# Part B1 Structural provisions

## Introduction to this Part

This Part focuses on safeguarding people from injury caused by structural failure, loss of amenity caused by structural behaviour (deflections, creep, vibration, settlement and the like), protection of other property from physical damage caused by structural failure and safeguarding people from injury that may be caused by failure of, or impact with, glazing.

## Objectives

### B1O1 Objective

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

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

### B1F2 Glazing

(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

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

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

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

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

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

(2) Each component of the building or structure must withstand all actions with the minimum levels of reliability specified in Tables B1P1a, B1P1b and B1P1c and determined in accordance with B1V1.

~~(2)~~(3) The actions to be considered to satisfy (1) and (2) include but are not limited to—

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

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

(c) wind action; and

(d) earthquake action; and

(e) snow action; and

(f) liquid pressure action; and

(g) ground water action; and

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

(i) earth pressure action; and

(j) differential movement; and

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

(l) thermal effects; and

(m) ground movement caused by—

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

(ii) landslip or subsidence; and

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

(n) *construction activity actions*; and

(o) termite actions.

(4) The structural resistance of materials and forms of construction must be determined using material properties with appropriate allowance for the type and use of the material and the degree of accuracy inherent in the methods used to assess the structural behaviour.

**Exemptions**

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

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

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

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

**Notes**

~~The requirement in B1P1(2)(a) to consider, for a Class 7b building, an additional notional permanent roof load of not less than 0.15 kPa to support the addition of solar photovoltaic panels does not take effect until 1 October 2023.~~

When assessing compliance with B1P1(3)(a) to (e), the actions must include those derived from the relevant part of AS/NZS 1170 series of Standards.

**Explanatory Information**

Structural reliability in terms of failure and behaviour is considered for each component (beams, columns, struts, ties, slabs, etc.) and for the structure as a whole. The *Performance Requirements* for components are prescribed as minimum reliability indices for combinations of loads and building importance. B1P1(1) requires that the structure as a whole achieves levels of reliability that take into account material properties, the nature of imposed actions, failure modes, building use, serviceability requirements and occupant vulnerability which may require that components have higher levels of reliability than those specified in Tables B1P1a, B1P1b and B1P1c. For further guidance refer to ABCB Handbook — Structural Reliability Verification Method.

The actions imposed by gravity, wind, snow and earthquake loads are set out in AS/NZS 1170 Parts 1 to 4. The reliability indices in Tables B1P1a, B1P1b and B1P1c are derived from load combinations based on AS/NZS 1170 and are a weighted average of indices for individual load combinations and components derived from various provisions in the below listed Australian Standards. These standards set the minimum structural requirements for timber, concrete, masonry and steel components for structural design:

- AS 1720 Timber structures.
- AS 3600 Concrete structures.
- AS 3700 Masonry structures.
- AS 4100 Steel structures.
- AS/NZS 4600 Cold-formed steel structures.

These standards apply to many types of structures, including buildings, and were adopted as the requirements for building structures in the BCA in 1989. As existing requirements they are classified as *Deemed-to-Satisfy Solutions* from NCC 1996 onwards. They remain the principle minimum requirements for timber, concrete, masonry and steel component in buildings for both *Performance Solutions* and *Deemed-to-Satisfy Solutions*. By retaining them as *Deemed-to-Satisfy Solutions* they can be applied without the need for a *Performance Based Design Brief*.

The derived reliability indices in Tables B1P1a, B1P1b and B1P1c give a consistent base for assessing components of building structures made from materials other than materials included in B1D4(a) to (f), or for components using these materials in a way not covered by these standards.

A2G2(5) requires that components made from materials included in B1D4(a) to (f) be assessed as part of a *Deemed-to-Satisfy Solution* using B1D3 and B1D4, or as part of a *Performance Solution* utilising comparison with *Deemed-to-Satisfy Provisions* B1D3 and B1D4.

**Table B1P1a: Minimum annual reliability indices ($\beta$) for additive load combinations (gravity actions only)**

| All Importance Levels |
|---|
| $\beta = 4.30$ |

**Table Notes**

(1) The annual reliability indices in Table B1P1a must be met for all components necessary to comply with B1P1(1) at the relevant Importance Level.

(2) *Ancillary components* may have a reliability index appropriate to the component, but not less than that *required* for Importance Level 1, irrespective of the Importance Level of the whole building or structure.

(3) Importance Level must be assigned in accordance with Table B1D3a.

**Table B1P1b: Minimum annual reliability indices ($\beta$) for additive load combinations (combined gravity and other actions)**

| Importance Level 1 | Importance Level 2 | Importance Level 3 | Importance Level 4 |
|---|---|---|---|
| $\beta = 3.45$ | $\beta = 3.70$ | $\beta = 3.85$ | $\beta = 4.00$ |

**Table Notes**

(1) The annual reliability indices in Table B1P1b must be met for all components necessary to comply with B1P1(1) at the relevant Importance Level.

(2) *Ancillary components* may have a reliability index appropriate to the component, but not less than that *required* for Importance Level 1, irrespective of the Importance Level of the whole building or structure.

(3) Importance Level must be assigned in accordance with Table B1D3a.

**Table B1P1c: Minimum annual reliability indices ($\beta$) for action reversal and stability load combinations (combined gravity and other actions)**

| Importance Level 1 | Importance Level 2 | Importance Level 3 | Importance Level 4 |
|---|---|---|---|
| $\beta = 3.00$ | $\beta = 3.35$ | $\beta = 3.55$ | $\beta = 3.65$ |

**Table Notes**

(1) The annual reliability indices in Table B1P1c must be met for all components necessary to comply with B1P1(1) at the relevant Importance Level.

(2) *Ancillary components* may have a reliability index appropriate to the component, but not less than that *required* for Importance Level 1, irrespective of the Importance Level of the whole building or structure.

(3) Importance Level must be assigned in accordance with Table B1D3a.

**Explanatory Information**

(1) Annual probability of failure ($P_F$) can be derived from the reliability index ($\beta$) where $\beta = -\sigma^{-1}(P_F)$ where $\sigma^{-1}$ is the inverse standardised normal distribution. Approximate equivalent probabilities of failure to the reliability indices in Tables B1P1a, B1P1b and B1P1c are contained in Table B1P1 (explanatory).

(2) Values in Table B1P1 (explanatory) are notional, accounting for uncertainties in design parameters but excluding accidents and gross human errors.

(3) For further guidance refer to ABCB Handbook – Structural Reliability Verification Method.

| Additive load combination (gravity actions only) | Additive load combinations (combined gravity and other actions) | | | | Action reversal and stability load combinations (combined gravity and other actions) | | | |
|---|---|---|---|---|---|---|---|---|
| All Importance Levels | Importance Level 1 | Importance Level 2 | Importance Level 3 | Importance Level 4 | Importance Level 1 | Importance Level 2 | Importance Level 3 | Importance Level 4 |
| $P_F$ =1/117,000 per year | $P_F$ =1/3,500 per year | $P_F$ =1/9,200 per year | $P_F$ =1/16,900 per year | $P_F$ =1/31,500 per year | $P_F$ =1/700 per year | $P_F$ =1/2,400 per year | $P_F$ =1/5,100 per year | $P_F$ =1/7,600 per year |

## ~~B1P2 Structural resistance~~

~~The structural resistance of materials and forms of construction must be determined using five percentile characteristic material properties with appropriate allowance for—~~

~~(a) known construction activities; and~~

~~(b) type of material; and~~

~~(c) characteristics of the site; and~~

~~(d) the degree of accuracy inherent in the methods used to assess the structural behaviour; and~~

~~(e) action effects arising from the differential settlement of foundations, and from restrained dimensional changes due to temperature, moisture, shrinkage, creep and similar effects.~~

## B1P~~3~~2 Glass installations at risk of human impact

Glass installations that are at risk of being subjected to human impact must have glazing that—

(a) if broken on impact, will break in a way that is not likely to cause injury to people; and

(b) resists a reasonably foreseeable human impact without breaking; and

(c) is protected or marked in a way that will reduce the likelihood of human impact.

*QLD B1P4*

*SA B1P4*

## B1P~~4~~3 Buildings in flood areas

(1) A building in a *flood hazard area*, must be designed and constructed, to the degree necessary, to resist flotation, collapse or significant permanent movement resulting from the action of hydrostatic, hydrodynamic, erosion and scour, wind and other actions during the *defined flood event*.

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

(a) flood actions; and

(b) elevation requirements; and

(c) foundation and footing requirements; and

(d) requirements for enclosures below the *flood hazard level*; and

(e) requirements for structural connections; and

(f) material requirements; and

(g) requirements for utilities; and

(h) requirements for occupant egress.

**Applications**

B1P4 only applies to—

(a) a Class 2 or 3 building or a Class 4 part of a building; and

(b) a Class 9a *health-care building*; and

(c) a Class 9c building.

# Verification Methods

## B1V1 Structural reliability of components

(1) This *Verification Method* is applicable to components with a resistance coefficient of variation of ~~at least 10% and~~ not more than 40%.

(2) Where the~~a component has a~~ calculated resistance coefficient of variation is~~of~~ less than 10%, then a minimum value of 10% must be used.

(3) The resistance model for the component must be established by taking into account variability due to material properties, fabrication and construction processes, structural modelling and time dependent effects.

~~(2)~~(4) Annual action models must be determined for all reasonably expected actions and combinations of actions in accordance with Table B1V1a.

~~(3)~~(5) Compliance with B1P1(2) ~~and B1P2~~ is verified for the design of a ~~structural~~ component ~~for strength~~ where—

(a) the calculated reliability index $\beta$ is not less than the applicable *required* values.

(b) the reliability index $\beta$ is calculated in accordance with the equation: $\beta = \frac{In\left[\left(\frac{\bar{R}}{\bar{S}}\right)\sqrt{\frac{C_S}{C_R}}\right]}{\sqrt{In(C_S C_R)}}$, where—

(i) $C_R = 1 + V^2_R$; and

(ii) $C_S = 1 + V^2_S$, where, subject to (iii)—

(A) $\bar{R}$ = mean resistance; and

(B) $\bar{S}$ =mean action; and

(C) $V_S$ =coefficient of variation of the action; and

(D) $V_R$ =coefficient of variation of the resistance; and

(iii) where the load action $S$ is due to the combination of multiple structural actions—

(A) $S = S_1 + S_2 + \cdots + S_n$; and

(B) the mean of the combined load action is calculated in accordance with the equation: $\bar{S} = \bar{S}_1 + \bar{S}_2 + \cdots + \bar{S}_n$, where $\bar{S}_i$ is the mean of the *i*th action $S_i$; and

(C) the standard deviation of the combined load action is calculated in accordance with the equation: $\sigma_s^2 = \sigma_{s1}^2 + \sigma_{s2}^2 + \cdots + \sigma_{sn}^2$, where $\sigma_{si}$ is the standard deviation of the *i*th action $S_i$; and

(D) the coefficient of the variation of the combined action $S$ is calculated in accordance with the equation: $V_S = \frac{\sigma_S}{\bar{S}}$.

**Table B1V1a: Annual action models**

| Design action | Ratio of mean action to nominal | Coefficient of variation of the action |
|---|---|---|
| Permanent action | 1.05 | 0.10 |
| Annual maximum imposed action | 0.35 | 0.45 |
| Arbitrary-point-in-time imposed action | 0.25 | 0.78 |
| Wind (non-cyclonic regions, Importance Level 1) | 0.37 | 0.47 |
| Wind (non-cyclonic regions, Importance Level 2) | 0.31 | 0.47 |
| Wind (non-cyclonic regions, Importance Level 3) | 0.29 | 0.47 |
| Wind (non-cyclonic regions, Importance Level 4) | 0.27 | 0.47 |
| Wind (cyclonic regions, Importance Level 1) | 0.19 | 0.76 |
| Wind (cyclonic regions, Importance Level 2) | 0.16 | 0.76 |
| Wind (cyclonic regions, Importance Level 3) | 0.14 | 0.76 |
| Wind (cyclonic regions, Importance level 4) | 0.13 | 0.76 |
| Earthquake (Importance Level 1) | 0.28 | 0.90 |
| Earthquake (Importance Level 2) | 0.15 | 0.90 |
| Earthquake (Importance Level 3) | 0.12 | 0.90 |
| Earthquake (Importance Level 4) | 0.084 | 0.90 |

| | | |
|---|---|---|
| Snow | 0.29 | 0.57 |

**Table Notes**

(1) Actions not listed must be considered and derived on a case-by-case basis.

(2) Nominal loads are based on AS/NZS 1170 series of standards.

**Notes**

When determining appropriate combinations of actions to meet the requirements of B1V1(5)(b)(ii), consideration must be made for those given in AS/NZS 1170.

B1V1 may be used for all materials and actions to determine compliance with B1P1(2).

~~(a) the capacity reduction factor $\phi$ satisfies $\phi \geq Average(\phi_G, \phi_Q, \phi_W, \ldots)$, where $\phi_G, \phi_Q, \phi_W, \ldots$ are capacity reduction factors for all relevant actions and must contain at least permanent (G), imposed (Q) and wind (W) actions; and~~

~~(b) the capacity reduction factors $\phi_G, \phi_Q, \phi_W, \ldots$ are calculated for target reliability indices for permanent action $\beta_{TG}$,~~

for imposed action $\beta_{TQ}$, for wind action $\beta_{TW}$,... in accordance with the equation: $\beta = \ln\left[\frac{\overline{R}}{S}\sqrt{\frac{C_S}{C_R}}\right]\sqrt{\ln(C_R.C_S)}$ , where—

(i) $\frac{\overline{R}}{S} = \frac{\phi}{\left(1-\frac{S}{S_N}\right)\left(1-\frac{R}{R_N}\right)}$ ; and

(ii) $C_R = 1+V_R^2$

$C_S = 1+V_S^2$, where—

(A) $\frac{\overline{R}}{R_N}$ = ratio of mean resistance to nominal; and

(B) $\frac{\overline{S}}{S_N}$ = ratio of mean action to nominal; and

(C) $C_S$ = correction factor for action; and

(D) $C_R$ = correction factor for resistance; and

(E) $V_S$ = coefficient of variation of the appropriate action as given in Table B1V1a; and

(F) $V_R$ = coefficient of variation of the resistance; and

(G) $\gamma$ = appropriate load factor for the action as given in AS/NZS 1170.0; and

(H) $\phi$ = capacity factor for the appropriate action; and

(c) the annual target reliability indices $\beta_{TG}, \beta_{TQ}, \beta_{TW}, \cdots$ are established as follows:

(i) For situations where it is appropriate to compare an equivalent Deemed-to-Satisfy product, a resistance model must be established for the equivalent Deemed-to-Satisfy product and $\beta_{TG}, \beta_{TQ}, \beta_{TW}, \cdots$ must be calculated for the equivalent Deemed-to-Satisfy product in accordance with the equation given at (b).

