ventilation and air-conditioning on/off	Cooling thermostat setting - *climate zones* 1 to 4 (°C)	Cooling thermostat setting - *climate zones* 5 to 8 (°C)	Heating thermostat setting - *climate zones* 2 to 8 (°C)
12:00 am to 1:00 am	On	24	24	18
1:00 am to 2:00 am	On	24	24	18
2:00 am to 3:00 am	On	24	24	18
3:00 am to 4:00 am	On	24	24	18
4:00 am to 5:00 am	On	24	24	18
5:00 am to 6:00 am	On	24	24	18
6:00 am to 7:00 am	On	24	24	20
7:00 am to 8:00 am	On	24	24	20
8:00 am to 9:00 am	On	24	24	20
9:00 am to 10:00 am	Off	N/A	N/A	N/A
10:00 am to 11:00 am	Off	N/A	N/A	N/A
11:00 am to 12:00 pm	Off	N/A	N/A	N/A
12:00 pm to 1:00 pm	Off	N/A	N/A	N/A
1:00 pm to 2:00 pm	Off	N/A	N/A	N/A
2:00 pm to 3:00 pm	Off	N/A	N/A	N/A
3:00 pm to 4:00 pm	Off	N/A	N/A	N/A
4:00 pm to 5:00 pm	Off	N/A	N/A	N/A
5:00 pm to 6:00 pm	Off	N/A	N/A	N/A
6:00 pm to 7:00 pm	On	24	24	20
7:00 pm to 8:00 pm	On	24	24	20
8:00 pm to 9:00 pm	On	24	24	20
9:00 pm to 10:00 pm	On	24	24	20
10:00 pm to 11:00 pm	On	24	24	20
11:00 pm to 12:00 am	On	24	24	20

Table J1V5j: Energy factors based on fuel type

Fuel type	NSW	VIC	QLD	SA	WA	TAS	NT	ACT
Electricity: peak (kWh)	1.53	1.53	1.53	1.54	1.54	1.55	1.54	1.55
Electricity: shoulder (kWh)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Electricity: off-peak (kWh)	0.79	0.79	0.79	0.78	0.79	0.78	0.79	0.78
Electricity: cont. load (kWh)	0.54	0.82	0.76	0.62	0.47	0.70	1.11	0.68
Natural gas (MJ)	0.14	0.10	0.24	0.13	0.16	0.21	0.16	0.18

Fuel type	NSW	VIC	QLD	SA	WA	TAS	NT	ACT
Electricity: PV export (kWh)	0.39	0.53	0.51	0.35	0.29	0.50	1.10	0.42

Table J1V5k: 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

Part J2 Energy efficiency

Introduction to this Part

This Part contains *Deemed-to-Satisfy Provisions* for Part J1. It sets out the application of Parts J3 to J9.

Deemed-to-Satisfy Provisions

J2D1 Deemed-to-Satisfy Provisions

[2019: J0.0]

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

(a) J2D2; and

(a) ~~J2D2~~J3D2 to ~~J2D6~~J3D15; and

(b) ~~J3D2~~J4D2 to ~~J3D7~~J4D7; and

(c) ~~J4D2~~J5D2 to ~~J4D8~~J5D8; and

(d) ~~J5D2~~J6D2 to ~~J5D13~~J6D13; and

(e) ~~J6D2~~J7D2 to ~~J6D9~~J7D9; and

(f) ~~J7D2~~J8D2 to ~~J7D4~~J8D4; and

(g) ~~J8D2~~J9D2 to ~~J8D3~~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) *Performance Requirement* J1P1 is satisfied by complying with—

(a) for reducing the *heating loads* or *cooling loads* of a Class 2 to 9 building, other than the *sole-occupancy units* of a Class 2 building or a Class 4 part of a building, Parts J4 and J5; and

(i) ~~of sole-occupancy units of a Class 2 building or a Class 4 part of a building, J2D3 to J2D6; and~~

(ii) ~~of a Class 2 to 9 building, other than the *sole-occupancy units* of a Class 2 building or a Class 4 part of a building, Parts J3 and J4; and~~

(b) for *air-conditioning* and ventilation, ~~Part J5~~Part J6; and

(c) for artificial lighting and power, ~~Part J6~~Part J7; and

(d) for heated water supply and *swimming pool* and spa pool plant, ~~Part J7~~Part J8; and

(e) for ~~facilities for monitoring~~energy monitoring and distributed energy resources, ~~Part J8~~Part J9.

(2) *Performance Requirement*J1P2 is satisfied by complying with—

(a) for reducing the *heating loads* or *cooling loads* of *sole-occupancy units* of a Class 2 building or Class 4 part of a building using *house energy rating software*, J3D3 to J3D6 as applicable; or

(b) for reducing the *heating loads* or *cooling loads* of *sole-occupancy units* of a Class 2 building or Class 4 part of a building by improving the thermal performance of the building fabric—

(i) for general thermal construction, J3D3(1)(b) to J3D3(1)(e); and

(ii) for fans, J3D4; and

(iii) for roofs, J3D7; and

(iv) for walls and glazing—

(A) J3D8 and J3D11 to J3D13; or

(B) J3D9; and

(v) for floors, J3D10.

(3) *Performance Requirement*J1P3 is satisfied by complying with—

(a) for artificial lighting and power, Part J7; and

(b) for the net energy usage of *air-conditioning* and ventilation, *heated water* supply, *swimming pool* and spa pool plant, J3D14 to J3D15.

(4) *Performance Requirement*J1P4 is satisfied by complying with J9D4 and J9D5.

Part J3 Elemental provisions for a Class 2 building and a Class 4 part

Introduction to this Part

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

~~J2D3~~J3D3 Heating and cooling loads of a sole-occupancy unit~~s~~ of a Class 2 building or a Class 4 part

[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 ~~6~~7 stars, including the separate heating and cooling load limits; and

(ii) individually achieve an energy rating of not less than ~~5~~6 stars, including the separate heating and cooling load limits; and

(b) for general thermal construction, comply with ~~J3D3~~J4D3; and

(c) for thermal breaks, comply with ~~J2D5~~J3D5 and ~~J2D6~~J3D6; and

(d) for floor edge insulation, comply with ~~J3D6(2)~~J4D7(3) and ~~J3D7(3)~~J4D7(4); and

(e) for building sealing, comply with ~~Part J4~~Part J5.

(2) Energy ratings referred to in (1)(a)(i) and (ii) must be achieved using *house energy rating software* and the load limits specified in the ABCB Standard for NatHERS Heating and Cooling Load Limits.

~~J2D4~~J3D4 Ceiling fans in a sole-occupancy unit of a Class 2 building or a Class 4 part

[2019: J0.3]

(1) Ceiling fans *required* as part of compliance with ~~J2D3(1)(a)~~J3D3(1)(a), must—

(a) be permanently installed in accordance with Table J3D4; and

(b) have a speed controller.~~; and~~

(c) ~~serve the whole room, with the *floor area* that a single fan serves not exceeding—~~

(i) ~~15 m² if it has a blade rotation diameter of not less than 900 mm; and~~

(ii) ~~25 m² if it has a blade rotation diameter of not less than 1 200 mm.~~

(2) In a *sole-occupancy unit* of a Class 2 building or a Class 4 part of a building not *required* to comply with (1), ceiling fans with a speed controller must be permanently installed in accordance with Table J3D4.

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 bedrooms in *climate zones* 1, 2 and 3	Minimum number and diameter (mm) of ceiling fans required in daytime habitable spaces in *climate zones* 1, 2, 3 and 5
≥ 10 to < 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 to < 65	2 x 1400	3 x 1200
≥ 65 to < 85	2 x 1400	4 x 1200

Table Notes

(1) The requirement for fans in *climate zone* 5 applies in New South Wales and Queensland only.

(2) Daytime habitable spaces are living rooms, rumpus rooms and the like.

(3) Circulation spaces such as hallways are not required to install ceiling fans.

~~J2D5~~J3D5 Roof thermal breaks of a sole-occupancy unit of a Class 2 building and a Class 4 part

[2019: J0.4]

~~For compliance with J3D3(1)(c), a~~A roof 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 metal sheet roofing and its supporting metal purlins, metal rafters or metal battens if the roof—

(a) has metal sheet roofing 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.

~~J2D6~~J3D6 Wall thermal breaks of a sole-occupancy unit of a Class 2 building and a Class 4 part

[2019: J0.5]

~~For compliance with J3D3(1)(c), a~~A wall 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) has lightweight external cladding such as weatherboards, fibre-cement or metal sheeting fixed to a metal frame.

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

[New for 2022]

(1) Subject to (2) and (3), where *required*, roof insulation must achieve the minimum *R-Value*—

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

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

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

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

(e) in *climate zone* 5, in accordance with Tables J3D7m to 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 to J3D7r as applicable.

(2) The solar absorptance of the upper surface of a roof in *climate zones* 1 to 5 must be ≤ 0.64.

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

(a) be downward facing; and

(b) have an emissivity of not more than 0.05; and

(c) be adjacent to a roof space—

(i) of not less than 20 mm; and

(ii) in accordance with F8D5.

(4) Where, for operational or safety reasons associated with exhaust fans, flues or recessed downlights, the area of ceiling insulation required to be added is reduced, the loss of insulation must be compensated for by increasing the material *R-Value* of the remainder of the ceiling insulation in accordance with Table J3D7s.

(5) The thermal bridging in a steel-framed roof must be addressed by—

(a) the roof achieving the total system *R-Value* specified in Tables J3D7t and J3D7u, calculated in accordance with AS/NZS 4859.2; or

(b) complying with one of the options in Tables J3D7v orJ3D7w.

Table J3D7a: Flat concrete roof — minimum R-Value for 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 material (bag) *R-Value* of insulation.

Table J3D7b: Pitched roof with flat ceiling — minimum R-Value for ceiling insulation: climate zone 1

Reflective insulation under-roof	Roof space ventilation	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	Vented	1.5	1.5	1.5	2.0	2.0
No	Vented	1.5	2.5	4.0	5.0	X
Yes	Standard	1.5	2.0	2.0	3.0	4.0
No	Standard	1.5	3.5	5.0	X	X

Table Notes

(1) SA = Solar Absorptance.

(1) A roof space is to be considered 'Vented' if it—

(a) has one wind-driven roof ventilator per 50 m^2 of ceiling area, in addition to the roof vents; or

(b) has one powered roof ventilator per 200 m^2 of ceiling area, in addition to the roof vents; or

(c) complies with Table F8D5.

(2) If a roof is not 'Vented', it is a 'Standard' roof.

(3) X = not permitted.

(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 material (bag) *R-Value* of insulation.

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) X = not permitted.

(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 material (bag) *R-Value* of insulation.

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 material (bag) *R-Value* of insulation.

Table J3D7e: Pitched roof with flat ceiling — minimum R-Value for insulation: climate zone 2

Reflective insulation under-roof	Roof ventilation	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
Yes	Any	0	2.5	2.5	2.5	2.5	2.5
No	Vented	0	2.5	3.0	3.0	3.5	3.5
	Standard	0	3.0	3.0	3.5	4.0	4.0
	Vented	0.5	2.5	2.5	2.5	2.5	2.5
	Standard	0.5	2.5	2.5	2.5	3.0	3.0
	Any	1.0	2.5	2.5	2.5	2.5	2.5

Table Notes

(1) SA = Solar Absorptance.

(1) A roof is considered 'Vented' if it—

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

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

(c) complies with Table F8D5.

(2) If a roof is not 'Vented', it is a 'Standard' roof.

(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 material (bag) *R-Value* of insulation.

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

Reflective insulation under-roof	Under-roof insulation *R-Value*	Minimum ceiling level insulation *R-Value*		
		SA ≤ 0.32	SA > 0.32 to ≤ 0.42	SA > 0.42 to ≤ 0.64
Yes	0	2.5	2.5	2.5
No	0	3.0	3.5	4.0
	0.5	2.5	2.5	3.0
	1.0	2.5	2.5	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 material (bag) *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 material (bag) *R-Value* of insulation.

Table J3D7h: Pitched roof with flat ceiling — minimum R-Values for insulation: climate zone 3

Reflective insulation under-roof	Roof ventilation	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
Yes	Vented	0	2.5	2.5	2.5	2.5	2.5
No	Vented	0	3.5	4.0	4.5	5.0	X
Yes	Standard	0	2.0	2.0	2.5	2.5	2.5
No	Standard	0	3.5	4.0	5.0	X	X
Yes	Vented	0.5	2.0	2.5	2.5	2.5	2.5
No	Vented	0.5	3.0	3.5	3.5	4.0	4.5
Yes	Standard	0.5	2.0	2.0	2.5	2.5	2.5
No	Standard	0.5	3.0	3.0	3.5	4.0	5.0
Yes	Vented	1.0	2.0	2.5	2.5	2.5	2.5
No	Vented	1.0	2.5	3.0	3.0	3.0	3.5
Yes	Standard	1.0	2.0	2.0	2.0	2.0	2.5
No	Standard	1.0	2.5	2.5	3.0	3.0	3.5
Yes	Vented	1.5	2.0	2.0	2.5	2.5	2.5
No	Vented	1.5	2.5	3.0	3.0	3.0	3.0
Yes	Standard	1.5	2.0	2.0	2.0	2.0	2.0
No	Standard	1.5	2.0	2.5	2.5	2.5	3.0
Yes	Vented	2.0	2.0	2.0	2.5	2.5	2.5
No	Vented	2.0	2.5	2.5	3.0	3.0	3.0
Yes	Standard	2.0	2.0	2.0	2.0	2.0	2.0
No	Standard	2.0	2.0	2.0	2.5	2.5	2.5

Table Notes

(1) SA = Solar Absorptance.