(ii) The target reliability indices $\beta_{TG}, \beta_{TQ}, \beta_{TW}, \cdots$ thus established, must be not less than those given in Table B1V1b minus 0.5.

(iii) For situations where it is not appropriate to compare with an equivalent Deemed-to-Satisfy product, the target reliability index $\beta$ must be as given in Table B1V1b.

(4) The resistance model for the component must be established by taking into account variability due to material properties, fabrication and construction processes and structural modelling.

**Table B1V1a: Annual action models**

| Design action | Ratio of mean action to nominal | Coefficient of variation of the action |
|---|---|---|
| Permanent action ($\gamma_G$ = 1.35) | $\overline{(GIG_N)}$ = 1.00 | $V_G$ = 0.10 |
| Imposed action ($\gamma_Q$ = 1.50) | $\overline{(QIQ_N)}$ = 0.50 | $V_Q$ = 0.43 |
| Wind action ($\gamma_W$ = 1.00) (non-cyclonic) | $\overline{(WIW_N)}$ = 0.33 | $V_W$ = 0.49 |
| Wind action ($\gamma_W$ = 1.00) (cyclonic) | $\overline{(WIW_N)}$ = 0.16 | $V_W$ = 0.71 |
| Snow action ($\gamma_S$ = 1.00) | $\overline{(SIS_N)}$ = 0.29 | $V_S$ = 0.57 |

| Design action | Ratio of mean action to nominal | Coefficient of variation of the action |
|---|---|---|
| Earthquake action ($\gamma_E = 1.00$) | $\overline{(E1E_N)} = 0.05$ | $V_E = 1.98$ |

**Table B1V1b: Annual target reliability indices**

| Type of action | Target reliability index β |
|---|---|
| Permanent action | 4.3 |
| Imposed action | 4.0 |
| Wind, snow and earthquake action | 3.7 |

**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

(1) Compliance with B1P1(1)(c) is verified for structural robustness if (2) and (3) are complied with.

(2) The structure is assessed such 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.

(3) It is demonstrated that if a supporting structural component is relied upon to carry more than 25% of the total structure, 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 chosen to minimise the risk.

# Deemed-to-Satisfy Provisions

## B1D1 Deemed-to-Satisfy Provisions

(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

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.

*WA B1D3*

## B1D3 Determination of individual actions

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

(a) Permanent actions:

(i) the design or known dimensions of the building or structure; and

(ii) the unit weight of the construction; and

(iii) AS/NZS 1170.1; and

(iv) for a Class 7b building, a notional additional permanent roof load of not less than 0.15 kPa to support the addition of solar photovoltaic panels.

(b) Imposed actions:

(i) the known loads that will be imposed during the occupation or use of the building or structure; and

(ii) *construction activity actions*; and

(iii) AS/NZS 1170.1.

(c) Wind, snow and ice and earthquake actions:

(i) the applicable annual probability of design event for safety, determined by—

(A) assigning the building or structure an Importance Level in accordance with Table B1D3a; and

(B) determining the corresponding annual probability of exceedance in accordance with Table B1D3b; and

(ii) AS/NZS 1170.2; and

(iii) AS/NZS 1170.3 as appropriate; and

(iv) AS 1170.4 as appropriate; and

(v) in cyclonic areas, metal roof cladding, its connections and immediate supporting members must comply with Specification 4; and

(vi) for the purposes of (v), cyclonic areas are those determined as being located in wind regions B2, 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

~~(ix)~~(x) expected 10-year deflection for *structural substrates* in Part F1.

**Table B1D3a: Importance Levels of buildings and structures**

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

**Table B1D3b: Design events for safety — Annual probability of exceedance**

| Importance level | ~~Annual probability of exceedance for n~~Non- cyclonic wind | ~~Annual probability of exceedance for c~~Cyclonic wind (wind regions B2 and C) | Cyclonic wind (wind region D) | ~~Annual probability of exceedance for s~~Snow | ~~Annual probability of exceedance for e~~Earthquake |
|---|---|---|---|---|---|
| 1 | 1:100 | 1:200 | 1:250 | 1:100 | 1:250 |
| 2 | 1:500 | 1:500 | 1:1000 | 1:150 | 1:500 |
| 3 | 1:1000 | 1:1000 | 1:2000 | 1:200 | 1:1000 |
| 4 | 1:2000 | 1:2000 | 1:5000 | 1:250 | 1:1500 |

~~**Notes**~~

~~B1D3(a)(iv) does not take effect until 1 October 2023.~~

**Exemptions**

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

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

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

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

*NT B1D4*

*QLD B1D4*

*WA B1D4*

## B1D4 Determination of structural resistance of materials and forms of construction

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 and AS 5146.3.

(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.

(ii) Timber structures: AS 1684.2, AS 1684.3 or AS 1684.4.

(iii) Nailplated timber roof trusses: AS 1720.5.

(g) Piling: AS 2159.

(h) Glazed assemblies:

(i) The following glazed assemblies in an *external wall* must comply with AS 2047:

(A) Windows excluding those listed in (ii).

(B) Sliding and swinging glazed doors with a frame, including french and bi-fold doors with a frame.

(C) Adjustable louvres.

(D) Shopfronts.

(E) Window walls with one piece framing.

(ii) All glazed assemblies not covered by (i) and the following glazed assemblies must comply with AS 1288:

(A) All glazed assemblies not in an *external wall*.

(B) Revolving doors.

(C) Fixed louvres.

(D) Skylights, roof lights and windows in other than the vertical plane.

(E) Sliding and swinging doors without a frame.

(F) Windows constructed on site and architectural one-off windows, which are not design tested in accordance with AS 2047.

(G) Second-hand windows, re-used windows and recycled windows.

(H) Heritage windows.

(I) Glazing used in balustrades and sloping overhead glazing.

(i) Termite Risk Management: Where a *primary building element* is subject to attack by subterranean termites: AS 3660.1, and—

(i) for the purposes of this provision, a *primary building element* consisting entirely of, or a combination of, any of the following materials is considered not subject to termite attack:

(A) Steel, aluminium or other metals.

(C) Masonry.

(D) Fibre-reinforced cement.

(E) Timber — naturally termite resistant in accordance with Appendix C of AS 3660.1.

(F) Timber — preservative treated in accordance with Appendix D of AS 3660.1; and

(ii) a durable notice must be permanently fixed to the building in a prominent location, such as a meter box or the like, indicating—

(A) the termite management system used; and

(B) the date of installation of the system; and

(C) where a chemical is used, its life expectancy as listed on the *appropriate authority's* pesticides register label; and

(D) the installer's or manufacturer's recommendations for the scope and frequency of future inspections for termite activity.

(j) Roof construction (except in cyclonic areas):

(i) Terracotta, fibre-cement and timber slates and shingles: AS 4597.

(ii) Roof tiling: AS 2050.

(iii) Cellulose cement corrugated sheets: AS/NZS 2908.1 with safety mesh installed in accordance with AS 1562.3 clause 2.4.3.2 except for sub-clause (c)(vii) for plastic sheeting.

(iv) Metal roofing: AS 1562.1.

(k) Particleboard structural flooring: AS 1860.2.

(l) Garage doors and other large access doors in openings not more than 3 m in height in *external walls* of buildings determined as being located in wind region B2, C or D in accordance with AS/NZS 1170.2: AS/NZS 4505.

(m) Lift *shafts* which are not *required* to have an FRL, must—

(i) except as required by (ii), be completely enclosed with non-perforated material between the bottom of the pit and the ceiling of the lift *shaft*, other than—

(A) at landing doors, emergency doors and pit access doors; and

(B) *low-rise, low-speed constant pressure lifts*.~~; and~~

~~(C) *small-sized, low-speed automatic lifts*; and~~

(ii) in *atrium* and observation areas, be protected with non-perforated material not less than 2.5 m in height—

(A) above any places on which a person can stand, which are within 800 mm horizontal reach of any vertical moving lift component including ropes and counterweights; and

(B) at the lowest level of the *atrium* area that the lift serves, on all sides except the door opening, for not less than 2.5 m in height, by enclosure with non-perforated material; and

(iii) be of non-brittle material; and

(iv) where glazing is used—

(A) comply with Table B1D4; or

(B) not fail the deflection criteria *required* by S6C11(c)(iii).

**Table B1D4: Material and minimum thickness of glazing and polycarbonate sheet**

| Application | Lift *shaft* vision panels more than 65 000 mm$^2$, door panels, and lift *shafts* | Lift *shaft* vision panels less than or equal to 65 000 mm$^2$ |
|---|---|---|
| Laminated glass | 10 mm (0.76 mm interlayer) | 6 mm (0.76 mm interlayer) |
| Toughened/ laminated glass | 10 mm (0.76 mm interlayer) | 6 mm (0.76 mm interlayer) |
| Annealed glass with security polyester film coating | 10 mm | 6 mm |
| Safety wire glass | Not applicable | Subject to fire test |
| Polycarbonate sheet | 13 mm | 6 mm |

# Specification 4 Design of buildings in cyclonic areas

## S4C1 Scope

(1) This specification contains requirements for the design of buildings in cyclonic areas in addition to the requirements of AS/NZS 1170.2.

*WA S4C1(2)*

(2) For the purposes of Specification 4, cyclonic areas are those determined as being located in wind regions B2, C and D in accordance with AS/NZS 1170.2.

## S4C2 Roof cladding

Test for strength: Metal roof cladding, its connections and immediate supporting members must be capable of remaining in position notwithstanding any permanent distortion, fracture or damage that might occur in the sheet or fastenings under the pressure sequences A to G defined in Table S4C2.

**Table S4C2: Low-high-low pressure sequence**

| Sequence | Number of cycles | Load |
|---|---|---|
| A | 4500 | 0 to 0.45 Pt |
| B | 600 | 0 to 0.6 Pt |
| C | 80 | 0 to 0.8 Pt |
| D | 1 | 0 to 1.0 Pt |
| E | 80 | 0 to 0.8 Pt |
| F | 600 | 0 to 0.6 Pt |
| G | 4500 | 0 to 0.45 Pt |

**Table Notes**

(1) Pt is the ultimate limit state wind pressure on internal and external surfaces as determined in accordance with AS/NZS 1170.2, modified by an appropriate factor for variability, as determined in accordance with Table B1 of AS/NZS 1170.0.

(2) The rate of load cycling must be less than 3 Hz.

(3) The single load cycle (sequence D) must be held for a minimum of 10 seconds.

*NT S4C3*

(b) will not cause heat flux in excess of those set out in Column 2 of Table C1V2.

**Table C1V2: Fire spread between buildings on the same allotment**

| Column 1 (Distance between buildings on the same allotment (m)) | Column 2 (Heat flux ($kW/m^2$)) |
|---|---|
| 0 | 80 |
| 2 | 40 |
| 6 | 20 |
| 12 | 10 |

## C1V3 Fire spread via external walls

Compliance with C1P2 to avoid the spread of fire via the *external wall* of a building is verified when—

(a) compliance with C1P2(1)(c) to avoid the spread of fire between buildings, where applicable, is verified in accordance with C1V1 or C1V2, as appropriate; and

(b) the *external wall* system—

(i) has been tested for external wall (EW) performance by an *Accredited Testing Laboratory* in accordance with AS 5113; and

(ii) has achieved the classification EW; and

(iii) if containing a cavity, incorporates cavity barriers and these cavity barriers have been included in the test performed under (i) at the perimeter of each floor; and

(c) in a building of Type A construction, the building is protected throughout by a sprinkler system (other than a FPAA101D or FPAA101H system) complying with Specification 17 and has—

(i) sprinkler protection to balconies, patios and terraces, and where overhead sprinkler coverage is not achieved alongside the *external wall*, sidewall sprinkler heads are provided at the *external wall* for the extent of the balcony, patio or terrace where overhead sprinkler coverage is not achieved; and

(ii) for a building with an *effective height* more than 25 m—

(A) monitored stop valves provided at each floor level arranged to allow the isolation of the floor level containing the stop valve while maintaining protection to the remainder of the building; and

(B) the sprinkler system being capable of providing sufficient flow to serve the design area required by AS 2118.1 for the relevant hazard class on each floor level plus the design area required by AS 2118.1 for the floor level above, except where the former level is either the floor level below the uppermost roof, or any floor level that is wholly below ground; and

(d) in a building of Type B construction, the building is—

(i) a Class 5, 6, 7 or 8 building or Class 4 part of a building; or

(ii) a Class 2, 3 or 9 building that—

(A) is protected throughout by a sprinkler system (other than a FPAA101D or FPAA101H system) complying with Specification 17; or

(B) has any openings in *external walls* separated by a slab or other horizontal construction complying with C3D7(1)(d) as if the building were of Type A construction.

**Note**

Until adoption of NCC 2028 EW performance testing need not be undertaken by an *Accredited Testing Laboratory*.

## C1V4 Fire Safety Verification Method

(1) Compliance with C1P1, C1P2, C1P3, C1P4, C1P5, C1P6, C1P7, C1P8 and C1P9 is verified when a building is

(b) the FRL prescribed in Table S5C24c.

(4) For the purposes of (1), where one part is a *carpark* complying with S5C19, S5C22 or S5C25, the parts may be separated by a *fire wall* complying with S5C19(3)(c), S5C22(3)(c) or S5C25(3)(c) as appropriate.

## C3D10 Separation of classifications in different storeys

If parts of different classification are situated one above the other in adjoining *storeys* they must be separated as follows:

(a) Type A construction — The floor between the adjoining parts must have an FRL of not less than that prescribed in Specification 5 for the classification of the lower *storey*.

(b) Type B or C construction — If one of the adjoining parts is of Class 2, 3 or 4, the floor separating the part from the *storey* below must—

(i) be a floor/ceiling system incorporating a ceiling which has a *resistance to the incipient spread of fire* to the space above itself of not less than 60 minutes; or

(ii) have an FRL of at least 30/30/30; or

(iii) have a *fire-protective covering* on the underside of the floor, including beams incorporated in it, if the floor is *combustible* or of metal.

## C3D11 Separation of lift shafts

(1) Any lift connecting more than 2 *storeys*, or more than 3 *storeys* if the building is sprinklered, (other than lifts which are wholly within an *atrium*) must be separated from the remainder of the building by enclosure in a *shaft* in which—

(a) in a building *required* to be of Type A construction — the walls have the relevant FRL prescribed by Specification 5; and

(b) in a building *required* to be of Type B construction — the walls—

(i) if *loadbearing*, have the relevant FRL prescribed by Table S5C21e; or

(ii) if non-*loadbearing*, be of *non-combustible* construction.

(2) Any lift in a *patient care area* in a Class 9a *health-care building* or a *resident use area* in Class 9c building must be separated from the remainder of the building by a *shaft* having an FRL of not less than—

(a) in a building of Type A or B construction — 120/120/120; or

(b) in a building of Type C construction — 60/60/60.

(3) An emergency lift must be contained within a *fire-resisting shaft* having an FRL of not less than 120/120/120.

(4) Openings for lift landing doors and services must be protected in accordance with the *Deemed-to-Satisfy Provisions* of Part C4.

## C3D12 Stairways and lifts in one shaft

A stairway and lift must not be in the same *shaft* if either the stairway or the lift is *required* to be in a *fire-resisting shaft*.

## C3D13 Separation of equipment

(1) Equipment other than that described in (2) and (3) must be separated from the remainder of the building with construction complying with (4), if that equipment comprises—

(a) lift motors and lift control panels; or

(b) emergency generators used to sustain emergency equipment operating in the emergency mode; or

(c) central smoke control plant; or

(d) *boilers*; or

(e) a *battery system* installed in the building that has a total voltage of 12 volts or more and a storage capacity of 200 kWh or more.

(2) Equipment need not be separated in accordance with (1) if the equipment comprises—

(a) smoke control exhaust fans located in the air stream which are constructed for high temperature operation in accordance with Specification 21; or

(b) ~~stair~~*exit* pressurising equipment installed in compliance with the relevant provisions of AS 1668.1; or

(c) a lift installation without a machine-room; or

(d) equipment otherwise adequately separated from the remainder of the building.

(3) Separation of on-site fire pumps must comply with the requirements of AS 2419.1.

(4) Separating construction must have—

(a) except as provided by (b)—

(i) an FRL as *required* by Specification 5, but not less than 120/120/120; and

(ii) any doorway protected with a *self-closing* fire door having an FRL of not less than –/120/30; or

(b) when separating a lift *shaft* and lift motor room, an FRL not less than 120/–/–.

## C3D14 Electricity supply system

(1) An electricity substation located within a building must—

(a) be separated from any other part of the building by construction having an FRL of not less than 120/120/120; and

(b) have any doorway in that construction protected with a *self-closing* fire door having an FRL of not less than –/120/30.

(2) A main switchboard located within the building which sustains emergency equipment operating in the emergency mode must—

(a) be separated from any other part of the building by construction having an FRL of not less than 120/120/120; and

(b) have any doorway in that construction protected with a *self-closing* fire door having an FRL of not less than –/120/30.

(3) Subject to (4), electrical conductors must—

(a) have a classification in accordance with AS/NZS 3013 of not less than—

(i) if located in a position that could be subject to damage by motor vehicles — WS53W; or

(ii) otherwise — WS52W; or

(b) be enclosed or otherwise protected by construction having an FRL of not less than 120/120/120.

(4) The requirements of (3) only apply to electrical conductors located within a building that supply—

(a) a substation located within the building which supplies a main switchboard covered by (2); or

(b) a main switchboard covered by (2).

(5) Where emergency equipment is *required* in a building, all switchboards in the electrical installation, which sustain the electricity supply to the emergency equipment, must be constructed so that emergency equipment switchgear is separated from non-emergency equipment switchgear by metal partitions designed to minimise the spread of a fault from the non-emergency equipment switchgear.

(6) For the purposes of (5), emergency equipment includes but is not limited to the following:

(a) Fire hydrant booster pumps.

(b) Pumps for *automatic* sprinkler systems, water spray, chemical fluid suppression systems or the like.

## C4D3 Protection of openings in external walls

(1) Subject to (2), openings in an *external wall, or part of an external wall,* that is *required* to have an FRL must be protected in accordance with C4D5, and if wall-wetting sprinklers are used, they must be located externally.

(2) The requirements of (1) only apply if the distance between the opening and the *fire-source feature* to which it is exposed is less than—

(a) 3 m from a side or rear boundary of the allotment; or

(b) 6 m from the far boundary of a road, river, lake or the like adjoining the allotment, if not located in a *storey* at or near ground level; or

(c) 6 m from another building on the allotment that is not Class 10.

(3) Openings *required* to be protected under (1), must not occupy more than 1/3 of the area of the *external wall* of the *storey* in which they are located unless they are in a Class 9b building used as an *open spectator stand*.

## C4D4 Separation of external walls and associated openings in different fire compartments

The distance between parts of *external walls* and any openings within them in different *fire compartments* separated by a *fire wall* must not be less than that set out in Table C4D4, unless—

(a) those parts of each wall have an FRL not less than 60/60/60; and

(b) any openings are protected in accordance with C4D5.

**Table C4D4: Distance between external walls and associated openings in different fire compartments**

| Angle between walls | Minimum distance (m) |
|---|---|
| 0° (walls opposite) | 6 |
| more than 0° to 45° | 5 |
| more than 45° to 90° | 4 |
| more than 90° to 135° | 3 |
| more than 135° to less than 180° | 2 |
| 180° or more | Nil |

## C4D5 Acceptable methods of protection

(1) Where protection is *required*, doorways, *windows* and other openings must be protected as follows:

(a) Doorways—

(i) internal or external wall-wetting sprinklers as appropriate used with doors that are *self-closing* or *automatic* closing; or

(ii) –/60/30 fire doors that are *self-closing* or *automatic* closing.

(b) *Windows*—

(i) internal or external wall-wetting sprinklers as appropriate used with *windows* that are *automatic* closing or permanently fixed in the closed position; or

(ii) –/60/– fire *windows* that are *automatic* closing or permanently fixed in the closed position; or

(iii) –/60/– *automatic* closing fire shutters.

(c) Other openings—

(i) excluding voids — internal or external wall-wetting sprinklers, as appropriate; or

30.

(2) Each door *required* by (1) must be *self-closing*, or *automatic*-closing in accordance with the following:

(a) The *automatic*-closing operation must be initiated by the activation of a smoke detector, or any other detector deemed suitable in accordance with AS 1670.1 if smoke detectors are unsuitable in the atmosphere, installed in accordance with the relevant provisions of AS 1670.1 and located on each side of the *fire wall* not more than 1.5 m horizontal distance from the opening.

(b) Where any other *required* suitable fire alarm system, including a sprinkler system (other than a FPAA101D system) complying with Specification 17, is installed in the building, activation of the system in either *fire compartment* separated by the *fire wall* must also initiate the *automatic*-closing operation.

## C4D9 Openings in fire-isolated exits

(1) Doorways that open to *fire-isolated stairways*, *fire-isolated passageways* or *fire-isolated ramps*, and are not doorways opening to a road or *open space*, must be protected by –/60/30 fire doors that are *self-closing*, or *automatic* closing in accordance with (2) and (3).

(2) The *automatic*-closing operation *required* by (1) must be initiated by the activation of a smoke detector, or any other detector deemed suitable in accordance with AS 1670.1 if smoke detectors are unsuitable in the atmosphere, installed in accordance with the relevant provisions of AS 1670.1 and located not more than 1.5 m horizontal distance from the approach side of the doorway.

(3) Where any other *required* suitable fire alarm system, including a sprinkler system (other than a FPAA101D system) complying with Specification 17, is installed in the building, activation of the system must also initiate the *automatic*-closing operation.

(4) A *window* in an *external wall* of a *fire-isolated stairway*, *fire-isolated passageway* or *fire-isolated ramp* must be protected in accordance with C4D5 if it is within 6 m of, and exposed to, a *window* or other opening in a wall of the same building, other than in the same fire-isolated enclosure.

## C4D10 Service penetrations in fire-isolated exits

Fire-isolated *exits* must not be penetrated by any services other than—

(a) electrical wiring permitted by D3D8(6) to be installed within the *exit*; or

(b) ducting associated with a pressurisation system if it—

(i) is constructed of material having an FRL of not less than –/120/60 where it passes through any other part of the building; and

(ii) does not open into any other part of the building; or

(c) for fire services, water supply and test drain pipes~~.~~; or

~~(c)~~(d) sensors and controls associated with a pressurisation system serving the *exit*.

## C4D11 Openings in fire-isolated lift shafts

(1) Doorways — If a lift *shaft* is *required* to be fire-isolated, an entrance doorway to that *shaft* must be protected by –/60/– fire doors that—

(a) comply with AS 1735.11; and

(b) are set to remain closed except when discharging or receiving passengers, goods or vehicles.

(2) Lift indicator panels — A lift call panel, indicator panel or other panel in the wall of a fire-isolated lift *shaft* must be backed by construction having an FRL of not less than –/60/60 if it exceeds 35 000 $mm^2$ in area.

(ii) located at least 1.5 m above the floor of the balcony, landing or the like.

*NSW C4D12(10)*

## C4D13 Openings in floors and ceilings for services

(1) Where a service passes through—

(a) a floor that is *required* to have an FRL with respect to *integrity* and *insulation*; or

(b) a ceiling *required* to have a *resistance to the incipient spread of fire*,

the service must be installed in accordance with (2).

(2) A service must be protected—

(a) in a building of Type A construction, by a *shaft* complying with Specification 5; or

(b) in a building of Type B or C construction, by a *shaft* that will not reduce the fire performance of the building elements it penetrates; or

(c) in accordance with C4D15.

(3) Where a service passes through a floor which is *required* to be protected by a *fire-protective covering*, the penetration must not reduce the fire performance of the covering.

## C4D14 Openings in shafts

In a building of Type A construction, an opening in a wall providing access to a ventilating, pipe, garbage or other service *shaft* must be protected by—

(a) if it is in a *sanitary compartment* — a door or panel which, together with its frame, is *non-combustible* or has an FRL of not less than –/30/30; or

(b) a *self-closing* –/60/30 fire door or hopper; or

(c) an access panel having an FRL of not less than –/60/30; or

(d) if the *shaft* is a garbage *shaft* — a door or hopper of *non-combustible* construction.

## C4D15 Openings for service installations

(1) The requirements of (2) apply where an electrical, electronic, plumbing, mechanical ventilation, air-conditioning or other service penetrates a building element (other than an *external wall* or roof) that is *required* to have an FRL with respect to *integrity* or *insulation* or a *resistance to the incipient spread of fire*.

(2) An installation mentioned in (1) must comply with any one of the following:

(a) Tested systems — the following applies:

(i) The service, building element and any protection method at the penetration—

(A) are identical with a prototype assembly of the service, building element and protection method which has been tested in accordance with AS 4072.1 and AS 1530.4 and has achieved the *required* FRL or *resistance to the incipient spread of fire*; or

(B) differ from a prototype assembly of the service, building element and protection method in accordance with Section 4 of AS 4072.1.

(ii) It complies with (i) except for the *insulation* criteria relating to the service if—

(A) the service is a pipe system comprised entirely of metal (excluding pipe seals or the like); and

(B) any *combustible* building element is not located within 100 mm of the service for a distance of 2 m from the penetration; and

(C) *combustible* material is not able to be located within 100 mm of the service for a distance of 2 m from

the penetration; and

(D) it is not located in a *required exit*.

(iii) The determination of the *required* FRL must be confirmed in a report from an *Accredited Testing Laboratory* in accordance with Specifications 1 and 2.

(b) Ventilation and air-conditioning — in the case of ventilating or air-conditioning ducts or equipment, the opening is protected~~installation is~~ in accordance with AS 1668.1.

(c) Compliance with Specification 13 — the following applies:

(i) The service is a pipe system comprised entirely of metal (excluding pipe seals or the like) and is installed in accordance with Specification 13 and it—

(A) penetrates a wall, floor or ceiling, but not a ceiling *required* to have a *resistance to the incipient spread of fire*; and

(B) connects not more than 2 *fire compartments* in addition to any *fire-resisting* service *shafts*; and

(C) does not contain a flammable or combustible liquid or gas.

(ii) The service is sanitary plumbing installed in accordance with Specification 13 and it—

(A) is of metal or UPVC pipe; and

(B) penetrates the floors of a Class 5, 6, 7, 8 or 9b building; and

(C) is in a *sanitary compartment* separated from other parts of the building by walls with the FRL *required* by Specification 5 for a stair *shaft* in the building and a *self-closing* –/60/30 fire door.

(iii) The service is a wire or cable, or a cluster of wires or cables installed in accordance with Specification 13 and it—

(A) penetrates a wall, floor or ceiling, but not a ceiling *required* to have a *resistance to the incipient spread of fire*; and

(B) connects not more than 2 *fire compartments* in addition to any *fire-resisting* service *shafts*.

(iv) The service is an electrical switch, outlet, or the like, and it is installed in accordance with Specification 13.

## C4D16 Construction joints

(1) Construction joints, spaces and the like in and between building elements *required* to be *fire-resisting* with respect to *integrity* and *insulation* must be protected in a manner—

(a) identical with a prototype tested in accordance with AS 4072.1 and AS 1530.4 to achieve the *required* FRL; or

(b) that differs from a prototype in accordance with Section 4 of AS 4072.1 and achieves the *required* FRL.

(2) The determination of the *required* FRL must be confirmed in a report from an *Accredited Testing Laboratory* in accordance with Specifications 1 and 2.

(3) The requirements of (1) do not apply where joints, spaces and the like between *fire-protected timber* elements are provided with cavity barriers in accordance with Specification 9.

## C4D17 Columns protected with lightweight construction to achieve an FRL

A column protected by *lightweight construction* to achieve an FRL which passes through a building element that is *required* to have an FRL or a *resistance to the incipient spread of fire*, must be installed using a method and materials identical with a prototype assembly of the construction which has achieved the *required* FRL or *resistance to the incipient spread of fire*.