(1) A roof is considered 'Vented' if it—

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

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

(c) complies with Table F8D5.

(2) If a roof is not 'Vented', it is a 'Standard' roof.

(3) X = not permitted.

(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 material (bag) *R-Value* of insulation.

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

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
Yes	Any	2.0	2.0	2.5	2.5	2.5
No	Any	3.5	4.0	5.0	X	X
Yes	0.5	2.0	2.0	2.0	2.0	2.0
No	0.5	3.0	3.5	4.5	5.0	X
Yes	1.0	1.5	1.5	1.5	1.5	1.5
No	1.0	2.5	3.0	4.0	4.5	5.0
Yes	1.5	1.5	1.5	1.5	1.5	1.5
No	1.5	2.0	2.5	3.5	4.0	4.5
Yes	2.0	1.5	1.5	1.5	1.5	1.5
No	2.0	1.5	2.0	3.0	3.5	4.0

Table Notes

(1) SA = Solar Absorptance.

(2) X = not permitted.

(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 material (bag) *R-Value* of insulation.

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

Reflective insulation under-roof	SA ≤ 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 material (bag) *R-Value* of insulation.

Table J3D7k: **Pitched roof with flat ceiling — minimum R-Value for insulation: climate zone 4**

Reflective insulation under- roof	Roof ventilation	Under-roof insulation *R-Value*	SA ≤ 0.23	SA > 0.23 to ≤ 0.64
Yes	Vented	0	3.0	3.5
	Standard	0	3.0	3.0
No	Any	0	3.5	3.5
	Any	0.5	3.5	3.5
	Vented	1.0	3.5	3.5
	Standard	1.0	3.0	3.0

Table Notes

(1) SA = Solar Absorptance.

(1) A roof is considered 'Vented' if it—

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

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

(c) complies with Table F8D5.

(2) If a roof is not 'Vented', it is a 'Standard' roof.

(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 material (bag) *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* 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 material (bag) *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 material (bag) *R-Value* of insulation.

Table J3D7n: Pitched roof with flat ceiling — minimum R-Value for ceiling insulation: climate zone 5

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

Table Notes

(1) SA = Solar Absorptance.

(1) A roof is considered 'Vented' if it—

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

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

(c) complies with Table F8D5.

(2) If a roof is not 'Vented', it is a 'Standard' roof.

(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 material (bag) *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	3.5

Table Notes

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

(2) *R-Values* listed are for the material (bag) *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	4.0	3.5	3.5	3.0	3.0	3.0	2.5
No	3.5	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* or any under-roof or ceiling insulation.

(3) *R-Values* listed are for the material (bag) *R-Value* of insulation.

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

Reflective insulation under- roof	Roof ventilation	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
Yes	Vented	0	4.5	4.5	4.5	4.5	4.5	4.0	4.0	4.0
Yes	Standard	0	4.5	4.5	4.5	4.0	4.0	4.0	4.0	4.0
Yes	Vented	1.0	4.5	4.5	4.5	4.5	4.0	4.0	4.0	4.0
Yes	Standard	1.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
No	Vented	0	5.0	4.5	4.5	4.5	4.0	4.0	3.5	3.5
No	Standard	0	5.0	4.5	4.5	4.0	4.0	4.0	3.5	3.5
No	Vented	1.0	4.5	4.5	4.5	4.5	4.0	4.0	4.0	4.0
No	Standard	1.0	4.5	4.5	4.0	4.0	4.0	4.0	3.5	3.5
No	Vented	1.5	4.5	4.5	4.5	4.5	4.5	4.0	4.0	4.0
No	Standard	1.5	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0

Table Notes

(1) SA = Solar Absorptance.

(1) A roof is considered 'Vented' if it—

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

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

(c) complies with Table F8D5.

(2) If a roof is not 'Vented', it is a 'Standard' roof.

(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 material (bag) *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
No	5.0	4.5	4.5	4.0	4.0	3.5	3.5	3.5
Yes	4.5	4.5	4.5	4.0	4.0	4.0	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 material (bag) *R-Value* for insulation.

Table J3D7s: **Adjustment to minimum R-Value of ceiling insulation required to compensate for loss of ceiling insulation area**

Percentage of ceiling area uninsulated	Minimum *R-Value* of insulation *required* to satisfy J3D7(1)									
	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

X = not permitted.

Table J3D7t: **Pitched steel-framed roof with flat ceiling — 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
1.0	1.05
1.5	1.49
2.0	1.87
2.5	2.25
3.0	2.59
3.5	2.90
4.0	3.19
4.5	3.46
5.0	3.72
5.5	3.95
6.0	4.17

Table Notes

The *Total R-Value* calculated must only include the ceiling frame, insulation and lining. It is not to include internal air films, roof space or roof lining.

Table J3D7u: **Flat, skillion or cathedral steel-framed 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
0.0	0.63	0.53
1.0	1.65	1.55
1.5	2.13	2.03
2.0	2.59	2.50
2.5	3.04	2.94
3.0	3.47	3.37
3.5	3.88	3.79
4.0	4.28	4.18
4.5	4.67	4.57
5.0	5.04	4.94
5.5	5.40	5.30
6.0	5.75	5.65

Table Notes

The *Total R-Value* calculated must only include the ceiling frame, insulation and lining. It is not to include internal air films, roof space or roof lining.

Table J3D7v: **Thermal bridging mitigation options for a steel-framed pitched roof with a flat ceiling: heat flow down**

Ceiling insulation *R-Value* derived from J3D7(1)(f) or Tables J3D7a to J3D7r	Option 1: increase minimum insulation *R-Value* between ceiling framing to at least the specified minimum *R-Values*	Option 2: add a thermal break strip with at least the specific minimum *R-Values* over ceiling framing	Option 3: add a layer of continuous insulation with at least the specified minimum *R-Values* above or below the ceiling framing
R1.0	R2.0	R0.26	R0.25
R1.5	R2.5	R0.38	R0.26
R2.0	R3.5	R0.51	R0.26
R2.5	R4.0	R0.51	R0.38
R3.0	R5.0	R0.51	R0.38
R3.5	R5.5	R0.51	R0.38
R4.0	X	R0.51	R0.38
R4.5	X	R0.51	R0.38
R5.0	X	R0.51	R0.38
R5.5	X	R0.51	R0.51
R6.0	X	R0.51	R0.51

Table Notes

(1) X = not permitted.

(2) The insulation values in Options 2 and 3 are in addition to the ceiling insulation specified in J3D7(1)(f) or Tables J3D7a to J3D7r.

(3) In *climate zones* 4, 5, 6, 7 and 8, when using Option 3, the continuous layer of insulation must have a *vapour permeance* of no less than the *vapour permeance* of the insulation it is added to.

Table J3D7w: **Thermal bridging mitigation for a steel-framed flat, skillion or cathedral roof**

Ceiling insulation *R-Value* derived from Tables J3D7a to J3D7r	Option 1: increase minimum ceiling insulation *R-Value* between ceiling framing to at least the specified minimum *R-Values*	Option 2: add a thermal break strip with at least the specified minimum *R-Values* over ceiling framing	Option 3: add a layer of continuous insulation with at least the specified minimum *R-Values* above or below the ceiling framing
R1.0	R1.5	R0.75	R0.25
R1.5	R2.5	R0.75	R0.25
R2.0	R3.5	R1.0	R0.38
R2.5	R4.5	R1.0	R0.5
R3.0	R6.0	R1.0	R0.5
R3.5	X	R1.0	R0.5
R4.0	X	R1.0	R0.5
R4.5	X	R1.0	R0.625
R5.0	X	R1.0	R0.625
R5.5	X	R1.0	R0.75
R6.0	X	R1.0	R0.75

Table Notes

(1) X = not permitted.

(2) The continuous layer of insulation may be replaced with a thermal break under Option 3 where the ceiling insulation *R-Value* requirement from J3D7(1)(f) or Tables J3D7a to J3D7r is 1.0 or 1.5.

(3) In *climate zones* 4, 5, 6, 7 and 8 a continuous layer of insulation must have a *vapour permeance* of no less than the *vapour permeance* of the insulation it is in addition to.

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

[New for 2022]

(1) Subject to (2), 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 < 20%, must be ≥ R1.28; and

(ii) where the ratio of the area of opaque *external walls* to the *floor area* of the *sole-occupancy unit* is ≥ 20%, but < 35%, must be R1.83; and

(iii) where the ratio of the area of opaque *external walls* to the *floor area* of the *sole-occupancy unit* is ≥ 35%, must be R2.03; and

(b) in *climate zones* 4, 7 and 8, must be ≥ R2.03.

(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 and 3—

(i) where the ratio of the area of opaque *external walls* to the *floor area* of the *sole-occupancy unit* is < 45%, be ≤ 0.8; and

(ii) where the ratio of the area of opaque *external walls* to the *floor area* of the *sole-occupancy unit* is ≥ 45%, must be ≤ 0.3; and

(b) in *climate zone* 2, where the ratio of the area of opaque *external walls* to the *floor area* of the *sole-occupancy unit* is ≥ 35% and there is no shading device or balcony which runs the width of the wall and overhangs by more than 300 mm installed, be ≤ 0.3; and

(c) in *climate zones* 4 and 5, where the ratio of the area of opaque *external walls* to the *floor area* of the *sole-occupancy unit* is ≥ 45% and there is no shading device or balcony which runs the width of the wall and overhangs by more than 1500 mm installed, must be ≤ 0.3; and

(d) in *climate zones* 7 and 8, be in accordance with Table J3D8.

Table J3D8: Permitted solar absorptance — climate zones 7 and 8

Solar absorptance	Shading device overhang (mm)	Opaque *external wall* to net *floor area* ratio < 20%	Opaque *external wall* to net *floor area* ratio ≥ 20% to < 35%	Opaque *external wall* to net *floor area* ratio ≥ 35% to < 45%	Opaque *external wall* to net *floor area* ratio ≥ 45%
< 0.4	≥ 0 to < 600	Permitted	Permitted	Permitted	Permitted
	≥ 600 to < 900	Permitted	Permitted	Permitted	Not permitted
	≥ 900	Not permitted	Not permitted	Not permitted	Not permitted
≥ 0.4 to < 0.6	≥ 0 to < 600	Permitted	Permitted	Permitted	Permitted
	≥ 600 to < 900	Permitted	Permitted	Permitted	Not permitted
	≥ 900	Permitted	Not permitted	Not permitted	Not permitted
≥ 0.6	≥ 0 to < 900	Permitted	Permitted	Permitted	Permitted
	≥ 900 to < 1200	Permitted	Not permitted	Not permitted	Not permitted
	≥ 1200	Not permitted	Not permitted	Not permitted	Not permitted

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

[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 zones* 6, U2.0; or

(c) in *climate zone* 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.

(4) 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 ≥ 0.55.

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

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 and a Class 4 part

[New for 2022]

(1) Underfloor insulation must be installed—

(a) in *climate zone* 2—

(i) if a concrete floor above an unenclosed *carpark* or undercroft, with a material *R-Value* ≥ R2.0; and

(ii) if a concrete floor above an enclosed *carpark*, with a material *R-Value* ≥ R0.5; and

(b) in *climate zone* 3—

(i) if a concrete floor above an unenclosed *carpark* or undercroft, with a material *R-Value* ≥ R1.5; and

(ii) if a concrete floor above an enclosed *carpark*, with a material *R-Value* ≥ R0.5; and

(c) in *climate zone* 4—

(i) if a concrete floor above an unenclosed *carpark*, with a material *R-Value* ≥ R1.5; and

(ii) if a concrete floor above an enclosed *carpark*, with a material *R-Value* ≥ R1.0; and

(d) in *climate zone* 5—

(i) if a concrete floor above an unenclosed *carpark*, with a material *R-Value* ≥ R2.0; and

(ii) if a concrete floor above an enclosed *carpark*, with a material *R-Value* ≥ R1.0; and

(e) in *climate zone* 6—

(i) if a concrete floor above an unenclosed *carpark*, with a material *R-Value* ≥ R2.0; and

(ii) if a concrete floor above an enclosed *carpark*, with a material *R-Value* ≥ R1.5; and

(f) in *climate zones* 7 and 8 if a concrete floor above a *carpark*, with a material *R-Value* ≥ R2.0.

(2) A concrete slab-on-ground—

(a) with an in-slab or in-screed heating or cooling system, must have insulation with an *R-Value* ≥ R1.0, installed around the vertical edge of its perimeter; and

(b) when in *climate zones* 6, 7 and 8, must use a waffle-pod slab; and

(c) when in *climate zone* 8, must be insulated—

(i) around the vertical edge of its perimeter with an insulation *R-Value* ≥ R1.0; and

(ii) underneath the slab with an insulation *R-Value* ≥ R2.0.

(3) Insulation *required* by (2)(a) and (2)(c)(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.

(4) The requirements of (2)(a) 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

[New for 2022]

(1) In *climate zones* 2 to 8, the ratio of *glazing* conduction (C_U) and solar gain (C_{SHGC}) of the external *glazing* of a *sole-occupancy unit* of a Class 2 building or a Class 4 part of a building must—

(a) not exceed the value in Table J3D11a; and

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

$$\frac{[(A1 \times U1 \times BC1 \times OC1 \times R1) + (A2 \times U2 \times BC2 \times OC2 \times R2) + \ldots]}{[(A1 \times SHGC1 \times EW1 \times BSW1 \times FW1 \times HW1 \times R1) + (A2 \times SHGC2 \times EW2 \times BSW2 \times FW2 \times HW2 \times R2) + \ldots]}$$

(2) In the formula at (1)(b)—

(a) $A1,2,etc$ = the area of each *glazing* element; and

(b) $U1,2,etc$ = the *Total System U-Value* of each *glazing* element; and

(c) $BC1,2,etc$ = the bedroom conductance factor obtained from Tables J3D11h to J3D11n; and

(d) $SHGC1,2,etc$ = the *Total System SHGC* for each *glazing* element, not exceeding 0.7; and

(e) $EW1,2,etc$ = the winter exposure factor for each *glazing* element obtained from Tables J3D11b to J3D11g, as appropriate; and

(f) $OC1,2,etc$ = the orientation sector conductance factor obtained from Table J3D11o; and

(g) $R1,2,etc$ = the room type factor to allow for lower energy demand in bedrooms and unconditioned rooms Tables J3D11h to J3D11m; and

(h) $BSW1,2,etc$ = the bedroom solar gain factor in Tables J3D11h to J3D11m; and

(i) $FW_{1,2,etc}$ = the factor in Tables J3D11o to J3D11t for window frames; and

(j) $HW_{1,2,etc}$ = the factor in Tables J3D11h to J3D11m for each *glazing* element where the adjoining floor has either a hard surface (e.g. polished concrete or ceramic tiles) or a non-hard surface (e.g. carpet, timber or cork).

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	22.60
3	26.51
4	17.78
5	15.77
6	8.36
7	17.20
8	17.20

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	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
0.1	1.38	1.48	1.09	0.76	0.53	0.85	1.22	1.55
0.2	1.21	1.32	0.97	0.69	0.50	0.75	1.10	1.39
0.4	1.00	1.06	0.77	0.57	0.42	0.63	0.92	1.14
0.6	0.83	0.87	0.69	0.50	0.37	0.55	0.77	0.96
0.8	0.62	0.69	0.56	0.43	0.35	0.50	0.66	0.79
1	0.43	0.59	0.46	0.41	0.33	0.43	0.56	0.65
1.2	0.26	0.47	0.40	0.36	0.31	0.40	0.53	0.53
1.4	0.22	0.40	0.33	0.33	0.29	0.38	0.47	0.44
1.6	0.18	0.32	0.31	0.33	0.28	0.35	0.39	0.39
1.8	0.15	0.28	0.27	0.31	0.26	0.33	0.35	0.32
2	0.12	0.21	0.24	0.29	0.26	0.33	0.33	0.31

Table Notes

See Part 13.3 of the ABCB Housing Provisions for orientation sectors.

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	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
0.1	0.83	1.01	0.78	0.58	0.42	0.49	0.61	0.84
0.2	0.74	0.90	0.70	0.52	0.40	0.44	0.55	0.76
0.4	0.59	0.74	0.60	0.43	0.36	0.37	0.47	0.63
0.6	0.44	0.57	0.48	0.39	0.34	0.32	0.38	0.51
0.8	0.30	0.45	0.43	0.34	0.30	0.30	0.32	0.41
1	0.20	0.38	0.35	0.30	0.28	0.28	0.29	0.33
1.2	0.14	0.29	0.31	0.28	0.28	0.25	0.24	0.28

P/H	North	North east	East	South east	South	South west	West	North west
1.4	0.11	0.26	0.25	0.26	0.26	0.23	0.21	0.24
1.6	0.08	0.23	0.24	0.24	0.24	0.21	0.20	0.20
1.8	0.07	0.16	0.19	0.24	0.24	0.19	0.17	0.18
2	0.06	0.16	0.18	0.21	0.24	0.19	0.15	0.16

Table Notes

See Part 13.3 of the ABCB Housing Provisions for orientation sectors.

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	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
0.1	1.53	1.54	1.04	0.74	0.56	0.62	0.75	1.28
0.2	1.30	1.41	0.94	0.67	0.50	0.56	0.68	1.15
0.4	1.18	1.20	0.78	0.57	0.44	0.48	0.58	0.99
0.6	0.98	0.99	0.69	0.50	0.38	0.42	0.49	0.81
0.8	0.85	0.81	0.60	0.45	0.36	0.38	0.44	0.68
1	0.68	0.73	0.52	0.41	0.32	0.34	0.37	0.58
1.2	0.49	0.56	0.46	0.36	0.32	0.32	0.34	0.50
1.4	0.38	0.52	0.42	0.33	0.30	0.30	0.30	0.42
1.6	0.27	0.45	0.39	0.33	0.28	0.28	0.26	0.37
1.8	0.21	0.39	0.35	0.31	0.28	0.26	0.24	0.32
2	0.19	0.35	0.31	0.29	0.26	0.24	0.22	0.26

Table Notes

See Part 13.3 of the ABCB Housing Provisions for orientation sectors.

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	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
0.1	1.56	1.23	0.92	0.69	0.54	0.62	0.75	1.14
0.2	1.30	1.10	0.83	0.63	0.49	0.54	0.67	1.03
0.4	1.19	0.91	0.69	0.54	0.41	0.47	0.55	0.86
0.6	0.97	0.75	0.56	0.47	0.38	0.41	0.47	0.70
0.8	0.78	0.62	0.49	0.42	0.34	0.37	0.42	0.57
1	0.64	0.47	0.39	0.38	0.32	0.33	0.36	0.49
1.2	0.43	0.42	0.35	0.36	0.31	0.31	0.29	0.39
1.4	0.32	0.31	0.29	0.34	0.29	0.29	0.28	0.33
1.6	0.22	0.27	0.27	0.31	0.25	0.25	0.23	0.28
1.8	0.18	0.23	0.22	0.29	0.25	0.25	0.20	0.25
2	0.14	0.17	0.21	0.27	0.25	0.23	0.19	0.19

Table Notes

See Part 13.3 of the ABCB Housing Provisions for orientation sectors.

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	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
0.1	2.91	2.28	1.33	1.21	1.19	1.30	1.52	2.55
0.2	2.50	2.05	1.18	1.08	1.05	1.16	1.40	2.34
0.4	2.29	1.77	1.01	0.91	0.91	0.98	1.20	1.98
0.6	1.95	1.51	0.86	0.77	0.81	0.83	1.04	1.71
0.8	1.73	1.28	0.72	0.71	0.74	0.80	0.92	1.42
1	1.38	1.02	0.65	0.64	0.67	0.69	0.78	1.24
1.2	1.12	0.95	0.55	0.61	0.60	0.65	0.72	1.04
1.4	0.85	0.72	0.49	0.54	0.60	0.62	0.64	0.93
1.6	0.70	0.65	0.42	0.50	0.56	0.54	0.56	0.79
1.8	0.51	0.53	0.40	0.47	0.53	0.51	0.54	0.72
2	0.40	0.47	0.38	0.44	0.49	0.51	0.48	0.58

Table Notes

See Part 13.3 of the ABCB Housing Provisions for orientation sectors.

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	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
0.1	1.61	1.44	0.79	0.64	0.59	0.62	0.73	1.34
0.2	1.51	1.34	0.73	0.58	0.53	0.55	0.66	1.22
0.4	1.30	1.17	0.63	0.49	0.44	0.47	0.55	1.07
0.6	1.19	1.02	0.54	0.43	0.40	0.41	0.48	0.91
0.8	1.02	0.88	0.48	0.39	0.36	0.37	0.43	0.79
1	0.93	0.78	0.44	0.34	0.34	0.33	0.37	0.67
1.2	0.73	0.66	0.37	0.32	0.32	0.31	0.33	0.60
1.4	0.66	0.64	0.36	0.30	0.29	0.29	0.30	0.46
1.6	0.51	0.46	0.32	0.28	0.27	0.25	0.28	0.43
1.8	0.42	0.44	0.26	0.26	0.27	0.25	0.25	0.37
2	0.31	0.37	0.26	0.24	0.25	0.25	0.22	0.31

Table Notes

See Part 13.3 of the ABCB Housing Provisions for orientation sectors.

Table J3D11h: Conductance and radiation factors: climate zone 2

Type of factor	Factor value
Room type multiplier (for bedroom and unconditioned areas) (R)	1.00
Bedroom conduction weighting factor	0.43
Bedroom solar gain weighting factor (BS)	0.40
Hard floor surface factor (H)	0.96

Type of factor	Factor value
Non-hard floor surface (H)	1.02

Table J3D11i: Conductance and radiation factors: climate zone 3

Type of factor	Factor value
Room type multiplier (for bedroom and unconditioned areas) (R)	1.00
Bedroom conduction weighting factor (BC)	0.42
Bedroom solar gain weighting factor (BS)	1.28
Hard floor surface factor (H)	0.97
Non-hard floor factor (H)	1.02

Table J3D11j: Conductance and radiation factors: climate zone 4

Type of factor	Factor value
Room type multiplier (for bedroom and unconditioned areas) (R)	1.00
Bedroom conduction weighting factor (BC)	0.70
Bedroom solar gain weighting factor (BS)	0.60
Hard floor surface factor (H)	0.92
Non-hard floor surface (H)	1.02

Table J3D11k: Conductance and radiation factors: climate zone 5

Type of factor	Factor value
Room type multiplier (for bedroom and unconditioned areas) (R)	1.10
Bedroom conduction weighting factor (BC)	0.63
Bedroom solar gain weighting factor (BS)	0.81
Hard floor surface factor (H)	0.93
Non-hard floor surface (H)	1.03

Table J3D11l: Conductance and radiation factors: climate zone 6

Type of factor	Factor value
Room type multiplier (for bedroom and unconditioned areas) (R)	1.00
Bedroom conduction weighting factor (BC)	0.81
Bedroom solar gain weighting factor (BS)	0.65
Hard floor surface factor (H)	0.98
Non-hard floor surface (H)	1.02

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

Type of factor	Factor value
Room type multiplier (for bedroom and unconditioned areas) (R)	1.00
Bedroom conduction weighting factor (BC)	0.60

Type of factor	Factor value
Bedroom solar gain weighting factor (BS)	0.51
Hard floor surface factor (H)	0.93
Non-hard floor surface (H)	1.03

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
7-8	1.40	1.25	1.10	1.00	0.90	0.95	1.00	1.20

Table Notes

See Part 13.3 of ABCB Housing Provisions for orientation sectors.

Table J3D11o: Winter solar heat gain factors — climate zone 2

Type of factor	Value
Frame solar absorptance multiplier SA = 0.3	0.97
Frame solar absorptance multiplier SA = 0.5	1.00
Frame solar absorptance multiplier SA = 0.85	1.08

Table Notes

Where the solar absorptance of a frame falls between the values shown, interpolation is permitted.

Table J3D11p: Winter solar heat gain factors — climate zone 3

Type of factor	Value
Frame solar absorptance multiplier SA = 0.3	0.98
Frame solar absorptance multiplier SA = 0.5	1.00
Frame solar absorptance multiplier SA = 0.85	1.05

Table Notes

Where the solar absorptance of a frame falls between the values shown, interpolation is permitted.

Table J3D11q: Winter solar heat gain factors—climate zone 4

Type of factor	Value
Frame solar absorptance multiplier SA = 0.3	0.99
Frame solar absorptance multiplier SA = 0.5	1.00
Frame solar absorptance multiplier SA = 0.85	1.01

Table Notes

Where the solar absorptance of a frame falls between the values shown, interpolation is permitted.

Table J3D11r: Winter solar heat gain factors — climate zone 5

Type of factor	Value
Frame solar absorptance multiplier SA = 0.3	1.00
Frame solar absorptance multiplier SA = 0.5	1.00
Frame solar absorptance multiplier SA = 0.85	1.01

Table Notes

Where the solar absorptance of a frame falls between the values shown, interpolation is permitted.

Table J3D11s: Winter solar heat gain factors — climate zone 6

Type of factor	Value
Frame solar absorptance multiplier SA = 0.3	0.92
Frame solar absorptance multiplier SA = 0.5	1.00
Frame solar absorptance multiplier SA = 0.85	1.13

Table Notes

Where the solar absorptance of a frame falls between the values shown, interpolation is permitted.

Table J3D11t: Winter solar heat gain factors — climate zone 7 and 8

Type of factor	Value
Frame solar absorptance multiplier SA = 0.3	0.97
Frame solar absorptance multiplier SA = 0.5	1.00
Frame solar absorptance multiplier SA = 0.85	1.01

Table Notes

Where the solar absorptance of a frame falls between the values shown, interpolation is permitted.

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

[New for 2022]

(1) The aggregate solar heat gain of the *glazing* in each storey, including any mezzanine, of a building must in *climate zones* 1 to 7—

(a) not exceed the allowances 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: $(A1 \times SHGC1 \times ES1 \times R1 \times F1 \times H2) + (A2 \times SHGC2 \times ES2 \times R2 \times F2 \times H2) + \ldots$

(2) In the formula at (1)(b)—

(a) $As1,s2,etc$ = the area of each *glazing* element; and

(b) $SHGCs1,s2,etc$ = the *Total System SHGC* for each *glazing* element, not exceeding the value 0.7; and

(c) $Rs1,s2,etc$ = the conductance factor in Table J3D12b or Table J3D12c for each *glazing* element located in a bedroom or room which is not a *conditioned space*; and

(d) $Fs1,s2,etc$ = the conductance factor in Table J3D12b or Table J3D12c for window frames; and

(e) $Hs1,s2,etc$ = the conductance factor in Table J3D12b or Table J3D12c for each glazing element where the

adjoining floor has either a hard surface (polished concrete or ceramic tiles) or a non-hard surface (e.g. carpet, timber or cork); and

(f) $Es1,s2,etc$ = the summer exposure factor for each *glazing* element in Tables J3D12d to J3D12j.

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, measured within the enclosing walls.

(2) If the *ventilation opening* area is between the values shown, the constant may be interpolated.

(3) No window can have a design *ventilation opening* less than 5% or greater than 90% because the window frame will always obstruct some area of the opening.