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(b) the bottom of a *shaft* if it is *non-combustible* and laid directly on the ground.

## S5C9 Carparks and ancillary uses ~~in~~ for Class 2 and 3 buildings

~~(1) If a Class 2 building contains not more than 4 *storeys* of which—~~

~~(a) one *storey* is Class 7 used solely for the purpose of parking motor vehicles or for some other purpose that is ancillary to a Class 2; and~~

~~(b) the remaining *storeys* are of Class 2,~~

~~the *carpark storey* is regarded as Class 2 only for the purpose of determining the relevant *fire-resisting* requirements of this Specification.~~

~~(2) If a Class 3 building or a building of Class 2 and 3 contains not more than 3 *storeys* of which—~~

~~(a) one *storey* is Class 7 used solely for the purpose of parking motor vehicles or for some other purpose that is ancillary to the other *storeys*; and~~

~~(b) the remaining *storeys* are of Class 2 or 3,~~

~~the *carpark storey* is regarded as Class 2 or 3 only for the purpose of determining the relevant *fire-resisting* requirements of this Specification.~~

(1) A Class 7 part of a building may be regarded as Class 2 for the purpose of determining the relevant *fire-resisting* requirements of this Specification where—

(a) the entire building—

(i) consists only of Class 2 and Class 7; and

(ii) contains not more than 4 *storeys*; and

(b) the Class 7 part—

(i) is wholly within the same *storey*; and

(ii) has a purpose that is ancillary to the building, such as carparking; and

(iii) is the only Class 7 part within the entire building.

(2) A Class 7 part of a building may be regarded as Class 3 for the purpose of determining the relevant fire resisting requirements of this Specification where—

(a) the entire building—

(i) consists only of Class 3 and Class 7; and

(ii) contains not more than 3 *storeys*; and

(b) the Class 7 part—

(i) is wholly within the same *storey*; and

(ii) has a purpose that is ancillary to the building, such as carparking; and

(iii) is the only Class 7 part within the entire building.

**Applications**

For S5C9(2), reference to 'Class 3' may include Class 2 parts in conjunction with Class 3 parts.

## S5C10 Residential care building: Concession

(1) In a Class 3 building protected with a sprinkler system complying with Specification 17 and used as a *residential care building*, any FRL criterion prescribed in Tables S5C11a, S5C11d, S5C11e, S5C11f, S5C11g, S5C21a, S5C21d, S5C21e, S5C21f, S5C21g, S5C24a, S5C24c or S5C24d—

(a) for any floor and any *loadbearing* wall, may be reduced to 60, except any FRL criterion of 90 for an *external wall* must be maintained when tested from the outside; and

(b) for any non-*loadbearing internal wall*, need not apply if—

(i) it is lined on each side with standard grade plasterboard not less than 13 mm thick or similar *non-combustible* material; and

(ii) it extends—

(A) to the underside of the floor next above; or

(B) to the underside of a ceiling lined with standard grade plasterboard not less than 13 mm thick or a material with at least an equivalent level of fire protection; or

(C) to the underside of a *non-combustible* roof covering; and

(iii) any insulation installed in the cavity of the wall is *non-combustible*; and

(iv) any construction joint, space or the like between the top of the wall and the floor, ceiling or roof is smoke sealed with intumescent putty or other suitable material.

(2) The concession described at (1) does not apply to *fire-protected timber* building elements.

## Type A Fire-Resisting Construction

### S5C11 Type A fire-resisting construction — fire-resistance of building elements

(1) In a building *required* to be of Type A construction—

(a) each building element listed in Tables S5C11a, S5C11b, S5C11c, S5C11d, S5C11e, S5C11f and S5C11g, and any beam or column incorporated in it, must have an FRL not less than that listed in those Tables for the particular

class of building concerned; and

(b) any *internal wall required* to have an FRL with respect to *integrity* and *insulation* must extend to—

(i) the underside of the floor next above; or

(ii) the underside of a roof complying with Table S5C11g; or

(iii) if under S5C15 the roof is not *required* to comply with Table S5C11g, the underside of the *non-combustible* roof covering and, except for roof battens with dimensions of 75 mm x 50 mm or less or *sarking-type material*, must not be crossed by timber or other *combustible* building elements; or

(iv) a ceiling that is immediately below the roof and has a *resistance to the incipient spread of fire* to the roof space between the ceiling and the roof of not less than 60 minutes; and

(c) a *loadbearing internal wall* and a *loadbearing fire wall* (including those that are part of a *loadbearing shaft*) must be constructed from—

(i) concrete; or

(ii) masonry; or

(iii) subject to (2), *fire-protected timber*; or

~~(iii)~~(iv) subject to (3), *fire-protected steel*; or

~~(iv)~~(v) any combination of (i) to (~~iii~~v); and

(d) the FRLs specified in Table S5C11c for an external column apply also to those parts of an internal column that face and are within 1.5 m of a *window* and are exposed through that *window* to a *fire-source feature*.

(2) For the purposes of (1)(c)(iii), fire-protected timber may be used, provided that—

(a) the building is—

(i) a separate building; or

(ii) a part of a building—

(A) which only occupies part of a *storey*, and is separated from the remaining part by a *fire wall*; or

(B) which is located above or below a part not containing *fire-protected timber* and the floor between the adjoining parts is provided with an FRL not less than that prescribed for a *fire wall* for the lower *storey*; and

(b) the building has an *effective height* of not more than 25 m; and

(c) the building has a sprinkler system (other than a FPAA101D or FPAA101H system) throughout complying with Specification 17; and

(d) any insulation installed in the cavity of the timber building element *required* to have an FRL is *non-combustible*; and

(e) cavity barriers are provided in accordance with Specification 9.

(3) For the purposes of (1)(c)(iv), *fire-protected steel* may be used, provided that —

(a) the building is—

(i) a separate building; or

(ii) a part of a building—

(A) which only occupies part of a *storey*, and is separated from the remaining part by a *fire wall*; or

(B) which is located above a part not containing *fire-protected steel* and the floor between adjoining parts is provided with an FRL, not less than that prescribed for a fire wall for the lower *storey*; and

(b) the building has an *effective height* of not more than 25 m; and

(c) the building is of Class 2 or 3 or the uppermost *storey* for any other Class; and

(d) the building has a sprinkler system (other than a FPAA101D or FPAA101H system) throughout complying with Specification 17; and

(e) any insulation installed in the cavity of walls *required* to have an FRL is *non-combustible*; and

(f) At each floor level, any cavity within a wall required to have an FRL that provides a vertically continuous gap the level above is interrupted by a cavity barrier in the form of a steel member, steel sheet of 0.5 mm base

metal thickness or greater, or a mineral wool barrier.

~~(3)~~(4) For the purposes of Table S5C11a and Table S5C11b, *external wall* includes any column and other building element incorporated within it or other external building element.

**Table S5C11a: Type A construction: FRL of loadbearing parts of external walls**

| Distance from a *fire-source feature* | FRL (in minutes): *Structural adequacy/ Integrity / Insulation* | | | |
|---|---|---|---|---|
| | Class 2, 3 or 4 part | Class 5, 7a or 9 | Class 6 | Class 7b or 8 |
| Less than 1.5 m | 90/90/90 | 120/120/120 | 180/180/180 | 240/240/240 |
| 1.5 to less than 3 m | 90/60/60 | 120/90/90 | 180/180/120 | 240/240/180 |
| 3 m or more | 90/60/30 | 120/60/30 | 180/120/90 | 240/180/90 |

## S5C19 Type A fire-resisting construction — carparks

(1) Notwithstanding S5C11, a *carpark* may comply with this clause if it ~~is an *open-deck carpark* or~~ is protected with a sprinkler system (other than a FPAA101D or FPAA101H system) complying with Specification 17 and is—

(a) a separate building; or

(b) a part of a building—

(i) which only occupies part of a *storey*, and is separated from the remaining part by a *fire wall*; or

(ii) which is located above, but not ~~or~~ below, another classification, and the floor separating the classifications complies with C3D10; or

(iii) which is located above another Class 7 part of the building not used for carparking, and the floor separating the parts complies with Table S5C11g for a Class 7 part other than a *carpark*; or

(iv) which is located below another Class 7 part of the building not used for carparking, and the floor separating the parts complies with this clause.

(2) For the purposes of this clause, a *carpark*—

(a) includes—

(i) an administration area associated with the functioning of the *carpark*; and

(ii) where the *carpark* is sprinklered, is associated with a Class 2 or 3 building and provides carparking for separate *sole-occupancy units*, each carparking area with an area not greater than 10% of its *floor area* for purposes ancillary to the *sole-occupancy units*; but

(b) excludes—

(i) except for (a), any area of another classification, or other part of a Class 7 building not used for carparking; and

(ii) a building or part of a building specifically intended for the parking of trucks, buses, vans and the like.

(3) For building elements in a *carpark* as described in (1) and (2), the following minimum FRLs are applicable:

(a) *External wall*:

(i) Less than 3 m from a *fire-source feature* to which it is exposed:

(A) *Loadbearing*: 60/60/60.

(B) Non-*loadbearing*: –/60/60.

(ii) 3 m or more from a *fire-source feature* to which it is exposed: –/–/–.

(b) *Internal wall*:

(i) *Loadbearing*, other than one supporting only the roof (not used for carparking): 60/–/–.

(ii) Supporting only the roof (not used for carparking): –/–/–.

(iii) Non-*loadbearing*: –/–/–.

(c) *Fire wall*:

(i) From the direction used as a *carpark*: 60/60/60.

(ii) From the direction not used as a *carpark*: as *required* by Table S5C11d.

(d) Columns:

(i) Supporting only the roof (not used for carparking) and 3 m or more from a *fire-source feature* to which it is exposed: –/–/–.

(ii) Steel column, other than one covered by (i) and one that does not support a part of a building that is not used as a *carpark*—

(A) 60/–/–; or

(B) an ESA/M of not greater than 26m$^2$/tonne.

(iii) Any other column not covered by (i) or (ii): 60/–/–.

(e) Beams:

(i) Steel floor beam in continuous contact with a concrete floor slab—

(A) 60/–/–; or

(B) an ESA/M of not greater than 30m$^2$/tonne.

(ii) Any other beam: 60/–/–.

(f) *Fire-resisting* lift and stair shaft (within the *carpark* only): 60/60/60.

(g) Floor slab and vehicle ramp: 60/60/60.

(h) Roof (not used for carparking): –/–/–.

(4) For the purposes of sub-clause (3):

(a) ESA/M means the ratio of exposed surface area to mass per unit length.

(b) Refer to Specification 17 for special requirements for a sprinkler system in a *carpark* complying with (3) and located within a multi-classified building.

## S5C20 Type A fire-resisting construction — Class 2 and 3 buildings: Concession

(1) In a Class 2 or 3 building with a *rise in storeys* of not more than 3—

(a) notwithstanding C2D10(1) and (2) and C3D7, timber framing may be used for—

(i) *external walls*; and

(ii) *common walls*; and

(iii) the floor framing of lifts pits; and

(iv) non-*loadbearing internal walls* which are *required* to be *fire-resisting*; and

(v) non-*loadbearing shafts*, except *shafts* used for the discharge of hot products of combustion; and

(vi) spandrels or horizontal construction provided for the purposes of C3D7; and

(b) notwithstanding S5C11(1)(c), for *loadbearing internal walls* and *loadbearing fire walls*—

(i) timber framing may be used; and

(ii) *non-combustible* materials may be used; and

(c) notwithstanding S5C3(1)(c), timber framing may be used for a part of a building that provides support to a part of a building constructed of timber framing or *non-combustible* material in accordance with (a) and (b).

(2) A ~~Class 2 or 3~~ building having a *rise in storeys* of not more than 4 may have the top three *storeys* constructed in accordance with (1) provided—

(a) the lowest *storey* is used solely for the purpose of parking motor vehicles or for some other ancillary purpose; and

~~(a)~~(b) the remaining *storeys* are Class 2 or 3; and

~~(b)~~(c) the lowest *storey's loadbearing* elements are ~~is~~ constructed of concrete or masonry including the floor between it and the Class 2 or 3 part of the building above; and

~~(c)~~(d) the lowest *storey* and the *storey* above are separated by construction having an FRL of not less than 90/90/90 with no openings or penetrations that would reduce the *fire-resisting* performance of that construction except that a doorway in that construction may be protected by a –/60/30 *self-closing* fire door.