Table J3D12b: Conductance factors climate zone 1

Factor	Value
Room type multiplier (for bedroom and unconditioned areas) (R)	0.32
Frame solar absorptance multiplier Frame SA = 0.5 or more (F)	1.10
Frame solar absorptance multiplier Frame SA = 0.4 up to 0.5 (F)	1.05
Frame solar absorptance multiplier Frame SA = 0.3 up to 0.4 (F)	1.00
Non-hard floor surface factor (H)	1.00
Hard floor surface factor (H)	1.00

Table J3D12c: Conductance factors — climate zones 2 to 7

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)	0.40	0.56	0.71	0.91	0.87	1.11
Frame solar absorptance multiplier (for metal frame windows) (F) SA = 0.3	0.89	0.89	0.87	0.85	1.22	0.86

Factor	*Climate zone 2*	*Climate zone 3*	*Climate zone 4*	*Climate zone 5*	*Climate zone 6*	*Climate zone 7*
Frame solar absorptance multiplier (for metal frame windows) (F) SA = 0.5	1.00	1.00	1.00	1.00	1.00	1.00
Frame solar absorptance multiplier (for metal frame windows) (F) SA = 0.85	1.22	1.18	1.22	1.24	0.74	1.32
Non-hard floor surface factor (H)	1.06	1.06	1.13	1.13	1.04	1.21
Hard floor surface factor (H)	0.97	0.97	0.94	0.94	0.94	0.90

Table Notes

Interpolation is allowed for values between those shown.

Table J3D12d: 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	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
0.1	0.49	0.61	0.68	0.65	0.41	0.76	0.92	0.69
0.2	0.44	0.53	0.62	0.57	0.33	0.66	0.80	0.60
0.4	0.36	0.41	0.48	0.42	0.25	0.53	0.66	0.47
0.6	0.30	0.33	0.40	0.36	0.20	0.42	0.53	0.38
0.8	0.26	0.28	0.32	0.28	0.18	0.36	0.46	0.32
1.0	0.23	0.23	0.27	0.25	0.15	0.30	0.38	0.28
1.2	0.21	0.21	0.23	0.20	0.13	0.27	0.34	0.26
1.4	0.20	0.19	0.20	0.18	0.13	0.22	0.30	0.22
1.6	0.18	0.16	0.17	0.16	0.11	0.20	0.27	0.21
1.8	0.15	0.16	0.16	0.13	0.10	0.20	0.24	0.18
2.0	0.14	0.15	0.14	0.13	0.10	0.17	0.22	0.17

Table Notes

Refer to Part 13.3 of the ABCB Housing Provisions for orientation sectors.

Table J3D12e: 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	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
0.1	0.50	0.94	1.35	0.99	0.58	1.10	1.50	1.00
0.2	0.42	0.81	1.20	0.88	0.51	0.98	1.32	0.87
0.4	0.35	0.62	0.95	0.70	0.40	0.78	1.10	0.67

P/H	North	North east	East	South east	South	South west	West	North west
0.6	0.30	0.48	0.78	0.57	0.33	0.64	0.88	0.50
0.8	0.26	0.41	0.65	0.47	0.29	0.54	0.77	0.43
1.0	0.23	0.33	0.56	0.40	0.24	0.47	0.62	0.36
1.2	0.21	0.30	0.46	0.35	0.22	0.40	0.54	0.31
1.4	0.19	0.26	0.42	0.32	0.21	0.35	0.48	0.27
1.6	0.17	0.25	0.36	0.29	0.19	0.31	0.41	0.24
1.8	0.15	0.22	0.31	0.25	0.17	0.30	0.37	0.22
2.0	0.15	0.21	0.29	0.24	0.16	0.26	0.36	0.21

Table Notes

Refer to Part 13.3 of the ABCB Housing Provisions for orientation sectors.

Table J3D12f: 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	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
0.1	0.63	1.03	1.24	1.19	0.73	1.14	1.13	0.99
0.2	0.54	0.88	1.09	1.05	0.62	1.00	1.01	0.87
0.4	0.46	0.68	0.87	0.83	0.51	0.83	0.80	0.67
0.6	0.40	0.52	0.73	0.68	0.42	0.66	0.67	0.52
0.8	0.34	0.42	0.58	0.55	0.36	0.58	0.57	0.42
1.0	0.29	0.35	0.50	0.47	0.32	0.49	0.50	0.35
1.2	0.27	0.31	0.42	0.40	0.28	0.43	0.41	0.31
1.4	0.24	0.27	0.35	0.36	0.27	0.37	0.39	0.27
1.6	0.24	0.24	0.33	0.32	0.22	0.36	0.33	0.25
1.8	0.21	0.23	0.30	0.28	0.22	0.32	0.31	0.23
2.0	0.21	0.22	0.25	0.28	0.20	0.28	0.26	0.20

Table Notes

Refer to Part 13.3 of the ABCB Housing Provisions for orientation sectors.

Table J3D12g: 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	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
0.1	0.62	0.95	0.99	0.91	0.55	0.98	1.29	1.03
0.2	0.47	0.83	0.90	0.82	0.49	0.87	1.16	0.89
0.4	0.33	0.63	0.74	0.67	0.41	0.71	0.94	0.68
0.6	0.30	0.48	0.59	0.56	0.35	0.61	0.79	0.50
0.8	0.26	0.36	0.50	0.49	0.30	0.52	0.65	0.40
1.0	0.22	0.29	0.44	0.42	0.26	0.45	0.56	0.33
1.2	0.21	0.25	0.37	0.37	0.24	0.40	0.50	0.28
1.4	0.18	0.22	0.31	0.34	0.20	0.38	0.42	0.23
1.6	0.18	0.19	0.30	0.30	0.19	0.33	0.36	0.22

P/H	North	North east	East	South east	South	South west	West	North west
1.8	0.15	0.17	0.26	0.27	0.17	0.29	0.35	0.19
2.0	0.14	0.16	0.22	0.23	0.17	0.28	0.29	0.18

Table Notes

Refer to Part 13.3 of the ABCB Housing Provisions for orientation sectors.

Table J3D12h: 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	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
0.1	0.63	0.97	1.11	0.87	0.65	0.86	1.11	0.94
0.2	0.51	0.84	0.98	0.77	0.58	0.76	0.99	0.83
0.4	0.39	0.64	0.78	0.63	0.46	0.62	0.81	0.62
0.6	0.35	0.51	0.64	0.52	0.40	0.51	0.65	0.48
0.8	0.30	0.41	0.55	0.44	0.34	0.43	0.52	0.40
1.0	0.26	0.34	0.46	0.37	0.30	0.37	0.46	0.31
1.2	0.24	0.29	0.40	0.33	0.26	0.33	0.40	0.27
1.4	0.21	0.25	0.35	0.30	0.24	0.29	0.34	0.24
1.6	0.20	0.24	0.32	0.25	0.22	0.27	0.30	0.21
1.8	0.18	0.22	0.28	0.23	0.20	0.23	0.27	0.20
2.0	0.17	0.19	0.26	0.23	0.19	0.21	0.25	0.19

Table Notes

Refer to Part 13.3 of the ABCB Housing Provisions for orientation sectors.

Table J3D12i: 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	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
0.1	1.69	2.30	2.48	1.89	1.27	2.13	2.60	2.43
0.2	1.35	1.96	2.20	1.66	1.14	1.92	2.33	2.13
0.4	0.94	1.48	1.78	1.38	0.94	1.57	1.87	1.61
0.6	0.78	1.10	1.53	1.15	0.81	1.36	1.58	1.19
0.8	0.68	0.89	1.25	0.97	0.68	1.17	1.37	0.94
1.0	0.57	0.74	1.05	0.82	0.60	0.98	1.16	0.84
1.2	0.52	0.61	0.93	0.74	0.60	0.91	1.00	0.68
1.4	0.47	0.56	0.80	0.66	0.49	0.80	0.87	0.61
1.6	0.42	0.48	0.70	0.61	0.47	0.73	0.79	0.49
1.8	0.39	0.46	0.65	0.56	0.44	0.66	0.71	0.47
2.0	0.36	0.43	0.60	0.54	0.44	0.61	0.64	0.40

Table Notes

Refer to Part 13.3 of the ABCB Housing Provisions for orientation sectors.

Table J3D12j: 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	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
0.1	0.71	0.88	0.92	0.79	0.56	0.76	0.92	0.89
0.2	0.58	0.77	0.82	0.69	0.50	0.68	0.81	0.78
0.4	0.37	0.59	0.67	0.57	0.42	0.55	0.66	0.58
0.6	0.30	0.46	0.57	0.50	0.36	0.47	0.56	0.46
0.8	0.26	0.36	0.48	0.44	0.31	0.41	0.47	0.36
1.0	0.23	0.30	0.42	0.37	0.28	0.35	0.39	0.29
1.2	0.20	0.25	0.36	0.34	0.25	0.31	0.34	0.25
1.4	0.18	0.21	0.32	0.30	0.23	0.28	0.29	0.22
1.6	0.17	0.19	0.29	0.27	0.22	0.26	0.28	0.19
1.8	0.16	0.18	0.25	0.24	0.20	0.24	0.24	0.17
2.0	0.15	0.17	0.24	0.23	0.20	0.21	0.22	0.16

Table Notes

Refer to Part 13.3 of the ABCB Housing Provisions for orientation sectors.

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

[New for 2022]

Where shading is required to comply with 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 of Specification 37; 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 Equivalent energy usage of a sole-occupancy unit of a Class 2 building or a Class 4 part

[New for 2022]

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

(a) $(A \times EE) + EP + ES - ER$, where—

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

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

(iii) EP = the swimming pool pump efficiency factor calculated in accordance with (2); and

(iv) ES = the spa pump efficiency factor calculated in accordance with (3); and

(v) ER = the installed capacity of photovoltaic solar power apportioned to a sole-occupancy unit of a Class 2 building or Class 4 part of a building (kW); and

(b) $A \times EF$, where—

(i) A = the floor area factor obtained from multiplying the total floor area of by the adjustment factor in Table J3D14a; and

(ii) EF = the energy factor obtained from in Table J3D14b.

(2) The swimming pool pump efficiency factor is determined in accordance with the following formula: $EP = V \times FP / 1000$, where—

(a) EP = swimming pool pump efficiency factor (kW); and

(b) V = the volume of the swimming pool to the nearest 1000L; and

(c) FP = the swimming pool energy factor in Table 13.6.2c of the ABCB Housing Provisions.

(3) The spa pump efficiency factor is determined in accordance with the following formula: $ES = V \times FSB / 100$, where—

(a) ES = spa pump efficiency factor (kW); and

(b) V = the volume of the spa to the nearest 100 Litres; and

(c) FSB = the spa energy 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	Floor area factor	Total floor area	Floor area factor	Total floor area	Floor area factor	Total floor area	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	X	X

Table Notes

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.

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

Climate zone	Jurisdiction	E_F
1	QLD	3.95

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

J3D15 Whole-of-home equivalent energy usage

[New for 2022]

The *sole-occupancy units* of a Class 2 building or a Class 4 part of a building must individually achieve a whole-of-home rating of not less than J1P3 using *house energy rating software*.

Part J~~3~~4 Building fabric

Introduction to this Part

This Part contains Deemed-to-Satisfy Provisions for Part J1. It sets out provisions for the insulation of the building envelope including roofs and walls, celling insulation, roof lights, glazing and floors.

Deemed-to-Satisfy Provisions

~~J3D1~~J4D1 Deemed-to-Satisfy Provisions

[2019: J1.0]

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

(a) J2D2; and

(a) ~~J2D2~~J3D2 to ~~J2D6~~J3D15; and

(b) ~~J3D2~~J4D2 to ~~J3D7~~J4D7; and

(c) ~~J4D2~~J5D2 to ~~J4D8~~J5D8; and

(d) ~~J5D2~~J6D2 to ~~J5D13~~J6D13; and

(e) ~~J6D2~~J7D2 to ~~J6D9~~J7D9; and

(f) ~~J7D2~~J8D2 to ~~J7D4~~J8D4; and

(g) ~~J8D2~~J9D2 to ~~J8D3~~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~~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 ~~J3D3(5)~~J4D3(5), ~~J3D4~~J4D4, ~~J3D5~~J4D5, ~~J3D6~~J4D6 and ~~J3D7(1)~~J4D7(1) which do not apply to a Class 2 *sole-occupancy unit* or a Class 4 part of a building.

~~J3D3~~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.

~~J3D4~~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.

SA ~~J3D4~~J4D4(3)

~~J3D5~~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 J3D5~~Table J4D5; and

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

Table ~~J3D5~~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.

~~J3D6~~J4D6 Walls and glazing

[2019: J1.5]

(1) The *Total System U-Value* of *wall-glazing construction*, including *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*, 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 J3D6a~~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 J3D6b~~Table J4D6b; and

(b) for a Class 3 or 9c building or a Class 9a *ward area*, the values specified in ~~Table J3D6c~~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 ~~J3D6a~~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
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 ~~J3D6b~~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 ~~J3D6c~~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

~~J3D7~~J4D7 Floors

[2019: J1.6]

(1) A floor must achieve the *Total R-Value* specified in ~~Table J3D7~~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 ≤ 2.

(~~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.

(~~3~~4) Insulation *required* by (~~2~~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 ~~J3D7~~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 40 or Section 3.5 of CIBSE Guide A.

Part ~~J4~~J5 Building sealing

Introduction to this Part

This Part contains Deemed-to-Satisfy Provisions for Part J1. It sets out provisions for the sealing of a building's windows, doors, exhaust fans and the like in order to increase thermal comfort for occupants and improve the efficiency of its air-conditioning systems.

Deemed-to-Satisfy Provisions

~~J4D1~~J5D1 Deemed-to-Satisfy Provisions

[2019: J3.0]

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

(a) J2D2; and

(a) ~~J2D2~~J3D2 to ~~J2D6~~J3D15; and

(b) ~~J3D2~~J4D2 to ~~J3D7~~J4D7; and

(c) ~~J4D2~~J5D2 to ~~J4D8~~J5D8; and

(d) ~~J5D2~~J6D2 to ~~J5D13~~J6D13; and

(e) ~~J6D2~~J7D2 to ~~J6D9~~J7D9; and

(f) ~~J7D2~~J8D2 to ~~J7D4~~J8D4; and

(g) ~~J8D2~~J9D2 to ~~J8D3~~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~~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 F4~~Part F6 provides sufficient pressurisation to prevent infiltration.

~~J4D3~~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.

~~J4D4~~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.

~~J4D5~~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.

~~J4D6~~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.

~~J4D7~~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.

~~J4D8~~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 ~~J5~~J6 Air-conditioning and ventilation

Introduction to this Part

This Part contains Deemed-to-Satisfy Provisions for 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.

Deemed-to-Satisfy Provisions

~~J5D1~~J6D1 Deemed-to-Satisfy Provisions

[2019: J5.0]

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

(a) J2D2; and

(a) ~~J2D2~~J3D2 to ~~J2D6~~J3D15; and

(b) ~~J3D2~~J4D2 to ~~J3D7~~J4D7; and

(c) ~~J4D2~~J5D2 to ~~J4D8~~J5D8; and

(d) ~~J5D2~~J6D2 to ~~J5D13~~J6D13; and

(e) ~~J6D2~~J7D2 to ~~J6D9~~J7D9; and

(f) ~~J7D2~~J8D2 to ~~J7D4~~J8D4; and

(g) ~~J8D2~~J9D2 to ~~J8D3~~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~~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*.

~~J5D3~~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 J5D3~~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 ~~J5D3~~J6D3: Requirement for an outdoor air economy cycle

Climate zone	Total air flow rate *requiring* an economy cycle (L/s)
2	9000
3	7500
4	3500
5	3000
6	2000
7	2500
8	4000

~~J5D4~~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 J5D4~~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 F4~~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 F4~~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 ~~J5D4~~J6D4: Required outdoor air treatment

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

~~J5D5~~J6D5 ~~Fan systems~~Duct systems containing fans

[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:

$$\eta \min = 0.13 \times ln(p) - 0.13$$

(b) In the formula at (a)—

(i) $\eta \min$ = 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.

(c) 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:

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

(d) In the formula at (c)—

(i) $\eta \min$ = 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 J5D5a~~Table J6D5a; and

(iv) a = regression coefficient a, obtained from ~~Table J5D5b~~Table J6D5b; and

(v) b = regression coefficient b, obtained from ~~Table J5D5c~~Table J6D5c; and

(vi) ln = natural logarithm.

(e) 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 J5D5b~~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 J5D5e~~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 ~~J5D5a~~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 ~~J5D5b~~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 ~~J5D5c~~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 ~~J5D5d~~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 ~~J5D5e~~J6D5e: Maximum clean filter pressure drop

Filter minimum efficiency reporting value	Maximum pressure drop (Pa)
9	55
11	65
13	95
14	110

~~J5D6~~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 J5D6~~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 ~~J5D6~~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
All other locations	2.0	3.0

~~J5D7~~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.

~~J5D8~~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 J5D8a~~Table J6D8a; or

(ii) for variable speed systems, the values nominated in ~~Table J5D8b~~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 J5D8c~~Table J6D8c; or

(ii) for variable speed systems, the values nominated in ~~Table J5D8d~~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 ~~J5D8a~~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
125	400	200
150 or more	400	200

Table ~~J5D8b~~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 ~~J5D8c~~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 ~~J5D8d~~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
65	400	300
80	400	300
100	400	300
125	400	300
150 or more	400	300

~~J5D9~~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 J5D9a~~Table J6D9a; and

(c) for vessels, heat exchangers or tanks, having an insulation *R-Value* in accordance with ~~Table J5D9b~~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 ~~J5D10~~J6D10, ~~J5D11~~J6D11 and ~~J5D12~~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 ~~J5D9a~~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
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 ~~J5D9b~~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

~~J5D10~~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 J5D10~~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 ~~J5D3(1)(b)(iii)~~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 ~~J5D10~~J6D10: Maximum electric heating capacity

Floor area of the *conditioned space*	W/m^2 of *floor area* in *climate zone* 3	W/m^2 of *floor area* in *climate zone* 4	W/m^2 of *floor area* in *climate zone* 5	W/m^2 of *floor area* in *climate zone* 6	W/m^2 of *floor area* in *climate zone* 7
≤ 500 m^2	50	60	55	65	70
> 500 m^2	40	50	45	55	60

~~J5D11~~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 J5D11a~~Table J6D11a or ~~Table J5D11b~~Table J6D11b when determined in accordance with AHRI 551/591.

Table ~~J5D11a~~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

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 > 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 ~~J5D11b~~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
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

~~J5D12~~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.

~~J5D13~~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 J5D13~~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 ~~J5D11~~J6D11; or

(b) packaged air-conditioners, split systems, and variable refrigerant flow *air-conditioning* equipment that complies with the energy efficiency ratios in ~~J5D12~~J6D12.

Table ~~J5D13~~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
Forced draft	19.5	Note	11.0

Table Notes

A closed circuit, forced draft cooling tower must not be used.

Part ~~J6~~J7 Artificial lighting and power

Introduction to this Part

This Part contains *Deemed-to-Satisfy Provisions* for Part J1. It sets out provisions for design and configuration of artificial lighting and power, boiling and chilled water units, lifts and escalators and moving walkways.

Deemed-to-Satisfy Provisions

~~J6D1~~J7D1 Deemed-to-Satisfy Provisions

[2019: J6.0]

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

(a) J2D2; and

(a) ~~J2D2~~J3D2 to ~~J2D6~~J3D15; and

(b) ~~J3D2~~J4D2 to ~~J3D7~~J4D7; and

(c) ~~J4D2~~J5D2 to ~~J4D8~~J5D8; and

(d) ~~J5D2~~J6D2 to ~~J5D13~~J6D13; and

(e) ~~J6D2~~J7D2 to ~~J6D9~~J7D9; and

(f) ~~J7D2~~J8D2 to ~~J7D4~~J8D4; and

(g) ~~J8D2~~J9D2 to ~~J8D3~~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~~J7D2 Application of Part

[2019: J6.1]

~~J6D3~~J7D3, ~~J6D4~~J7D4 and ~~J6D6(1)(b)~~J7D6(1)(b) do not apply to a Class 8 *electricity network substation*.

~~J6D3~~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 J6D3b~~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 J6D3a~~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 J6D3b~~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 ~~J6D3a~~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
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

Space	Maximum *illumination power density* (W/m^2)
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
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 J6D3b~~Table J7D3b and ~~Table J6D3c~~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 ~~J6D3b~~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
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

Item Notes 1 and 2	Description	*illumination power density* adjustment factor
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 ~~J6D3c~~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.

~~J6D4~~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.

~~J6D5~~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.

~~J6D6~~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*.

~~J6D7~~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.

~~J6D8~~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 J6D8a~~Table J7D8a; and

(c) achieve—

(i) the energy efficiency class in ~~Table J6D8b~~Table J7D8b; or

(ii) if a dedicated goods lift, energy efficiency class D in accordance with ISO 25745-2.

Table ~~J6D8a~~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 ~~J6D8b~~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

~~J6D9~~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 ~~J7~~J8 Heated water supply and swimming pool and spa pool plant

Introduction to this Part

This Part contains Deemed-to-Satisfy Provisions for Part J1. It sets out provisions to ensure that water heaters, and swimming and spa pool heaters and pump systems, use energy efficiently.

Deemed-to-Satisfy Provisions

~~J7D1~~J8D1 Deemed-to-Satisfy Provisions

[2019: J7.0]

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

(a) J2D2; and

(a) ~~J2D2~~J3D2 to ~~J2D6~~J3D15; and

(b) ~~J3D2~~J4D2 to ~~J3D7~~J4D7; and

(c) ~~J4D2~~J5D2 to ~~J4D8~~J5D8; and

(d) ~~J5D2~~J6D2 to ~~J5D13~~J6D13; and

(e) ~~J6D2~~J7D2 to ~~J6D9~~J7D9; and

(f) ~~J7D2~~J8D2 to ~~J7D4~~J8D4; and

(g) ~~J8D2~~J9D2 to ~~J8D3~~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~~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.

~~J7D3~~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 ~~J5D9~~J6D9.

(6) For the purpose of ~~J7D3~~J8D3, a *swimming pool* does not include a spa pool.

~~J7D4~~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 ~~J5D9~~J6D9.

Part ~~J8~~J9 ~~Facilities for energy monitoring~~Energy monitoring and on-site distributed energy resources

Introduction to this Part

This Part contains Deemed-to-Satisfy Provisions for Part J1. It sets out provisions for the installation of facilities to enable the monitoring of energy use (other than for billing purposes) and to facilitate easy retrofit of renewable energy and electric vehicle equipment..

Deemed-to-Satisfy Provisions

~~J8D1~~J9D1 Deemed-to-Satisfy Provisions

[2019: J8.0]

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

(a) J2D2; and

(a) ~~J2D2~~J3D2 to ~~J2D6~~J3D15; and

(b) ~~J3D2~~J4D2 to ~~J3D7~~J4D7; and

(c) ~~J4D2~~J5D2 to ~~J4D8~~J5D8; and

(d) ~~J5D2~~J6D2 to ~~J5D13~~J6D13; and

(e) ~~J6D2~~J7D2 to ~~J6D9~~J7D9; and

(f) ~~J7D2~~J8D2 to ~~J7D4~~J8D4; and

(g) ~~J8D2~~J9D2 to ~~J8D3~~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~~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*.

~~J8D3~~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 ~~an~~ 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 ~~consumption~~data recording, in accordance with (3), ~~of the energy consumption~~ 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 consumption 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 Class 2 building with a floor area of more than 2 500 m2 where the total area of the common areas is less than 500 m2.~~

(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 500 m^2.

J9D4 Facilities for electric vehicle charging equipment

[New for 2022]

(1) A *carpark* in or serving a Class 2 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) when part of or serving a Class 2 building, be fitted with a charging control system with the ability to—

(i) manage and schedule charging of electric vehicles; and

(ii) have each circuit support an electric vehicle charger able to deliver a minimum of 12 kWh from 11:00 pm to 7:00 am daily; and

(b) be sized to support the future installation of a 7 kW (32 A) type 2 electric vehicle charger in 25% of the car parking spaces; and

(c) contain space for individual sub-circuit electricity metering to record electricity use of electric vehicle charging equipment; and

(d) be labelled to indicate the use of the space *required* by (c) is for the future installation of metering equipment; and

(e) when part of or serving a Class 3 or Class 5 to 9 building—

(i) be fitted with a charging control system with the ability to—

(A) manage and schedule charging of electric vehicles in response to total building demand; and

(B) have each circuit support an electric vehicle charger able to deliver not less than 12 kWh from 11:00 pm to 7:00 am daily; and

(ii) be sized to support the future installation of a 7 kWh (32 A) type 2 electric vehicle charger in—

(A) 10% of car parking spaces in a Class 5 or 6 building; or

(B) 20% of car parking spaces in a Class 3, 7b, 8 or 9 building.

(3) A *carpark* in or serving a Class 2 building must contain a designated space for cable trays to support the future installation of 32 A single phase final sub-circuits to each car parking space—

(a) from the electrical distribution boards *required* by (1) to within 20 m of the nearest edge of each car parking space to be served by that distribution board; and

(b) with a width equal to at least 40 mm multiplied by the number of 32 A single phase final sub-circuits to be served by that section of the cable tray.

(4) The area *required* for cable trays in (3) must be labelled to indicate use for electric vehicle charging.

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*, 1 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 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 on-site solar photovoltaic panels on at least 20% of the roof area; 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) do not apply to a building with on-site solar photovoltaic panels on at least 20% of the roof area.

(2) The requirements of J9D5(1)(a)(ii) do not apply to a building with *battery systems*.

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 and J1V3.

S33C2 Additional requirements — general

[2019: Spec JVa: 2]

In addition to the modelling requirements for J1V1, J1V2 and J1V3, a building must comply with—

(a) for general thermal construction, J3D3; and

(b) for floor edge insulation, J3D7(2) and J3D7(3); and

(c) for building sealing, J1V4 or J4; and

(d) for deactivation, control and insulation of *air-conditioning* and mechanical ventilation systems—

(i) J5D3(1)(a); and

(ii) J5D3(1)(b)(i); and

(iii) J5D3(1)(d); and

(iv) J5D3(1)(f); and

(v) J5D3(2); and

(vi) J5D3(3); and

(vii) J5D4(2); and

(viii) J5D4(4); and

(ix) J5D5; and

(x) J5D6; and

(xi) J5D9; 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, J6D4; and

(h) for interior decorative and display lighting, J6D5; and

(i) for artificial lighting around the exterior of a building, J6D6; and

(j) for boiling water and chilled water storage units, J6D7; and

(k) for deactivation of *swimming pool* heating and pumping, J7D3(2)(b) and J7D3(3); and

(l) for deactivation of spa pool heating and pumping, J7D4(2)(b) and J7D4(3); and

(m) for facilities for energy monitoring, Part J8; and

(n) for deactivation of fixed outdoor space heating appliances, clause J5D10(3).

S33C3 Additional requirements — NABERS Energy for Offices

[2019: Spec JVa: 3]

Where not included in the building energy simulation to satisfy J1V1(1), compliance must be achieved with—

(a) for a tenant supplementary heating and cooling system, J5D8; and

(b) for *carpark* ventilation and lighting—

(i) J5D4; and

(ii) J5D5; and

(iii) J6D3; and

(iv) J6D4; and

(c) for heating, cooling and ventilation equipment not covered by the *NABERS Energy for Offices* base building rating, Part J5; and

(d) for artificial lighting not covered by the *NABERS Energy for Offices* base building rating, Part J6.