(3) In a Class 2 or 3 building complying with (1) or (2) and fitted with a sprinkler system (other than a FPAA101D or FPAA101H system) complying with Specification 17, any FRL criterion prescribed in Tables S5C11a, S5C11d, S5C11e, S5C11f and S5C11g—

(a) for any floor and any *loadbearing* wall, may be reduced to 60, except any FRL criterion of 90 for an *external wall* must be maintained when tested from the outside; and

(b) for any non-*loadbearing internal wall*, need not apply if—

(i) it is lined on each side with 13 mm standard grade plasterboard or similar *non-combustible* material; and

(ii) it extends—

(A) to the underside of the floor next above; or

| Distance from a *fire-source feature* | FRL (in minutes): *Structural adequacy* / *Integrity* / *Insulation* | | | |
|---|---|---|---|---|
| | Class 2, 3 or 4 part | Class 5, 7a or 9 | Class 6 | Class 7b or 8 |
| *Loadbearing* column — 18 m or more | –/–/– | –/–/– | –/–/– | –/–/– |
| Non-*loadbearing* column | –/–/– | –/–/– | –/–/– | –/–/– |

**Table S5C21d: Type B construction: FRL of common walls and fire walls**

| Wall type | FRL (in minutes): *Structural adequacy* / *Integrity* / *Insulation* | | | |
|---|---|---|---|---|
| | Class 2, 3 or 4 part | Class 5, 7a or 9 | Class 6 | Class 7b or 8 |
| *Loadbearing* or non-*loadbearing* | 90/90/90 | 120/120/120 | 180/180/180 | 240/240/240 |

**Table S5C21e: Type B construction: FRL of loadbearing internal walls**

| Location | FRL (in minutes): *Structural adequacy* / *Integrity* / *Insulation* | | | |
|---|---|---|---|---|
| | Class 2, 3 or 4 part | Class 5, 7a or 9 | Class 6 | Class 7b or 8 |
| *Fire-resisting* lift and stair *shafts* | 90/90/90 | 120/120/120 | 180/120/120 | 240/120/120 |
| Bounding *public corridors*, public lobbies and the like | 60/60/60 | 120/–/– | 180/–/– | 240/–/– |
| Between or bounding *sole-occupancy units* | 60/60/60 | 120/–/– | 180/–/– | 240/–/– |

**Table S5C21f: Type B construction: FRL of non-loadbearing internal walls**

| Location | FRL (in minutes): *Structural adequacy* / *Integrity* / *Insulation* | | | |
|---|---|---|---|---|
| | Class 2, 3 or 4 part | Class 5, 7a or 9 | Class 6 | Class 7b or 8 |
| *Fire-resisting* ~~lift and~~ stair *shafts* | –/90/90 | –/120/120 | –/120/120 | –/120/120 |
| Bounding *public corridor*, public lobbies and the like | –/60/60 | –/–/– | –/–/– | –/–/– |
| Between or bounding *sole-occupancy units* | –/60/60 | –/–/– | –/–/– | –/–/– |

**Table S5C21g: Type B construction: FRL of other building elements not covered by Tables S5C21a to S5C21f**

| Building element | FRL (in minutes): *Structural adequacy* / *Integrity* / *Insulation* | | | |
|---|---|---|---|---|
| | Class 2, 3 or 4 part | Class 5, 7a or 9 | Class 6 | Class 7b or 8 |
| Other *loadbearing* internal walls and columns | 60/–/– | 120/–/– | 180/–/– | 240/–/– |
| Roofs | –/–/– | –/–/– | –/–/– | –/–/– |

## S5C22 Type B fire-resisting construction — carparks

(1) Notwithstanding S5C21, a *carpark* may comply with this clause ~~if it is an *open-deck carpark* or~~ is protected with a sprinkler system (other than a FPAA101D or FPAA101H system) complying with Specification 17 and is—

(a) a separate building; or

(b) a part of a building, and if occupying only part of a *storey*, is separated from the remaining part by a *fire wall*.

(2) For the purposes of this clause, a *carpark*—

(a) includes—

(i) an administration area associated with the functioning of the *carpark*; and

(ii) where the *carpark* is sprinklered, is associated with a Class 2 or 3 building and provides carparking for separate *sole-occupancy units* each carparking area with an area not greater than 10% of its *floor area* for purposes ancillary to the *sole-occupancy units*; but

(b) excludes—

(i) except for (a), any area of another classification, or other part of a Class 7 building not used for carparking; and

(ii) a building or part of a building specifically intended for the parking of trucks, buses, vans and the like.

(3) For building elements in a *carpark* as described in (1) and (2), the following minimum FRLs are applicable:

(a) *External walls*:

(i) Less than 3 m from a *fire-source feature* to which it is exposed:

(A) *Loadbearing*: 60/60/60.

(B) Non-*loadbearing*: –/60/60.

(ii) 3 m or more from a *fire-source feature* to which it is exposed: –/–/–.

(b) *Internal walls*:

(i) *Loadbearing*, other than one supporting only the roof (not used for carparking): 60/–/–.

(ii) Supporting only the roof (not used for carparking): –/–/–.

(iii) Non-*loadbearing*: –/–/–.

(c) *Fire walls*:

(i) From the direction used as a *carpark*: 60/60/60.

(ii) From the direction not used as a *carpark*: as *required* by Table S5C21d.

(d) Columns:

(i) Supporting only the roof (not used for carparking) and 3 m or more from a *fire-source feature* to which it is exposed: –/–/–.

(ii) Steel column, other than one covered by (i) and one that does not support a part of a building that is not used as a *carpark*—

(A) 60/–/–; or

(B) an ESA/M of not greater than 26 $m^2$/tonne.

(iii) Any other column not covered by (i) or (ii): 60/–/–.

(e) Beams:

(i) Steel floor beam less than 3 m from a *fire-source feature* in continuous contact with a concrete floor slab—

(A) 60/–/–; or

(B) an ESA/M of not greater than 30 $m^2$/tonne.

(ii) Any other beam less than 3 m from a *fire-source feature*: 60/–/–.

(iii) Any beam 3 m or more from a *fire-source feature*: –/–/–.

(f) Lift *shaft*: –/–/–.

(g) Fire-resisting stair shaft (within the *carpark* only): 60/60/60.

(h) Roof, floor slab and vehicle ramp: –/–/–.

(4) For the purposes of (3), ESA/M means the ratio of exposed surface area to mass per unit length.

## S5C23 Type B fire-resisting construction — Class 2 and 3 buildings: Concession

(1) In a Class 2 or 3 building with a *rise in storeys* of not more than 2—

(a) notwithstanding C2D10(1) and (2), timber framing may be used for—

(i) *external walls*; and

(ii) *common walls*; and

(iii) the floor framing of lifts pits; and

(iv) non-*loadbearing internal walls* which are *required* to be *fire-resisting*; and

(v) non-*loadbearing shafts*, except *shafts* used for the discharge of hot products of combustion; and

(b) notwithstanding S5C21(1)(d), for *loadbearing internal walls* and *loadbearing fire walls*—

(i) timber framing may be used; and

(ii) *non-combustible* materials may be used; and

(c) notwithstanding S5C3(1)(c), timber framing may be used for a part of a building that provides support to a part of a building constructed of timber framing or *non-combustible* material in accordance with (a) and (b).

(2) A ~~Class 2 or 3~~ building having a *rise in storeys* of not more than 2 may have the top *storey* constructed in accordance with (1) provided—

(a) the lowest *storey* is used solely for the purpose of parking motor vehicles or for some other ancillary purpose; and

~~(a)~~(b) the remaining *storeys* are Class 2 or 3; and

~~(b)~~(c) the lowest *storey's loadbearing* elements are ~~is~~ constructed of concrete or masonry including the floor between it and the Class 2 or 3 part of the building above; and

~~(c)~~(d) the lowest *storey* and the *storey* above are separated by construction having an FRL of not less than 90/90/90 with no openings or penetrations that would reduce the *fire-resisting* performance of that construction except that a doorway in that construction may be protected by a –/60/30 *self-closing* fire door.

(3) In a Class 2 or 3 building complying with (1) or (2) and fitted with a sprinkler system (other than a FPAA101D or FPAA101H system) complying with Specification 17, any FRL criterion prescribed in Tables S5C21a, S5C21d, S5C21e, S5C21f and S5C21g; and~~—~~

(a) for any *loadbearing* wall, may be reduced to 60, except any FRL criterion of 90 for an *external wall* must be maintained when tested from the outside; and

(b) for any non-*loadbearing internal wall*, need not apply, if—

(i) it is lined on both sides with 13 mm standard grade plasterboard or similar *non-combustible* material; and

(ii) it extends—

(A) to the underside of the floor next above if that floor has an FRL of at least 30/30/30 or is lined on the underside with a *fire-protective covering*; or

(B) to the underside of a ceiling with a *resistance to the incipient spread of fire* of 60 minutes; or

(C) to the underside of a *non-combustible* roof covering; and

(iii) any insulation installed in the cavity of the wall is *non-combustible*; and

(iv) any construction joints, spaces and the like between the top of the wall and the floor, ceiling or roof is smoke sealed with intumescent putty or other suitable material.

# Type C Fire-Resisting Construction

## S5C24 Type C fire-resisting construction — fire-resistance of building elements

(1) In a building *required* to be of Type C construction—

**Table S5C24c: Type C construction: FRL of common walls and fire walls**

| Wall type | FRL (in minutes): *Structural adequacy* / *Integrity* / *Insulation* | | | |
|---|---|---|---|---|
| | Class 2, 3 or 4 part | Class 5, 7a or 9 | Class 6 | Class 7b or 8 |
| *Loadbearing* or non-*loadbearing* | 90/90/90 | 90/90/90 | 90/90/90 | 90/90/90 |

**Table S5C24d: Type C construction: FRL of internal walls**

| Location | FRL (in minutes): *Structural adequacy* / *Integrity* / *Insulation* | | | |
|---|---|---|---|---|
| | Class 2, 3 or 4 part | Class 5, 7a or 9 | Class 6 | Class 7b or 8 |
| Bounding *public corridors*, public lobbies and the like | 60/60/60 | –/–/– | –/–/– | –/–/– |
| Between or bounding *sole-occupancy units* | 60/60/60 | –/–/– | –/–/– | –/–/– |
| Bounding a stair if *required* to be rated | 60/60/60 | 60/60/60 | 60/60/60 | 60/60/60 |

**Table S5C24e: Type C construction: FRL of roof**

| Location | FRL (in minutes): *Structural adequacy* / *Integrity* / *Insulation* | | | |
|---|---|---|---|---|
| | Class 2, 3 or 4 part | Class 5, 7a or 9 | Class 6 | Class 7b or 8 |
| Roofs | –/–/– | –/–/– | –/–/– | –/–/– |

## S5C25 Type C fire-resisting construction — carparks

(1) Notwithstanding S5C24, a *carpark* may comply with this clause if it is an *open-deck carpark* or is protected with a sprinkler system (other than a FPAA101D or FPAA101H system) complying with Specification 17 and is—

(a) a separate building; or

(b) a part of a building, and if occupying only part of a *storey*, is separated from the remaining part by a *fire wall*.

(2) For the purposes of this clause, a *carpark*—

(a) includes—

(i) an administration area associated with the functioning of the *carpark*; and

(ii) where the *carpark* is sprinklered, is associated with a Class 2 or 3 building and provides carparking for separate *sole-occupancy units*, each carparking area with an area not greater than 10% of its *floor area* for purposes ancillary to the *sole-occupancy units*; but

(b) excludes—

(i) except for (a), any area of another classification, or other part of a Class 7 building not used for carparking; and

(ii) a building or part of a building specifically intended for the parking of trucks, buses, vans and the like.

(3) For building elements in a *carpark* as described in (1) and (2), the following minimum FRLs are applicable:

(a) *External walls*:

(i) Less than 1.5 m from a *fire-source feature* to which it is exposed:

(A) *Loadbearing*: 60/60/60.

(B) Non-*loadbearing*: –/60/60.

(ii) 1.5 m or more from a *fire-source feature* to which it is exposed: –/–/–.

(b) *Internal walls*: –/–/–.

(c) *Fire walls*:

(i) From the direction used as a *carpark*: 60/60/60.

(ii) From the direction not used as a *carpark*: 90/90/90.

(d) Columns:

(i) Steel column less than 1.5 m from a *fire-source feature*—

(A) 60/–/–; or

(B) ESA/M not greater than 26 $m^2$/tonne.

(ii) Any other column ~~not~~ less than 1.5 m from a *fire-source feature*: 60/–/–.

(iii) Any other column not covered by (i) or (ii): –/–/–.

(e) Beams:

(i) Steel floor beam, less than 1.5 m from a *fire-source feature*, in continuous contact with a concrete floor slab—

(A) 60/–/–; or

(B) an ESA/M of not greater than 30 $m^2$/tonne.

(ii) any other beam: 60/–/–.

(iii) more than 1.5 m from a *fire-source feature*: –/–/–.

(f) Roof, floor slab and vehicle ramp: –/–/–.

(4) For the purposes of (3), ESA/M means the ratio of exposed surface area to mass per unit length.

**Table S7C3: Critical radiant flux (CHF in kW/m$^2$) of floor linings and floor coverings**

| Class of building | Building not fitted with a sprinkler system (other than a FPAA101D or FPAA101H system) complying with Specification 17 | Building fitted with a sprinkler system (other than a FPAA101D or FPAA101H system) complying with Specification 17 | Fire-isolated *exits* and fire control rooms |
|---|---|---|---|
| Class 2, 3, 5, 6, 7, 8 or 9b, excluding Class 3 accommodation for the aged and Class 9b as specified below | 2.2 kW/m$^2$ | 1.2 kW/m$^2$ | 2.2 kW/m$^2$ |
| Class 3 accommodation for the aged | 4.5 kW/m$^2$ | 2.2 kW/m$^2$ | 4.5 kW/m$^2$ |
| Class 9a *patient care areas* | 4.5 kW/m$^2$ | 2.2 kW/m$^2$ | 4.5 kW/m$^2$ |
| Class 9a areas other than *patient care areas* | 2.2 kW/m$^2$ | 1.2 kW/m$^2$ | 4.5 kW/m$^2$ |
| Class 9b auditorium or audience seating area used mainly for indoor swimming or ice skating | 1.2 kW/m$^2$ | 1.2 kW/m$^2$ | 2.2 kW/m$^2$ |
| Class 9b auditorium or audience seating area used mainly for other sports or multi-purpose functions | 2.2 kW/m$^2$ | 1.2 kW/m$^2$ | 2.2 kW/m$^2$ |
| Class 9c *resident use area* | N/A | 2.2 kW/m$^2$ | 4.5 kW/m$^2$ |
| Class 9c areas other than *resident use areas* | N/A | 1.2 kW/m$^2$ | 4.5 kW/m$^2$ |

## S7C4 Wall and ceiling linings

(1) A wall or ceiling lining system must comply with the *group number* specified in Table S7C4 and for buildings not fitted with a sprinkler system (other than a FPAA101D or FPAA101H system) complying with Specification 17 have—

(a) a *smoke growth rate index* not more than 100; or

(b) an *average specific extinction area* less than 250 m$^2$/kg.

(2) A *group number* of a wall or ceiling lining and the *smoke growth rate index* or *average specific extinction area* must be determined by an *Accredited Testing Laboratory* in accordance with AS 5637.1.

**Note**

Until adoption of NCC 2028 determination need not be undertaken by an *Accredited Testing Laboratory*.

**Table S7C4: Wall and ceiling lining materials (material groups permitted)**

| Class of building | Fire-isolated *exits* and fire control rooms | Public corridors | Specific areas | Other areas |
|---|---|---|---|---|
| Class 2 or 3, unsprinklered, excluding accommodation for the aged, people with disabilities and children | Walls: 1 | Walls: 1, 2 | Walls: 1, 2, 3 | Walls: 1, 2, 3 |
| | Ceilings: 1 | Ceilings: 1, 2 | Ceilings: 1, 2, 3 | Ceilings: 1, 2, 3 |

# Specification 11 Smoke-proof walls in health-care and residential care buildings

## S11C1 Scope

(1) This Specification sets out requirements for the construction of smoke-proof walls in Class 9a *health-care buildings* and Class 9c buildings.