S33C4 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 J5; and

(b) for artificial lighting outside the scope of the *Green Star* model, Part J6.

Specification 34 Modelling parameters

S34C1 Scope

[2019: Spec JVb: 1]

This Specification contains the *required* modelling parameters for J1V2 and 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 J3 to J7; and

(ii) have the minimum amount of mechanical ventilation *required* by Part F4.

(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 J6 without applying the control device adjustment factors.

(f) *Minimum Energy Performance Standards* must be applied to *services* not covered by Parts J5 to J7.

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 ~~ground to lowest floor arrangements~~; 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 for Offices* 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 J4.

(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	-	~~256~~224	~~201~~174	~~256~~225	~~170~~121	~~61~~41	~~323~~272	~~207~~189
~~Naturalg~~Gas	-	51.53	51.53	51.53	51343	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

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

Time period (local standard time)	Occupancy (Daily)	Artificial lighting (Daily)	Appliances and equipment (Daily)	*Air-conditioning* (Daily)
8:00pm to 9:00pm	0%	50%	0%	On
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 J6.

Table S35C2b: Occupancy and operation profiles of a Class 3 hotel

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 Class 3 building.

(2) The artificial lighting profile is expressed as a percentage of the maximum *illumination power density* permitted under Part J6.

(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 J6.

(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

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)
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	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 J6.

(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

Time period (local standard time)	Occupancy (Daily)	Artificial lighting (Daily)	Appliances and equipment (Daily)	*Air-conditioning* (Daily)
8:00am to 9:00am	20%	100%	70%	On
9:00am to 10:00am	20%	100%	70%	On
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 J6.

(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

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)
3:00pm to 4:00pm	20%	90%	90%	On
4:00pm to 5:00pm	25%	90%	90%	On
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 J6.

(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

Time period (local standard time)	Occupancy (Daily)	Artificial lighting (Daily)	*Air-conditioning* (Daily)
8:00pm to 9:00pm	70%	50%	On
9:00pm to 10:00pm	70%	50%	On
10:00pm to 11:00pm	70%	50%	On
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 J6.

(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 Saturday)	Occupancy (Saturday and Sunday)	Artificial lighting (Monday to Saturday)	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	80%	20%	100%	100%	On	On
1:00pm to 2:00pm	70%	70%	5%	5%	On	On
2:00pm to 3:00pm	40%	70%	5%	5%	On	On
3:00pm to 4:00pm	20%	70%	5%	5%	On	On

Time period (local standard time)	Occupancy (Monday to Saturday)	Occupancy (Saturday and Sunday)	Artificial lighting (Monday to Saturday)	Artificial lighting (Saturday and Sunday)	*Air-conditioning* (Monday to Friday)	*Air-conditioning* (Saturday and Sunday)
4:00pm to 5:00pm	25%	70%	5%	5%	On	On
5:00pm to 6:00pm	50%	20%	100%	100%	On	On
6:00pm to 7:00pm	80%	20%	100%	100%	On	On
7:00pm to 8:00pm	80%	70%	100%	100%	On	On
8:00pm to 9:00pm	80%	70%	5%	5%	On	On
9:00pm to 10:00pm	50%	70%	5%	5%	On	On
10:00pm to 11:00pm	35%	70%	5%	5%	On	On
11:00pm to 12:00am	20%	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 J6.

(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

Hour	Occupancy (Daily)	Artificial lighting and equipment (Daily)	*Air-conditioning* (Monday to Friday)
6:00pm to 7:00pm	20%	60%	On
7:00pm to 8:00pm	15%	25%	On
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 J6.

(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	55%	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 J6.

(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 (~~Monday to Friday~~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 J6.

(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*

Application	Internal heat gains per person
	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 W/m.K.

(3) Tables S36C2f to S36C2m~~S36C2i~~ list the *R-Value* considered to be achieved by air films and airspaces.

(4) The thermal properties considered to be achieved by reflective ~~surfaces~~airspaces are—

(a) within a non-ventilated wall~~—~~, those in Table S36C2i; and

(i) ~~with an inner reflective surface of 0.05 emittance and a 20 mm airspace to the wall lining, an added *R-Value* of 0.48; and~~

(ii) ~~with an inner reflective surface of 0.05 emittance and a 70 mm airspace to the wall lining, an added *R-Value* of 0.43; and~~

(iii) ~~with an inner reflective surface of 0.05 emittance and a 70 mm airspace to the wall lining and an outer anti-glare reflective surface of 0.20 emittance and a 25 mm airspace to the wall cladding, an added *R-Value* of 0.95; and~~

(iv) ~~with an outer anti-glare reflective surface of 0.20 emittance and a 35 mm airspace to the wall cladding, an added *R-Value* of 0.50; and~~

(b) within a roof where the *reflective insulation* is laid directly under the roof, those in Tables S36C2j to S36C2l.

(~~5~~) ~~A ventilated roof space is a roof space with—~~

(a) ~~gable vents, ridge vents, eave vents, roof vents or the like that—~~

(i) ~~are evenly distributed to allow an unobstructed flow of air; and~~

(ii) ~~are located to ensure, where practicable, there are no dead airspaces; and~~

(iii) ~~have an aggregate fixed open area of not less than 1.0% of the ceiling area; or~~

(b) ~~not less than 2 wind driven roof ventilators having an aggregate opening area of not less than 0.14 m² in conjunction with gable vents, ridge vents, eave vents, roof vents or the like having an aggregate fixed open area of not less than 0.2% of the ceiling area; or~~

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

(5) For construction that contains a ventilated airspace, other than a roof with an airspace greater than 300 mm thick or a pitched roof greater than 5° with a horizontal ceiling, the *Total R-Value* of the construction must be de-rated based on the area of ventilation openings according to clause 6.3 of AS/NZS 4859.2.

Table S36C2a: Thermal conductivity of typical framing materials

Description	Density (kg/m^3)	Thermal conductivity (W/m.K)
Steel	7850	47.5
Timber – kiln dried hardwood (across the grain)	677	0.16
Timber – Radiata pine (across the grain)	506	0.10

Table Notes

The *R-Value* of a material is determined by the thickness of the material in metres by the thermal conductivity in W/m.K.

Table S36C2b: Thermal conductivity of typical roof cladding materials

Description	Density (kg/m^3)	Thermal conductivity (W/m.K)
Aluminium sheeting	2680	210
Concrete or terra cotta tiles	1922	0.81
Steel sheeting	7850	47.5

Table Notes

The *R-Value* of a material is determined by dividing the thickness of the material in metres by the thermal conductivity in W/m.K.

Table S36C2c: Thermal conductivity of typical wall cladding materials

Description	Density (kg/m^3)	Thermal conductivity (W/m.K)
Aluminium sheeting	2680	210
Autoclaved aerated concrete	350	0.10
	510	0.15
	900	0.27
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

Description	Density (kg/m^3)	Thermal conductivity (W/m.K)
Prestressed hollow core concrete panel	1680	0.80

Table Notes

(1) 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).

(2) The *R-Value* of a material is determined by dividing the thickness of the material in metres by the thermal conductivity in W/m.K.

Table S36C2d: Thermal conductivity of typical flooring materials

Description	Density (kg/m^3)	Thermal conductivity (W/m.K)
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 Notes

(1) 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).

(2) The *R-Value* of a material is determined by dividing the thickness of the material in metres by the thermal conductivity in W/m.K.

Table S36C2e: Thermal conductivity of other materials not listed in Tables S36C2a to S36C2d

Description	Density (kg/m^3)	Thermal conductivity (W/m.K)
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 Notes

The *R-Value* of a material is determined by dividing the thickness of the material in metres by the thermal conductivity in W/m.K.

Table S36C2f: Typical R-Values for air films: surfaces other than outdoor surfaces

Position of airspace	Direction of heat flow	*R-Value*
On a surface with a pitch of not more than 5°	Up	0.11

Position of airspace	Direction of heat flow	*R-Value*
	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 airspace	Direction of heat flow	*R-Value*
Not more than 3 m/s wind	Any	0.04
More than 3 m/s wind but not more than 7 m/s wind	Any	0.03

Table S36C2~~f~~h: Typical R-Values for airspaces ~~and air films~~: ~~airspaces~~ non-reflective ~~un~~non-ventilated

Position of airspace	Direction of heat flow	*R-Value*
In a roof with a pitch of not more than 5° and a roof airspace less than 300 mm thick	Up	0.15
	Down	~~0.22~~0.19
In a roof with a ceiling that is parallel with a roof with a pitch ~~more than 5° and not more than 15°~~of 22° and a roof airspace less than 300 mm thick	Up	0.15
	Down	~~0.21~~0.18
In a roof with a ceiling that is parallel with a roof with a pitch ~~more than 22° and not more than~~ of 45° and a roof airspace less than 300 mm thick	Up	0.15
	Down	0.18
In any roof space with a horizontal ceiling, with a roof pitch more than 5°	Up	0.18
	Down	0.28
In a wall	Horizontal	~~0.17~~0.16

Table Notes

(1) ~~*R-Values* are for a temperature of 10°C and a temperature difference of 15 K.~~

(2) Linear interpolation may be used to calculate the *R-Value* of the airspace in a roof with an intermediate pitch.

(3) A non-ventilated airspace in a roof is one with continuous cover such as metal or sarked tiles and no specific provision for ventilation.

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	0.65

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	1.2
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	0.58

Table Notes

(1) A non-ventilated airspace in a wall is one where the ventilation openings do not exceed 500 mm^2 per metre of length in the horizontal direction.

(2) 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.

Table S36C2~~g~~i: Typical R-Values for airspaces ~~and air films~~: ~~airspaces~~ non-reflective ventilated

Position of airspace	Direction of heat flow	*R-Value*
~~In any roof with a pitch not more than 5° and 100 mm deep airspace~~	~~Up~~	~~Nil~~
	~~Down~~	~~0.19~~
In any roof space with a horizontal ceiling, with a pitch more than 5°	Up	Nil
	Down	0.46
~~In a wall~~	~~Horizontal~~	~~0.14~~

Table Notes

~~*R Values* are for a temperature of 10°C and a temperature difference of 15 K.~~

Table S36C2h: ~~Typical R-Values for airspaces and air films: air films – still air~~

~~Position of airspace~~	~~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° and not more than 30°~~	~~Up~~	~~0.11~~
	~~Down~~	~~0.15~~
~~On a surface with a pitch of more than 30° and not more than 45°~~	~~Up~~	~~0.11~~
	~~Down~~	~~0.13~~
~~On a wall~~	~~Horizontal~~	~~0.12~~

Table Notes

~~R Values are for a temperature of 10°C and a temperature difference of 15 K.~~

Table S36C2i: ~~Typical R-Values for airspaces and air films: air films – moving air~~

~~Position of airspace~~	~~Direction of heat flow~~	~~*R-Value*~~
~~Not more than 3 m/s wind~~	~~Any~~	~~0.04~~
~~More than 3 m/s wind speed and not more than 7 m/s wind speed~~	~~Any~~	~~0.03~~

Table Notes

~~*R-Values are for a temperature of 10°C and a temperature difference of 15 K.*~~

Table S36C2~~j~~k: Typical thermal properties for ~~reflective surfaces with~~ airspaces with reflective surfaces in roofs: Pitched roof (>~~10~~5°) with horizontal ceiling or roof airspace > 300 mm thick

~~Emittance of added reflective insulation~~	Direction of heat flow	*R-Value* ~~added by reflective surface~~ of reflective airspace	
		Ventilated roof space	Non-ventilated roof space
~~0.2 outer~~	Down	~~1.21~~1.36	~~1.12~~1.09
~~0.05 inner~~			
~~0.2 outer~~	Up	~~0.59~~0.34	~~0.75~~0.56
~~0.05 inner~~			
~~0.9 outer~~	~~Down~~	~~1.01~~	~~0.92~~
~~0.05 inner~~			
~~0.9 outer~~	~~Up~~	~~0.40~~	~~0.55~~
~~0.05 inner~~			

Table Notes

~~R-Values are for a temperature of 10°C and a temperature difference of 15 K.~~A non-ventilated airspace in a roof is one with continuous cover such as metal or sarked tiles and no specific provision for ventilation.

Table S36C2~~k~~l: Typical thermal properties for reflective surfaces with non-ventilated airspaces in roofs: Flat, skillion or pitched roof (≤~~10~~5°) with horizontal ceiling, roof airspace < 300 mm

Emittance of airspace bounding surfaces	Direction of heat flow	*R-Value* of reflective airspace
~~0.2 outer~~	~~Down~~	~~1.28~~
~~0.05 inner~~		
~~0.2 outer~~	~~Up~~	~~0.68~~
~~0.05 inner~~		
0.9/0.05 ~~outer~~	Down	~~1.06~~1.54
~~0.05 inner~~		
0.9/0.05 ~~outer~~	Up	~~0.49~~0.45
~~0.05 inner~~		

Table Notes

~~R-Values are for a temperature of 10°C and a temperature difference of 15 K.~~A non-ventilated airspace in a roof is one with continuous cover such as metal or sarked tiles and no specific provision for ventilation.

Table S36C2~~l~~m: Typical thermal properties for reflective surfaces with non-ventilated airspaces in roofs: Pitched roof with cathedral ceiling, roof airspace < 300 mm thick

Emittance of added *reflective insulation*	Direction of heat flow	*R-Value* ~~added by reflective surface~~ of reflective airspace		
		15° to not more than 25° pitch	more than 25° to not more than 35° pitch	more than 35° to 45° pitch
~~0.2 outer~~	~~Down~~	~~0.96~~	~~0.86~~	~~0.66~~

Emittance of added *reflective insulation*	Direction of heat flow	*R-Value*~~added by reflective surface~~of reflective airspace		
		15° to not more than 25° pitch	more than 25° to not more than 35° pitch	more than 35° to 45° pitch
~~0.05 inner~~				
~~0.2 outer~~ ~~0.05 inner~~	~~Up~~	~~0.72~~	~~0.74~~	~~0.77~~
0.9/0.05~~ outer~~ ~~0.05 inner~~	Down	~~0.74~~1.04	~~0.64~~0.97	~~0.44~~0.86
0.9/0.05~~ outer~~ ~~0.05 inner~~	Up	~~0.51~~0.45	~~0.52~~0.45	~~0.53~~0.45

Table Notes

(1) ~~*R-Values* are for a temperature of 10°C and a temperature difference of 15 K.~~

(2) Linear interpolation may be used to calculate the *R-Value* of the airspace in a roof with an intermediate pitch.

(3) A non-ventilated airspace in a roof is one with continuous cover such as metal or sarked tiles and no specific provision for ventilation.

Explanatory Information

(1) Section F of NCC Volume One may require ventilation in roof airspaces for *climate zones* 6, 7 and 8 to manage risks associated with condensation.

(2) For the purposes of Tables S36C2h, S36C2i, S36C2j and S36C2k, *R-Values* are calculated based on the following:

(a) Summer temperatures of 24°C internal and 36°C external for heat transfer down.

(b) Winter temperatures of 18°C internal and 12°C external for heat transfer up.

(c) Average of summer and winter results for horizontal heat transfer (e.g. in walls).

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 J3D6(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 J3D6(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:

$$SA = \frac{AW1 \times SW1 \times SHGCW1}{AWall} + \frac{AW2 + SW2 \times SHGCW2}{AWall} + \ldots$$

(2) In the formula at (1)—

(a) SA = the *wall-glazing construction solar admittance*; and

(b) $AW1, AW2, \ldots$ = the area of each *glazing* element; and

(c) $SW1, SW2, \ldots$ = the shading multiplier for each *glazing* element in accordance with S37C7; and

(d) $SHGCW1, W2, \ldots$ = the *total system SHGC* of each *glazing* element; and

(e) $AWall$ = the total *wall-glazing construction* area.

(3) The *solar admittance* of the *wall-glazing construction* must not exceed the applicable value in J3D6(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:

$$ER = AN\alpha NSAN + AE\alpha ESAE + AS\alpha SSAS + AW\alpha WSAW$$

(2) In the formula at (1)—

(a) ER = the representative *air-conditioning* energy value; and

(b) AN, 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) SAN, E, S, W = the *wall-glazing construction solar admittance* of each aspect—

(i) equal to the applicable value in J3D6(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
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

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*
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.

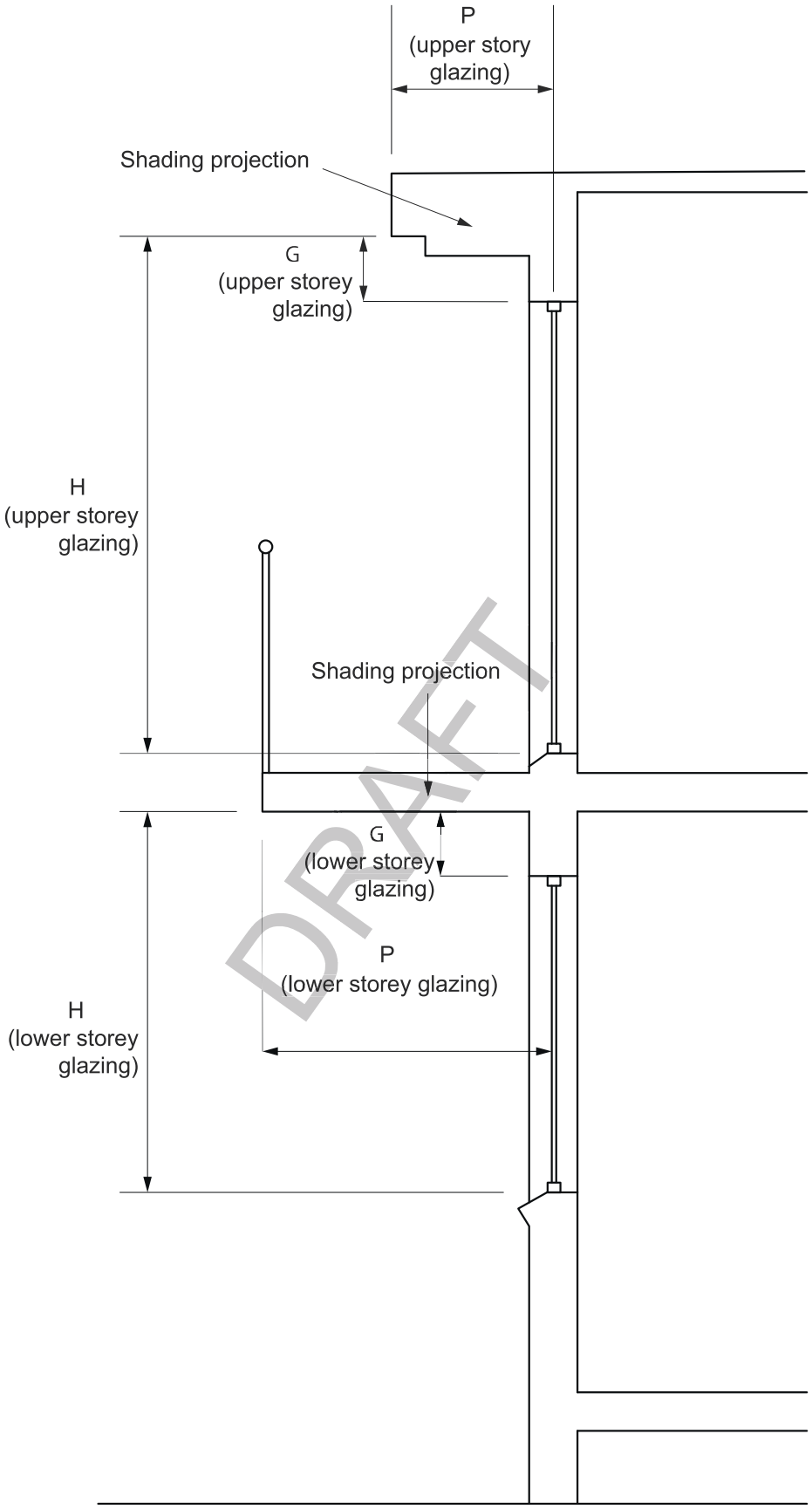
Table S37C7a: Shading multipliers — Northern, eastern and western aspects

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 unbroken (bridged) 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 unbroken (bridged) 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	1.03	1.07	1.09

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:

$$Usp = \frac{UcsAcs + \sum UesAes + \sum UfsAfs}{Acs + \sum Aes + \sum Afs}$$

(2) In the formula at (1)—

(a) Acs = the area of the centre region of the *spandrel panel*; and

(b) Aes = the area of the edge region of the *spandrel panel*, where the edge has a defined width of 127 mm; and

(c) Afs = the area of the frame region of the *spandrel panel*; and

(d) Ucs = the U-value of the centre region of the *spandrel panel*; and

(e) Ues = the U-value of the edge region of the *spandrel panel*, where the edge has a defined width of 127 mm; and

(f) Ufs = the U-value of the frame region of the *spandrel panel*; and

(g) Usp = 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

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
2.0	0.7	0.8	0.9	1.0	1.1	1.3
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.

(1) 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) $((0.0044 \times HDH) - 5.9) \times FH$, where—

(i) HDH = the total annual *heating degree hours* of the building location; and

(ii) FH = 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_{AH})
≤ 50 m^2	1.37
> 50 m^2 to ≤ 350 m^2	$(5.11 \times 10^{-6})AH^2 - (3.82 \times 10^{-3})AH + 1.55$
> 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:

$$CLL = (5.4 + 0.00617 \times (CDH + 1.85DGH)) \times FC$$

(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) FC = 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	$(1.29 \times 10^{-5})AH^2 - (5.55 \times 10^{-3})AH + 1.58$

Total area of the *habitable rooms* (A_H)	Area adjustment factor (F_C)
> 200 m² and ≤ 1000 m²	$(3.76\times10^{-7})AH^2-(7.82\times10^{-4})AH+1.12$
> 1000 m²	0.71

S44C4 Thermal energy load limit

[New for 2022]

(1) The *thermal energy load* limit of a space, measured in MJ/m².annum, is calculated in accordance with the following formula:

$$TLL=\frac{19.3\,HLL+22.6\,CLL-8.4}{Tr+10.74}-15$$

(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) Tr = the annual average *daily outdoor temperature range*.

Schedule 1 Definitions

Abbreviations

Symbols

Glossary

Abbreviations

Abbreviation	Definitions
ABCB	Australian Building Codes Board
AC	Alternating Current
ACP	Aluminium Composite Panel
AS	Australian Standard
ASET	Available Safe Egress Time
ASTM	American Society for Testing and Materials
BCA	Building Code of Australia
BE	Fire blocks evacuation route
CCT	Correlated Colour Temperature
CF	Challenging fire
CHF	Critical Heat Flux
CRF	Critical Radiant Flux
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
GEMS	Greenhouse and Energy Minimum Standards
GRP	Glass fibre reinforced polyester
HRR	Heat Release Rate
HS	Horizontal fire spread
IS	Rapid fire spread involving internal surface linings
ISO	International Organisation for Standardisation
LED	Light-Emitting Diode
MEPS	Minimum Energy Performance Standards
NABERS	National Australian Built Environment Rating System
NATA	National Association of Testing Authorities
NatHERS	Nationwide House Energy Rating Scheme
NCC	National Construction Code
PBDB	Performance-based design brief
PCA	Plumbing Code of Australia
PMV	Predicted Mean Vote
ppm	parts per million
PVC	Polyvinyl chloride
RC	Robustness check
RSET	Required Safe Egress Time
R_W	Weighted sound reduction index

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 $17.8 + 0.31Tm$, where Tm 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*.

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.

Connections: The parts that fix the members into the structure, through which the loads pass.

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.

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*.

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.

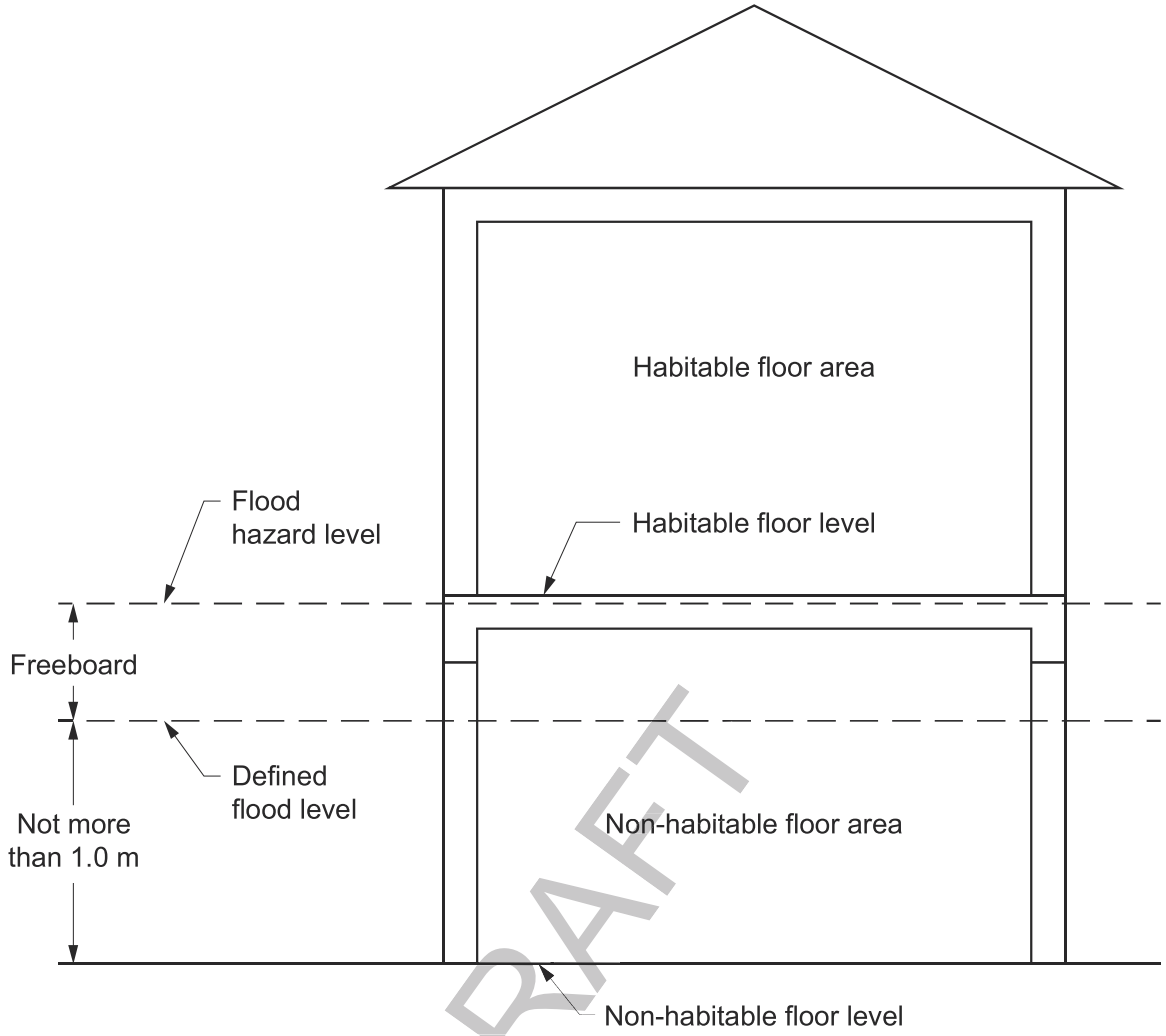
Deemed-to-Satisfy Provisions: Provisions which are deemed to satisfy the *Performance Requirements*.