(2) Smoke proof walls *required* to have an FRL are to be in accordance with A5G5.

## S11C2 Class 9a health-care buildings

Smoke-proof walls *required* by C3D6 in Class 9a *health-care buildings* must comply with the following:

(a) Be lined on both sides.

~~(a)~~(b) Be *non-combustible* and extend to the underside of—

(i) the floor above; or

(ii) a *non-combustible* roof covering; or

(iii) a ceiling having a *resistance to the incipient spread of fire* to the space above itself of not less than 60 minutes.

~~(iii)~~(c) If plasterboard is used in the lining on a wall, it must be a minimum of 13 mm standard grade plasterboard.

~~(b)~~(d) Not incorporate any glazed areas unless the glass is safety glass as defined in AS 1288.

~~(c)~~(e) Only have doorways which are fitted with smoke doors complying with Specification 12.

~~(d)~~(f) Have all openings around penetrations and the junctions of the smoke-proof wall and the remainder of the building stopped with *non-combustible* material to prevent the free passage of smoke.

~~(e)~~(g) Incorporate smoke dampers where air-handling ducts penetrate the wall unless the duct forms part of a smoke hazard management system *required* to continue air movement through the duct during a fire.

## S11C3 Class 9c buildings

Smoke-proof walls *required* by C3D6 in Class 9c buildings must comply with the following:

(a) The wall may be lined on one side only.

(b) Linings on the wall must be *non-combustible* and extend to the underside of—

(i) the floor above; or

(ii) a *non-combustible* roof covering; or

(iii) a flush plasterboard ceiling lined with 13 mm standard grade plasterboard or a *fire-protective covering*, with all penetrations sealed against the free passage of smoke.

(c) If plasterboard is used in the lining on a wall, it must be a minimum of 13 mm standard grade plasterboard.

(d) Not incorporate any glazed areas unless the glass is safety glass as defined in AS 1288.

(e) Only have doorways which are fitted with smoke doors complying with Specification 12.

(f) Have all openings around penetrations and the junctions of the smoke-proof wall and the remainder of the building stopped with *non-combustible* material to prevent the free passage of smoke.

(g) Incorporate smoke dampers where air-handling ducts penetrate the wall unless the duct forms part of a smoke hazard management system *required* to continue air movement through the duct during a fire.

## S11C4 Doorways in smoke-proof walls

A door *required* by C3D6 or this Specification to be smoke-proof or have an FRL~~, other than one that serves a *fire compartment* provided with a zone pressurisation system in accordance with AS 1668.1,~~ must provide a smoke reservoir by not extending within 400 mm of the underside of—

(a) a roof covering; or

(b) the floor above; or

(c) an imperforate false ceiling that will prevent the free passage of smoke.

## D1P1 Access for people with a disability

Access must be provided, to the degree necessary, to enable—

(a) people to—

(i) approach the building from the road boundary and from any *accessible* carparking spaces associated with the building; and

(ii) approach the building from any *accessible* associated building; and

(iii) access work and public spaces, accommodation and facilities for personal hygiene; and

(b) identification of *accessways* at appropriate locations which are easy to find.

**Limitations**

D1P1 does not apply to a Class 4 part of a building.

## D1P2 Safe movement to and within a building

So that people can move safely to and within a building, it must have—

(a) walking surfaces with safe gradients; and

(b) any doors installed to avoid the risk of occupants—

(i) having their egress impeded; or

(ii) being trapped in the building; and

(c) any stairways and ramps, other than *thresholds ramps* with—

(i) slip-resistant walking surfaces on—

(A) ramps, including *threshold ramps* where necessary for people with a disability; and

(B) stairway treads or near the edge of the nosing; and

(ii) suitable handrails where necessary to assist and provide stability to people using the stairway or ramp; and

(iii) suitable landings to avoid undue fatigue; and

(iv) landings where a door opens from or onto the stairway or ramp so that the door does not create an obstruction; and

(v) in the case of a stairway, suitable safe passage in relation to the nature, volume and frequency of likely usage.

## D1P3 Fall prevention barriers

(1) A barrier must be provided where people could fall—

(a) 1 m or more—

(i) from a floor or roof or through an opening (other than through an openable window) in the *external wall* of a building; or

(ii) due to a sudden change of level within or associated with a building; or

(b) 2 m or more from a floor through an openable window—

(i) in a bedroom in a Class 2 or 3 building or a Class 4 part of a building; or

(ii) in a Class 9b *early childhood centre*; or

(c) 4 m or more from a floor through an openable window not covered by (b).

(2) A barrier *required* by (1) must be—

must be not more than 60 m.

(6) Assembly buildings — In a Class 9b building other than a *school* or *early childhood centre*, the distance to one of the *exits* may be 60 m if—

(a) the path of travel from the room concerned to that *exit* is through another area which is a corridor, hallway, lobby, ramp or other circulation space; and

(b) the room is smoke-separated from the circulation space by construction having an FRL of not less than 60/60/60 with every doorway in that construction protected by a tight fitting, *self-closing*, solid-core door not less than 35 mm thick; and

(c) the maximum distance of travel does not exceed 40 m within the room and 20 m from the doorway to the room through the circulation space to the *exit*.

*SA D2D5(7)*

*SA D2D5(8)*

*SA D2D6*

## D2D6 Distance between alternative exits

*Exits* that are *required* as alternative means of egress must be—

(a) distributed as uniformly as practicable within or around the *storey* served and in positions where unobstructed access to at least 2 *exits* is readily available from all points on the floor including lift lobby areas; and

(b) not less than 9 m apart; and

(c) not more than—

(i) in a Class 2 or 3 building — 45 m apart; or

(ii) in a Class 9a *health-care building*, if such *required exit* serves a *patient care area* — 45 m apart; or

(iii) in all other cases — 60 m apart; and

(d) located so that alternative paths of travel do not converge such that they become less than 6 m apart.

## D2D7 Height of exits, paths of travel to exits and doorways

In a *required exit* or path of travel to an *exit* the unobstructed height throughout must be not less than 2 m, except the unobstructed height of any doorway may be reduced to not less than 1980 mm.

## D2D8 Width of exits and paths of travel to exits

(1) The unobstructed width of each *required exit* or path of travel to an *exit*, except for ladders provided in accordance with D2D21, D3D23 or I3D5, and doorways, must be not less than—

(a) 1 m; or

(b) 1.8 m in a passageway, corridor or ramp normally used for the transportation of patients in beds within a *treatment area* or *ward area*; and

(c) in a *public corridor* in a Class 9c *aged care building*, notwithstanding (2) and (3)—

(i) 1.5 m; and

(ii) 1.8 m for the full width of the doorway, providing access into a *sole-occupancy unit* or communal bathroom.

(2) If ~~the~~ a *fire compartment* relying on one or more *horizontal exits*, *storey*, *mezzanine* or *open spectator stand* accommodates more than 100 persons but not more than 200 persons, the aggregate unobstructed width of *required exits* or paths of travel to an *exit*, except for doorways, must be not less than—

(a) 1 m plus 250 mm for each 25 persons (or part) in excess of 100; or

(b) 1.8 m in a passageway, corridor or ramp normally used for the transportation of patients in beds within a *treatment area* or *ward area*.

(3) If ~~the~~a *fire compartment* relying on one or more *horizontal exits, storey*, *mezzanine* or *open spectator stand* accommodates more than 200 persons, the aggregate unobstructed width of *required exits* or paths of travel to an *exit*, except for doorways, must be not less than—

(a) 2 m plus 500 mm for every 60 persons (or part) in excess of 200 persons if egress involves a change in floor level by a stairway or ramp with a gradient steeper than 1 in 12; or

(b) in any other case, 2 m plus 500 mm for every 75 persons (or part) in excess of 200.

(4) In an *open spectator stand* which accommodates more than 2000 persons, the aggregate unobstructed width of *required exits* or paths of travel to an *exit*, except for doorways, must be not less than 17 m plus a width (in metres) equal to the number in excess of 2000 divided by 600.

*NSW D2D8(5)*

*NSW D2D9*

*VIC D2D9*

## D2D9 Width of doorways in exits or paths of travel to exits

In a *required exit* or path of travel to an *exit*, the unobstructed width of a doorway must be not less than—

(a) in *patient care areas* through which patients would normally be transported in beds—

(i) if the doorway provides access to, or from, a corridor of width—

(A) less than 2.2 m — 1200 mm; or

(B) 2.2 m or greater — 1070 mm; and

(ii) where the doorway referred to in (i) is fitted with two leaves and one leaf is secured in the closed position in accordance with D3D26(3)(e), the other leaf must permit an unobstructed opening not less than 800 mm wide; or

(b) in *patient care areas* in a *horizontal exit* — 1250 mm; or

(c) the unobstructed width of each *exit* provided to comply with D2D8, minus 250 mm; or

(d) in a Class 9c building, 800 mm, except—

(i) in *resident use areas* the minimum unobstructed width must be 870 mm; and

(ii) for doorways leading from a *public corridor* to a *sole-occupancy unit* the minimum unobstructed width must be 1070 mm; and

(iii) where the doorway is fitted with two leaves and one leaf is secured in the closed position in accordance with D3D26(3)(e), the other leaf must permit an unobstructed opening not less than 870 mm wide in *resident use areas* and 800 mm wide in non-*resident use area*; or

(e) in any other case except where it opens to a *sanitary compartment* or bathroom — 750 mm wide.

## D2D10 Exit width not to diminish in direction of travel

The unobstructed width of a *required exit* must not diminish in the direction of travel to a road or *open space*, except where the width is increased in accordance with D2D8(1)(b) or D2D9(a)(i).

## D2D11 Determination and measurement of exits and paths of travel to exits

For the purposes of D2D7 to D2D10 the following apply:

(a) The *required* width of a stairway or ramp in a *required exit* or path of travel to an *exit* must—

(i) be measured clear of all obstructions such as handrails, projecting parts of barriers and the like; and

## D3D11 Pedestrian ramps

(1) A *fire-isolated ramp* may be substituted for a *fire-isolated stairway* if the construction enclosing the ramp and the width and ceiling height comply with the requirements for a *fire-isolated stairway*.

(2) A ramp serving as a *required exit* must—

(a) where the ramp is also serving as an *accessible* ramp under Part D4, be in accordance with AS 1428.1; or

(b) in any other case, have a gradient not steeper than 1:8.

(3) The floor surface of a ramp, other than a *threshold ramp*, must have a slip-resistance classification not less than that listed in Table D3D15 when tested in accordance with AS 4586.

## D3D12 Fire-isolated passageways

(1) The enclosing construction of a *fire-isolated passageway* must have an FRL when tested for a fire outside the passageway in another part of the building of—

(a) if the passageway discharges from a *fire-isolated stairway* or ramp — not less than that *required* for the stairway or ramp *shaft*; or

(b) in any other case — not less than 60/60/60.

(2) Notwithstanding (1)(b), the top construction of a *fire-isolated passageway* need not have an FRL if the walls of the *fire-isolated passageway* extend to the underside of—

(a) a *non-combustible* roof covering; or

(b) a ceiling having a *resistance to the incipient spread of fire* of not less than 60 minutes separating the roof space or ceiling space in all areas surrounding the passageway within the *fire compartment*.

## D3D13 Roof as open space

If an *exit* discharges to a roof of a building, the roof must—

(a) have an FRL of not less than 120/120/120; and

(b) not have any roof lights or other openings within 3 m of the path of travel of persons using the *exit* to reach a road or *open space*.

## D3D14 Goings and risers

*NSW D3D14(1)*

(1) A stairway must have—

(a) not more than 18 and not less than 2 risers in each *flight*; and

(b) going (G), riser (R) and quantity (2R + G) in accordance with Table D3D14, except as permitted by (2) and (3); and

(c) constant goings and risers throughout each *flight*, except as permitted by (2) and (3), and the dimensions of goings (G) and risers (R) in accordance with (1)(b) are considered constant if the variation between—

(i) adjacent risers, or between adjacent goings, is no greater than 5 mm; and

(ii) the largest and smallest riser within a *flight*, or the largest and smallest going within a *flight*, does not exceed 10 mm; and

(d) risers which do not have any openings that would allow a 125 mm sphere to pass through between the treads; and

(e) treads which have—

## D3D16 Thresholds

The threshold of a doorway must not incorporate a step or ramp at any point closer to the doorway than the width of the door leaf unless the doorway opens to an external space; and—

(a) where the doorway serves an area *required* to be *accessible*, it is provided with a threshold ramp or step ramp in accordance with AS 1428.1; or

(b) where (a) does not apply, the door sill is not located below, and is not more than 190 mm above, the finished surface of the ground, balcony, or the like to which the doorway opens.

~~(a) in *patient care areas* in a Class 9a *health-care building*, the door sill is not more than 25 mm above the finished floor level to which the doorway opens; or~~

~~(b) in *resident use areas* in a Class 9c building, a ramp is provided with a maximum gradient of 1:8 for a maximum height of 25 mm over the threshold; or~~

~~(c) in a building *required* to be *accessible* by Part D4, the doorway—~~

~~(i) opens to a road or *open space*; and~~

~~(ii) is provided with a threshold ramp or step ramp in accordance with AS 1428.1; or~~

~~(d) in other cases—~~

~~(i) the doorway opens to a road or *open space*, external stair landing or external balcony; and~~

~~(ii) the door sill is not more than 190 mm above the finished surface of the ground, balcony, or the like, to which the doorway opens.~~

**Exemption**

D3D16 does not apply to a plant room, machinery room, store-room or the like.

**Explanatory Information: Read in conjunction with D4D3**

D3D16(a) is to be read in conjunction with D4D3, which requires some external doorways to be *accessible*. In order to comply with D4D3, the thresholds of these doorways cannot incorporate a ramp within the width of the door leaf.

**Explanatory Information: Bunds**

D3D16 does not prevent the addition of a bund within the width of the door leaf from the doorway.

## D3D17 Barriers to prevent falls

(1) A continuous barrier must be provided along the side of—

(a) a roof to which general access is provided; and

(b) a stairway or ramp; and

(c) a floor, corridor, hallway, balcony, deck, verandah, *mezzanine*, access bridge or the like; and

(d) any delineated path of access to a building,

if the trafficable surface is 1 m or more above the surface beneath.

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

(a) the perimeter of a *stage*, rigging loft, loading dock or the like; or

(b) areas referred to in D3D23; or

(c) a retaining wall, unless the retaining wall forms part of, or is directly associated with, a delineated path of access to a building from the road, or a delineated path of access between buildings; or

(d) a barrier provided to an openable window covered by D3D29.

(3) A barrier *required* by (1) must be constructed in accordance with D3D18, D3D19, D3D20 and, if a wire barrier is used, D3D21.

## D3D18 Height of barriers

[2019: Table D2.16a]

*NSW D3D18(1)*

(1) The height of a barrier *required* by D3D17 must be not less than the following:

(a) For stairways or ramps with a gradient of 1:20 or steeper — 865 mm.

(b) For *landings* to a stair or ramp where the barrier is provided along the inside edge of the *landing* and does not exceed 500 mm in length — 865 mm.

(c) In front of fixed seating on a *mezzanine* or balcony within an auditorium in a Class 9b building, where the horizontal projection extends not less than 1 m outwards from the top of the barrier — 700 mm.

(d) For all other locations — 1 m.

(2) For a barrier provided under (1) —

## D3D22 Handrails

(1) ~~Except for handrails referred to in D3D23, and s~~Subject to (2), handrails must—

(a) be located along at least one side of the ramp or *flight*; and

(b) be located along each side if the total width of the stairway or ramp is 2 m or more; and

(c) in a Class 9b building used as a primary *school* or a building that contains an *early childhood centre*—

(i) have one handrail fixed at a height of not less than 865 mm; and

(ii) in addition to (i), have a handrail—

(A) fixed at a height between 665 mm and 750 mm in a primary *school*; and

(B) with a cross-sectional dimension not less than 16 mm and not greater than 45 mm as measured in any direction across its centre, fixed at a height between 450 mm and 700 mm in a Class 9b *early childhood centre*; and

(d) in any other case, be fixed at a height of not less than 865 mm; and

(e) be continuous between stair *flight* landings and have no obstruction on or above them that will tend to break a hand-hold; and

(f) in a *required exit* serving an area *required* to be *accessible*, be designed and constructed to comply with clause 12 of AS 1428.1, except that clause 12(d) does not apply to a handrail *required* by (1)(c)(ii).

(2) For the purposes of (1) the following applies: ~~The height *required* by (1)(c) and (d) is measured above the nosings of stair treads and the floor surface of the ramp, landing or the like.~~

(a) (1) does not apply to—

(i) handrails referred to in D3D23; and

(ii) *step ramps*, *threshold ramps* and *kerb ramps*.

~~(2)~~(b) The height *required* by (1)(c) and (d) is measured above the nosings of stair treads and the floor surface of the ramp, landing or the like.

(3) Handrails—

(a) in a Class 9a *health-care building* must be provided along at least one side of every passageway or corridor used by patients, and must be—

(i) fixed not less than 50 mm clear of the wall; and

(ii) where practicable, continuous for their full length; and

(b) in a Class 9c *aged care building* must be provided along both sides of every passageway or corridor used by residents, and must be—

(i) fixed not less than 50 mm clear of the wall; and

(ii) where practicable, continuous for their full length.

(4) Handrails *required* to assist people with a disability must be provided in accordance with D4D4.

(5) Handrails to a stairway or ramp within a *sole-occupancy unit* in a Class 2 or 3 building or Class 4 part of a building must—

(a) be located along at least one side of the *flight* or ramp; and

(b) be located along the full length of the *flight* or ramp, except in the case where a handrail is associated with a barrier, the handrail may terminate where the barrier terminates; and

(c) have the top surface of the handrail not less than 865 mm vertically above the nosings of the stair treads or the floor surface of the ramp; and

(d) have no obstruction on or above them that will tend to break a handhold, except for newel posts, ball type stanchions, or the like.

(6) The requirements of (5) do not apply to—

(a) handrails referred to in D3D23; or

(4) A door referred to in (3)(c) must be able to be immediately unlocked—

(a) by operating a fail-safe control switch, not contained within a protective enclosure, to actuate a device to unlock the door; or

(b) by hand by a person or persons, specifically nominated by the owner, properly instructed as to the duties and responsibilities involved and available at all times when the building is lawfully occupied so that persons in the building or part may immediately escape if there is a fire.

*NSW D3D26(5)*

(5) The requirements of (1) and (2) do not apply in a Class 9b building (other than a *school*, an *early childhood centre* or a building used for religious purposes) to a door in a *required exit*, forming part of a *required exit* or in the path of travel to a *required exit* serving a *storey* or room accommodating more than 100 persons, determined in accordance with D2D18, in which case it must be readily openable—

(a) without a key from the side that faces a person seeking egress; and

(b) by a single hand pushing action on a single device such as a panic bar located between 900 mm and 1.2 m from the floor; and

(c) where a two-leaf door is fitted, the provisions of (a) and (b) need only apply to one door leaf if the appropriate requirements of D2D9 are satisfied by the opening of that one leaf.

*NSW D3D26(6)*

*VIC D3D26(6)*

## D3D27 Re-entry from fire-isolated exits

(1) Doors of a fire-isolated *exit* must not be locked from the inside as follows:

~~(a) In a Class 9a *health-care building*.~~

~~(b) In a Class 9b *early childhood centre*.~~

~~(c) In a Class 9c building.~~

(a) In a Class 2 building.

(b) In a Class 3 building.

(c) In a Class 6 building.

(d) In a Class 7a building.

(e) In a Class 9 building.

~~(d)~~(f) In a fire-isolated *exit* serving any storey above an *effective height* of 25 m, throughout the *exit*.

(2) The requirements of (1)~~(a), (c) and (d)~~ do not apply to a door, other than a door in a Class 9b *early childhood centre*, fitted with a fail-safe device that *automatically* unlocks the door upon the activation of a fire alarm and—

(a) re-entry is facilitated by—~~on at least every fourth *storey*, the doors are not able to be locked and a sign is fixed on such doors stating that re-entry is available; or~~

(i) on at least every fourth *storey*, the doors are not able to be locked and a sign is fixed on such doors stating that re-entry is available; and

~~(a)~~(ii) on at least every second *storey* where re-entry is not available, a sign is fixed to the wall within the *fire-isolated exit* within 1.5 m of the *exit* door stating the location of nearby re-entry; or

(b) an intercommunication system, or an audible or visual alarm system, operated from within the enclosure is provided near the doors on at least every fourth storey, and a sign is fixed adjacent to such doors explaining its purpose and method of operation.

(3) The requirements of (1)(e~~b~~) do not apply to a door in a Class 9b *early childhood centre* fitted with a fail-safe device that *automatically* unlocks the door ~~serving the Class 9b *early childhood centre*~~ upon the activation of a fire alarm.

## D3D28 Signs on doors

must not permit a 300 mm sphere to pass through it.

## D3D30 Timber stairways: Concession

(1) Notwithstanding D3D3(a), timber treads, risers, landings and associated supporting framework within a *required fire-isolated stairway* or *fire-isolated passageway* may be constructed from *fire-protected timber* in accordance with C2D13—

(a) if the timber—

(i) has a finished thickness of not less than 44 mm; and

(ii) has an average density of not less than 800 kg/m$^3$ at a moisture content of 12%; and

(b) subject to—

(i) the building being protected throughout by a sprinkler system (other than a FPAA101D system) complying with Specification 17 which extends to within the fire-isolated enclosure; and

(ii) fire protection being provided to the underside of stair *flights* and landings located immediately above a landing level which—

(A) is at or near the level of egress; or

(B) provides direct access to a carpark.

(2) Fire protection required by (1) must be not less than one layer of 13 mm fire-protective grade plasterboard fixed in accordance with the system requirements for a *fire-protective covering*.

*NSW D3D31*

## D3D31 Wayfinding signage

(1) Buildings with an *effective height* of more than 12 m or with more than 3 below ground *storeys* must be provided with stairway identification signs, floor level identification signs and *sole-occupancy unit* indicator signs in accordance with (2) to (7).

(2) Stair identification signs must—

(a) be located on all doors that provide access into *required exit* stairways, including discharge doors; and

(b) identify the floor levels served where the *required exit* stairway does no serve all floor levels; and

(c) state—

(i) "**Stair**", or in the case of a scissor stair "**Scissor Stair**"; and

(ii) a unique stair descriptor; and

(d) use text that—

(i) is not less than 50 mm high; and

(ii) contrasts with its background; and

(iii) is legible in low level lighting conditions or when illuminated with a torch.

(3) Floor level identification signs must—

(a) be located at—

(i) every landing of a *required exit* stairway located at a floor level; and

(ii) every corridor or lobby into which an emergency lift or lift with a stretcher facility opens; and

(b) be visible from the top step of the *flight* serving the relevant floor level and, where possible, from inside the relevant lift when the lift car doors open; and

(c) be mounted between 1.7 m and 2 m above floor level and, as far as practicable, at the same height; and

(d) where within a *required exit* stairway, identify that *required exit* stairway in accordance with (2)(d); and

(e) state—

(i) "**Ground Floor**" when identifying the ground floor level; o

(ii) "**Level**", or in the case of a basement level "**Basement**", in conjunction with a floor level descriptor; and

(f) use text that—

(i) is not less than 50 mm high, except the height of the character that designates the floor level descriptor must be at least 100 mm high; and

(ii) contrasts with the background; and

(iii) is legible in low level lighting conditions or when illuminated with a torch.

(4) The floor level descriptor *required* by (3)(e)(ii) must—

(a) for floor levels above the ground floor, be numbered sequentially beginning with "1"; and

(b) for basement levels below the ground floor, be numbered sequentially beginning with "1".

(5) Where a storey in a Class 2 or Class 3 building contains more than one *sole-occupancy unit*, *sole-occupancy unit* indicator signs must be provided that state the direction to *sole-occupancy units* accessed on that *storey*.

(6) *Sole-occupancy unit* identification signs *required* by (5) must—

(a) be located immediately below floor identification signs, such that the top edge of the sign is not more than 50 mm below the bottom edge of the floor identification sign; and

(b) state—

(i) "**Units**"; and

(ii) a sequential descriptor of the range of *sole-occupancy units* in each direction relative to the location of the sign; and

(iii) the direction in which the ranges of *sole-occupancy units* are relative to the location of the sign, such as by an arrow symbol; and

(c) use text and symbols that—

(i) are not less than 25 mm high; and

(ii) contrast with the background; and

(iii) are legible in low level lighting conditions or when illuminated with a torch.

**Notes**

(1) Where a *sole-occupancy unit* is accessed from 2 or more *storeys*, the *sole-occupancy unit* need only be identified by a *sole-occupancy unit* identification sign on the primary access storey.

(2) Stair, floor level and *sole-occupancy unit* designations are to be consistent with designations used in block plans and other *fire safety system* documentation.

**Explanatory Information**

Each *required exit* stairway and floor level is to be provided with a unique descriptor to assist co-ordination of egress and *fire brigade* activities. For example, a building may be provided with 2 *required exit* stairways, A and B. Stairway identification signs and floor identification signs for stairway B must contain the text "Stair B".

# Part D4 Access for people with a disability

## Introduction to this Part

This Part contains *Deemed-to-Satisfy Provisions* for Part D1. It covers which buildings, and parts of a building, must be *accessible*, provision of *accessible* carparking spaces, braille and tactile signage, hearing augmentation, tactile ground surface indicators and seating in *assembly buildings* (e.g. cinemas), and access to *swimming pools*.

## Deemed-to-Satisfy Provisions

### D4D1 Deemed-to-Satisfy Provisions

[2019: D3.0]

*TAS D4D1(1)*

(1) Where a *Deemed-to-Satisfy Solution* is proposed, *Performance Requirements* D1P1 to D1P6, D1P8 and D1P9 are satisfied by complying with—

(a) D2D2 to D2D23, D3D2 to D3D30 and D4D2 to D4D13; and

(b) in a building containing an *atrium*, Part G3; and

(c) in a building in an *alpine area*, Part G4; and

(d) for additional requirements for Class 9b buildings, Part I1; and

(e) for public transport buildings, Part I2.

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

*TAS D4D1(3)*

(3) *Performance Requirement* D1P7 must be complied with if lifts are to be used to assist occupants to evacuate a building.

### D4D2 General building access requirements

(1) Buildings and parts of buildings must be *accessible* as *required* by this clause, unless exempted by D4D5.

(2) Access requirements for a Class 1b building are as follows:

(a) Dwellings located on one allotment and used for short-term holiday accommodation — to and within a number of dwellings determined in accordance with Table D4D2a.

(b) A boarding house, bed and breakfast, guest house, hostel or the like, other than those described in (a) — to and within—

(i) 1 bedroom and associated sanitary facilities; and

(ii) not less than 1 of each type of room or space for use in common by the residents or guests, including a cooking facility, sauna, gymnasium, *swimming pool*, laundry, games room, eating area, or the like; and

(iii) rooms or spaces for use in common by all residents on a floor to which access by way of a ramp complying with AS 1428.1 or a passenger lift is provided.

(3) For the purposes of (2)(a), a community or strata-type subdivision or development is considered to be on a single allotment.

*SA D4D2(4)*

(4) For a Class 2 building, common areas are to be *accessible* as follows:

(a) From a pedestrian entrance *required* to be *accessible* to at least 1 floor containing *sole-occupancy units* and to

the entrance doorway of each *sole-occupancy unit* located on that level.

(b) To and within not less than 1 of each type of room or space for use in common by the residents, including a cooking facility, sauna, gymnasium, *swimming pool*, common laundry, games room, individual shop, eating area, or the like.

(c) Where a ramp complying with AS 1428.1 or a passenger lift is installed—

(i) to the entrance doorway of each *sole-occupancy unit*; and

(ii) to and within rooms or spaces for use in common by the residents.

(d) The requirements of (c) only apply where the space referred to in (c)(i) or (ii) is located on the levels served by the lift or ramp.

(5) For a Class 3 building, access requirements are as follows:

(a) Common areas:

(i) From a pedestrian entrance *required* to be *accessible* to at least 1 floor containing *sole-occupancy units* and to the entrance doorway of each *sole-occupancy unit* located on that level.