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.

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~~3~~ 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 Housing Provisions Part 2.2, Structural provisions).	C2, C3, C4 (these wind classes are covered in the Housing Provisions Part 2.2, Structural provisions).

Table Notes

(1) Wind classification map identifying wind regions is contained in Housing Provisions Part 2.2 (see Figure 2.2.3).

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.

Envelope

(1) For the purposes of Section J in Volume One, the parts of a building's *fabric* that separate a *conditioned space* or *habitable room* from—

(a) the exterior of the building; or

(b) a non-*conditioned space* including—

(i) the floor of a rooftop plant room, lift-machine room or the like; and

(ii) the floor above a *carpark* or warehouse; and

(iii) the *common wall* with a *carpark*, warehouse or the like.

(2) For the purposes of Part H6 in Volume Two and Section 13 of the Housing Provisions, the parts of a building's *fabric* that separate artificially heated or cooled spaces from—

(a) the exterior of the building; or

(b) 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

(1) Any, or any combination of the following if they provide egress to a road or *open space*:

(a) An internal or external stairway.

(b) A ramp.

(c) A *fire-isolated passageway*.

(d) A doorway opening to a road or *open space*.

(2) 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.

Exposed joint: A construction joint, control joint, expansion joint, contraction joint or movement joint that is exposed to rainwater.

External wall

(1) For the purposes of Volume One, an outer wall of a building which is not a *common wall*.

(2) For the purposes of 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.

Gradual failure: Relatively slow collapse of a structure that occurs through significant plastic deformation and/or moment redistribution.

Green Star: The building sustainability rating scheme managed by the Green Building Council of Australia.

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~~Theeerae A~~ting of ~~either~~ *Low Hazard*, *Medium Hazard* or *High Hazard*, ~~is~~ determined in accordance with NCC Volume Three. ~~Specification 41, for any Deemed-to-Satisfy Solution.~~

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 18°C, the degrees Celsius temperature difference between the mean outdoor air temperature and 18°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 3).

Hob: The upstand at the perimeter to a shower area.

Horizontal exit: A *required* doorway between 2 parts of a building separated from each other by a *fire wall*.

House energy rating software

(1) For the purposes of Volume One, means software accredited under the Nationwide House Energy Rating Scheme (NatHERS) and its associated NatHERS Certificate.

(2) For the purposes of Volume Two—

(a) applied to H6V2—software accredited or previously accredited under the Nationwide House Energy Rating Scheme (NatHERS), its associated NatHERS Certificate and the additional functionality provided in non-regulatory mode; and

(b) applied to H6D3—software accredited under the Nationwide House Energy Rating Scheme (NatHERS) and its associated NatHERS Certificate.

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.

Housing Provisions: The requirements for Class 1 and 10 buildings referenced in Volume Two of the National Construction Code, as published by the Australian Building Codes Board.

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 footing, buttress, cross wall, beam, floor or braced roof structure) that effectively restrains the wall or pier at right angles to the face of the wall or pier.

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, H2D3 and Section 4 of the 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 lead: Where a plumbing product or material in contact with drinking water is calculated using a weighted average lead content of no more than 0.25%.

Low rainfall intensity area: An area with a 5 minute rainfall intensity for an *annual exceedance probability* of 5% ~~average recurrence interval of 20 years~~ of not more than 125 mm/hour.

Explanatory Information

Rainfall intensity figures can be obtained from Tables 7.4.3d to 7.4.3k in the 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 the dwelling connected to at least one shower and the largest number of hot water outlets.

Main space conditioning: Either—

(a) the *service* that supplies to at least 70% of the conditioned area of the dwelling, or

(b) if no one heating or cooling appliance serves at least 70% of the conditioned area of the dwelling, the appliance that results in the highest net equivalent energy usage when calculated in accordance with J3D14(1)(a).

Notes

(1) If a multi-split air-conditioner 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 the definition for main space conditioning is to provide information on which heating or cooling or

appliance should be selected when showing compliance with J3D14(1)(a) and ABCB Housing Provisions clause 13.6.2(1)(a) when more than one type and efficiency of appliance are present. In J3D14(1)(a) the formula that determines ER allows the selection of only one heating or cooling system. This definition requires that if any one appliance serves at 70% of the floor area that is heated or cooled it should be used as the basis of determining ER. If, however, no one system serves at least 70% of the area, then the appliance that results in the highest net equivalent energy usage when calculated in accordance with J3D14(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 acceptable annual probability of structural failure of structures, buildings, members and connections: The probability that, in any year, there could be a structural failure leading to collapse of either the whole of the structure or building, or significant members and/or their connections, expressed as 1 in … (e.g. 1 in 1,000 meaning a probability of 1 in 1,000 that the failure could occur).

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.

Members: The parts of a structure or component that provide resistance to structural actions.

Members and connections that do not provide primary building support: Those components of a building or other structure that are not necessary to resist collapse of other members, parts of the building or the whole building, including but are not limited to—

(a) non-*loadbearing* walls including framing, wall cladding, roof cladding, roof purlins and battens, mezzanine floors; and

(b) connections and fixings that fix in position only those members that do not provide primary building support.

Members and connections that provide primary building support: Those components of a building or other structure that provide the structural system resisting collapse of other members, parts of the building or the whole building under the design actions, including but are not limited to—

(a) beams, columns, trusses, portal frames, posts, *loadbearing* walls, floor systems, footings, foundations and earth retaining structures; and

(b) connections and fixings that transfer loads between members that provide primary building support.

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 Acceptable Annual Structural Reliability Index of Structures, Buildings, Members and Connections: The Structural Reliability Index (β), determined in accordance with the ABCB Structural Reliability Handbook (Version 2022.1) that corresponds to the maximum acceptable annual probability of structural failure tabulated in Table B1P1.

Minimum Energy Performance Standards (MEPS): The Minimum Energy Performance Standards for equipment and appliances established through the Greenhouse and Energy Minimum Standards Act 2012.

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.

Multiple resistance paths: Situations where the failure of a part of a building or structure is resisted collectively by more than one member or connection, such that the failure of any member or connection will result in the transfer of loads to the other members and connections with sufficient combined capacity to resist the total applied loads.

NABERS Energy for Apartment Buildings: The National Australian Built Environment Rating System for apartment building energy efficiency, which is managed by the New South Wales Government.

NABERS Energy for Hotels: The National Australian Built Environment Rating System for hotel building energy efficiency, which is managed by the New South Wales Government.

NABERS Energy for Offices: The National Australian Built Environment Rating Systems for office energy efficiency, which is managed by the New South Wales Government.

NABERS Energy for Shopping Centres: The National Australian Built Environment Rating System for shopping centre

energy efficiency, which is managed by the New South Wales Government.

TAS Network Utility Operator

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

(1) Applied to a material — means not deemed *combustible* as determined by AS 1530.1 — Combustibility Tests for Materials.

(2) Applied to 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, but which may have other uses. ~~drinking water.~~

Non-transient actions: The combination of structural actions in which the combined magnitude of the permanent gravity action and imposed gravity action is equal to or greater than 50% of the magnitude of the total combined actions.

Occupant traits

(1) For the purposes of Volume One, the features, needs and profile of the occupants in a *habitable room* or space.

(2) For the purposes of 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*.

TAS On-site wastewater management system

On-site wastewater management system: A system ~~installed on premises that~~ that receives and/or treats wastewater generated and discharges ~~on the premises and applies~~ 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.

Reference building

(1) For the purposes of Volume One, a hypothetical building that is used to calculate the maximum allowable *annual greenhouse gas emissions* and determine the thermal comfort level for the proposed building.

(2) For the purposes of Volume Two, means a hypothetical building that is used to determine the maximum allowable *heating load* and *cooling load* for the proposed building.

system, a system of *loadbearing* walls and the like) which could result in loss of life or injury should it fail.

Sudden failure: Relatively rapid collapse of a structure that occurs with little warning with little plastic deformation and/or moment redistribution.

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.

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)

(1) For the purposes of Volume One, the fraction of incident irradiance on a *wall-glazing construction* or a *roof light* that adds heat to a building's space.

(2) For the purposes of 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

(1) For the purposes of Volume One, 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.

(2) For the purposes of Volume Two, means the thermal transmittance of the composite element allowing for the effect of any airspaces and associated surface resistances, expressed in W/m^2.K.

Transient actions: The combination of structural actions in which the combined magnitude of the permanent gravity action and imposed gravity action is less than 50% of the magnitude of the total combined actions.

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 F1V1 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 Housing Provisions, a glazed area that a person could mistake for an open doorway or clearway and walk into the glazed panel.

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 Water Method at 23°C.

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 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

(1) In relation to 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.

Referenced documents

The Standards and other documents listed in this Schedule are referenced in the NCC.

No.	Date	Title	Volume One	Volume Two	Housing Provisions	Volume Three
AS/NZS 4859 Part 2	2018	Thermal insulation materials for buildings — Design	~~J3D3~~J4D3, Spec 37	N/A	N/A	N/A
AS 5113	2016	Classification of external walls of buildings based on reaction-to-fire performance (incorporating amendment 1)	C1V3	N/A	N/A	N/A
AS 5146 Part 1	2015	Reinforced autoclaved aerated concrete — Structures (incorporating amendment 1)	B1D4	H1D7	N/A	N/A
AS 5216	2018	Design of post-installed and cast-in fastenings in concrete	B1D4	N/A	2.2.4	N/A
AS/NZS 5601 Part1	2013	Gas installations, Part 1: General installations	J1V4	H6V3	N/A	N/A
AS 5637 Part 1	2015	Determination of fire hazard properties — Wall and ceiling linings	Spec 7, Schedule 2	Schedule 2	Schedule 2	Schedule 2
AS ISO 9239 Part 1	2003	Reaction to fire tests for floorings — Determination of the burning behaviour using a radiant heat source	Schedule 2	Schedule 2	Schedule 2	Schedule 2
AS/NZS ISO 9972	2015	Thermal performance of buildings — Determination of air permeability of buildings — Fan pressurization method	J1V4	H6V3	N/A	N/A
AIRAH-DA07	2020	Criteria for moisture control design analysis in buildings	F8V1	H4V5	N/A	N/A
AIRAH-DA09	1998	Air conditioning load estimation	Spec 35	N/A	N/A	N/A
AIRAH-DA28	2011	Building management and control systems	Spec 34	N/A	N/A	N/A
ANSI/ASHRAE Standard 55	2013	Thermal environmental conditions for human occupancy	Schedule 2	Schedule 2	Schedule 2	Schedule 2
ANSI/ASHRAE Standard 140	2007	Standard method of test for the evaluation of building energy analysis computer programs	J1V1, J1V2, J1V3	H6V2	N/A	N/A
ASTM E2073-10	2010	Standard Test Method for Photopic Luminance of Photoluminescent (Phosphorescent) Markings	Spec 25	N/A	N/A	N/A
ASTM E72-15	2015	Standard Test Methods of Conducting Strength Tests of Panels for Building Construction	Spec 6	N/A	N/A	N/A
ASTM E695-03	2003	Standard Test Method of Measuring Relative Resistance of Wall, Floor and Roof Construction to Impact Loading	Spec 6	N/A	N/A	N/A

No.	Date	Title	Volume One	Volume Two	Housing Provisions	Volume Three
ASTM E903	2012	Standard Test Method for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating Spheres	N/A	N/A	13.2.3	N/A
ASTM E96	2016	Standard Test Methods for Water Vapor Transmission of Materials	Schedule 1	Schedule 1	Schedule 1	Schedule 1
AHRI 460	2005	Performance rating of remote mechanical-draft air-cooled refrigerant condensers	~~J5D13~~J6D13	N/A	N/A	N/A
AHRI 551/591	2015	Performance rating of water-chilling and heat pump water-heating packages using the vapor compression cycle.	Spec 33, ~~J5D11~~J6D11	N/A	N/A	N/A
ABCB	2011	Protocol for Structural Software, Version 2011.2	B1D5	H1D6	2.2.5	N/A
ABCB	2012	Standard for Construction of Buildings in Flood Hazard Areas, Version 2012.3	B1D6	H1D10	N/A	N/A
ABCB	2022	Fire Safety Verification Method	C1V4, D1V4, E1V1, E2V1, E3V1, E4V2	N/A	N/A	N/A
ABCB	2019	Standard for NatHERS Heating and Cooling Load Limits, Version 2019.1	~~J2D3~~J3D3	Spec 42	N/A	N/A
CIBSE Guide A	2015	Environmental design	Spec 34, Spec 35, ~~J3D3~~J4D3, ~~J3D7~~J4D7	N/A	N/A	N/A
N/A	2002	Disability Standards for Accessible Public Transport	F4D12~~F2D12~~, I2D1	N/A	N/A	N/A
N/A	2010	Education and Care Services National Law Act (Vic)	Schedule 2	Schedule 2	Schedule 2	Schedule 2
European Union Commission Regulation 547/2012	2012	Eco-design requirements for water pumps	~~J5D8~~J6D8	N/A	N/A	N/A
European Union Commission Regulation 622/Annexx II, point 2	2012	Eco-design requirements for glandless standalone circulators and glandless circulators integrated in products	~~J5D8~~J6D8	N/A	N/A	N/A