(ii) To and within not less than 1 of each type of room or space for use in common by the residents, including a cooking facility, sauna, gymnasium, *swimming pool*, common laundry, games room, TV room, individual shop, dining room, public viewing area, ticket purchasing service, lunch room, lounge room, or the like.

(iii) Where a ramp complying with AS 1428.1 or a passenger lift is installed—

(A) to the entrance doorway of each *sole-occupancy unit*; and

(B) to and within rooms or spaces for use in common by the residents.

(iv) The requirements of (iii) only apply where the space referred to in (iii)(A) ~~and~~or (iii)(B) ~~are~~is located on the levels served by the lift or ramp.

(b) To and within *sole-occupancy units* — in accordance with Table D4D2b.

(6) For Class 5, 6, 7b, 8 and 9a buildings, access must be provided to and within all areas normally used by the occupants.

(7) For a Class 7a building, access must be provided to and within any level containing *accessible* carparking spaces.

(8) For a Class 9b building, access requirements are as follows:

(a) *Schools* and *early childhood centres* — to and within all areas normally used by the occupants.

(b) An *assembly building*, not being a *school* or *early childhood centre* — to and within—

(i) wheelchair seating spaces provided in accordance with D4D10; and

(ii) all other areas normally used by the occupants, except that access need not be provided to tiers or platforms of seating areas that do not contain wheelchair seating spaces.

(9) For a Class 9c building, access requirements are as follows:

(a) Common areas:

(i) From a pedestrian entrance *required* to be *accessible* to at least 1 floor containing *sole-occupancy units* and to the entrance doorway of each *sole-occupancy unit* located on that level.

(ii) To and within not less than 1 of each type of room or space for use in common by the residents, including a cooking facility, sauna, gymnasium, *swimming pool*, common laundry, games room, TV room, individual shop, dining room, public viewing area, ticket purchasing service, lunch room, lounge room, or the like.

(iii) Where a ramp complying with AS 1428.1 or a passenger lift is installed—

(A) to the entrance doorway of each *sole-occupancy unit*; and

(B) to and within rooms or spaces for use in common by the residents.

(iv) The requirements of (iii) only apply where the space referred to in (iii)(A) or (iii)(B) is located on the levels served by the lift or ramp.

(b) *Sole-occupancy units* — to and within a number of *sole-occupancy units* determined in accordance with Table D4D2b.

(10) For a Class 10 building, access requirements are as follows:

(a) For a Class 10a non-habitable building located in an *accessible* area intended for use by the public and containing a sanitary facility, change room facility or shelter, to and within—

*SA E1D2(6)*

*SA E1D2(7)*

*SA E1D2(8)*

*SA Figure E1D2*

*SA Table E1D2*

## E1D3 Fire hose reels

*SA E1D3(1)*

(1) E1D3 does not apply to—

(a) a Class 2, 3 or 5 building or Class 4 part of a building; or

(b) a Class 8 *electricity network substation*; or

(c) a Class 9c building; or

(d) classrooms and associated corridors in a primary or secondary *school*; or

(e) areas less than 100 $m^2$, which are—

(i) separated from other parts of the building by construction having an FRL of not less than 60/60/60; and

(ii) protected with a *self-closing* fire door having an FRL of not less than –/60/30; and

~~(d)~~(iii) provided with fire extinguishers in accordance with AS 2444 located on the egress side of an entry door to the space.

(2) A fire hose reel system must be provided—

(a) to serve the whole building where one or more internal fire hydrants are installed; or

(b) where internal fire hydrants are not installed, to serve any *fire compartment* with a *floor area* greater than 500 $m^2$.

(3) The fire hose reel system must—

(a) have fire hose reels installed in accordance with AS 2441; and

(b) provide fire hose reels to serve only the *storey* at which they are located, except a *sole-occupancy unit* of not more than 2 *storeys* in a Class 6, 7, 8 or 9 building may be served by a single fire hose reel located at the level of egress from that *sole-occupancy unit* provided the fire hose reel can provide coverage to the whole of the *sole-occupancy unit*.

(4) Fire hose reels must be located internally, externally or in combination, to achieve the system coverage specified in AS 2441.

(5) In achieving system coverage, one or a combination of the following criteria for individual internally located fire hose reels must be met in determining the layout of any fire hose reel system:

(a) Fire hose reels must be located adjacent to an internal fire hydrant (other than one within a fire-isolated *exit*), except that a fire hose reel need not be located adjacent to every fire hydrant, provided system coverage can be achieved.

(b) Fire hose reels must be located within 4 m of an *exit*, except that a fire hose reel need not be located adjacent to every *exit*, provided system coverage can be achieved.

(c) Where system coverage is not achieved by compliance with (a) and (b), additional fire hose reels may be located in paths of travel to an *exit* to achieve the *required* coverage.

(6) Fire hose reels must be located so that the fire hose will not need to pass through doorways fitted with fire or smoke doors, except—

(a) doorways in walls referred to in C3D6(1)(e) in a Class 9a building and C3D6(3)(d) in a Class 9c building, separating ancillary use areas of high potential *fire hazard*; and

(b) doorways in walls referred to in C3D13 or C3D14 separating equipment or electrical supply systems; and

(c) doorway openings to *shafts* referred to in C4D14.

## E1D4 Sprinklers

A sprinkler system must—

(a) be installed in a building or part of a building when *required* by E1D5 to E1D13 as applicable; and

(b) comply with Specification 17 and Specification 18 as applicable.

**Notes**

(1) See Specification 5 for use of sprinklers in Class 2 buildings and *carparks* generally.

(2) See Part E2 for use of sprinklers to satisfy smoke hazard management provisions.

(3) See C2D13 and Specification 5 for use of sprinklers in buildings where C2D13 is applied.

## E1D5 Where sprinklers are required: all classifications

Sprinklers are *required* throughout the whole building if any part of the building has an *effective height* of more than 25 m~~—~~.

~~(a) including an *open-deck carpark* within a multi-classified building; but~~

~~(b) excluding—~~

~~(i) an *open-deck carpark* being a separate building; and~~

~~(ii) a Class 8 *electricity network substation*, with a *floor area* not more than 200 m$^2$, located within a multi-classified building.~~

**Limitations**

E1D5 does not apply to a Class 8 *electricity network substation* with a *floor area* not more than 200 m$^2$ located within a multi-classified building.

## E1D6 Where sprinklers are required: Class 2 and 3 buildings other than residential care buildings

(1) In a Class 2 or 3 building, or any multi-classified building containing a Class 2 or 3 part, sprinklers are *required* throughout the whole building if any part of the building has—

(a) a *rise in storeys* of 4 or more; and

(b) an *effective height* of not more than 25 m.

(2) The requirements of (1) do not apply to~~—a *residential care building.*~~

(a) a *residential care building*; and

~~(2)~~(b) a Class 8 *electricity network substation* with a *floor area* not more than 200 m$^2$ located within a multi-classified building.

*VIC E1D7*

## E1D7 Where sprinklers are required: Class 3 building used as a residential care building

Sprinklers are *required* throughout ~~a building containing~~—

(a) a Class 3 building used as a *residential care building*; and

(b) any *fire compartment* containing a Class 3 part used for residential care.

(a) A *floor area* of more than 3500 $m^2$.

(b) A *volume* of more than 21000 $m^3$.

## E1D9 Where sprinklers are required: Class 7a building, other than an open-deck carpark

In a Class 7a building~~, other than an *open-deck carpark*~~, sprinklers are *required* in *fire compartments* where—

(a) more than 40 vehicles are accommodated; or

(b) a carstacker is installed.

**Note**
A carstacker is a machine that stores 2 or more cars in a vertical arrangement such that one or more cars may not be accessible from floor level.

*NT E1D10*

## E1D10 Where sprinklers are required: Class 9a health-care building used as a residential care building and Class 9c buildings

(1) In a Class 9a *health-care building* used as a *residential care building*, sprinklers are *required* throughout the building and in any *fire compartment* containing a Class 9a part used for residential care.

(2) In a Class 9c building, sprinklers are *required* throughout the building and in any *fire compartment* containing a Class 9c part.

## E1D11 Where sprinklers are required: Class 9b buildings

(1) In a Class 9b building, other than an *early childhood centre*, see Part I1.

(2) In a Class 9b *early childhood centre* and in a building containing a Class 9b *early childhood centre*, sprinklers are *required* throughout the whole building, including any part of another class.

**Exemptions**
E1D11(2) does not apply to a Class 9b *early childhood centre*—

(a) wholly within a *storey* that provides direct egress to a road or *open space*; or

(b) with a *rise in storeys* of not more than 2, where the Class 9b *early childhood centre* is the only use in the building.

## E1D12 Where sprinklers are required: additional requirements

(1) For sprinkler requirements for *atriums*, see Part G3.

(2) For sprinkler requirements for large isolated buildings, see C3D4.

## E1D13 Where sprinklers are required: occupancies of excessive hazard

(1) In occupancies of excessive hazard, sprinklers are *required* in *fire compartments* where either of the following apply:

(a) A *floor area* of more than 2000 $m^2$.

(2) In addition to the *Deemed-to-Satisfy Provisions* of E2D3 to E2D13, the following specific *Deemed-to-Satisfy Provisions* apply to the following Class 6 and Class 9b buildings:

(a) For Class 6 buildings, in *fire compartments* more than 2000 $m^2$—

(i) not containing an enclosed common walkway or mall serving more than one Class 6 *sole-occupancy unit* — must comply with E2D14; or

(ii) containing an enclosed common walkway or mall serving more than one Class 6 *sole-occupancy unit* — must comply with E2D15.

(b) For Class 9b *assembly buildings*—

(i) nightclubs, discotheques and the like — must comply with E2D16; and

(ii) exhibition halls — must comply with E2D17; and

(iii) theatres and public halls — must comply with E2D18; and

(iv) theatres and public halls (not covered by E2D18) including lecture theatres and cinema/auditorium complexes — must comply with E2D19; and

(v) other *assembly buildings* (not listed in (i) to (iv)) excluding *schools* — must comply with E2D20.

(3) The smoke exhaust and *smoke-and-heat vent* provisions of this Part do not apply to any area not used by occupants for an extended period of time such as a storeroom with a *floor area* less than 30 $m^2$, *sanitary compartment*, plant room or the like.

## E2D3 General requirements

(1) An air-handling system which does not form part of a smoke hazard management system in accordance with E2D4 to E2D20 and which recycles air from one *fire compartment* to another *fire compartment* or operates in a manner that may unduly contribute to the spread of smoke from one *fire compartment* to another *fire compartment* must, subject to (2), be designed and installed—

(a) to operate as a ~~smoke control~~shutdown system in accordance with AS 1668.1; or

(b) such that it—

(i) incorporates smoke dampers where the air-handling ducts penetrate any elements separating the *fire compartments* served; and

(ii) is arranged such that the air-handling system is shut down and the smoke dampers are activated to close *automatically* by smoke detectors complying with clause 7.5 of AS 1670.1.

(2) For the purposes of (1), each *sole-occupancy unit* in a Class 2 or 3 building is treated as a separate *fire compartment*.

(3) Miscellaneous air-handling systems covered by Sections 5 and 6 of AS 1668.1 serving more than one *fire compartment* (other than a *carpark* ventilation system) and not forming part of a smoke hazard management system must comply with these Sections of the Standard.

(4) A smoke detection system must be installed in accordance with S20C6 to operate AS 1668.1 systems that are provided for zone pressurisation and *automatic* air pressurisation for fire-isolated *exits*.

## E2D4 Fire-isolated exits

(1) A part of a building listed in (2) must be provided with—

(a) an *automatic* air pressurisation system for fire-isolated *exits* in accordance with AS 1668.1; or

(b) open access ramps or balconies in accordance with D3D6.

(2) The requirements of (1) apply to—

(a) a *required fire-isolated stairway*, including any associated *fire-isolated passageway* or *fire-isolated ramp* serving—

(i) any *storey* above an *effective height* of 25 m; or

(ii) more than 2 below ground *storeys*, not counted in the *rise in storeys* in accordance with C2D3; or

must meet the requirements of (2).

(2) A building referred to in (1) must be provided with—

(a) in each *required fire-isolated stairway*, including any associated *fire-isolated passageway* or *fire-isolated ramp*, an *automatic* air pressurisation system for fire-isolated *exits* in accordance with AS 1668.1; or

(b) a zone pressurisation system between vertically separated *fire compartments* in accordance with AS 1668.1, if the building has more than one *fire compartment*; or

(c) an *automatic* smoke detection and alarm system complying with Specification 20; or

(d) a sprinkler system (other than a FPAA101D or FPAA101H system) complying with Specification 17.

(3) For the purposes of (2), vertically separated *fire compartments* are *fire compartments* above and below each other, and not *fire compartments* within the same *storey*.

*NSW E2D10*

## E2D10 Buildings not more than 25 m in effective height: large isolated buildings subject to C3D4

(1) In a Class 7 or 8 building of not more than 25 m in *effective height*, and which does not exceed 18 000 $m^2$ in *floor area* nor exceed 108 000 $m^3$ in *volume*, the building must be provided with—

(a) a sprinkler system complying with Specification 17, and provided with perimeter vehicular access complying with C3D5(2); or

(b) an *automatic* fire detection and alarm system complying with AS 1670.1 and monitored in accordance with S20C8; or

(c) an *automatic* smoke exhaust system in accordance with Specification 21; or

(d) *automatic smoke-and-heat vents* in accordance with Specification 22; or

(e) natural smoke venting, with ventilation openings distributed as evenly as practicable and comprising permanent openings at roof level with a free area not less than 1.5% of *floor area* and low level openings which may be permanent or readily openable with a free area not less than 1.5% of *floor area*.

(2) In a Class 5, 6, 7, 8 or 9 building of not more than 25 m in *effective height*, and which exceeds 18 000 $m^2$ in *floor area* or 108 000 $m^3$ in *volume*, the building must be provided with—

(a) if the ceiling height of the *fire compartment* is not more than 12 m—

(i) an *automatic* smoke exhaust system in accordance with Specification 21; or

(ii) *automatic smoke-and-heat vents* in accordance with Specification 22; or

(b) if the ceiling height of the *fire compartment* is more than 12 m, an *automatic* smoke exhaust system in accordance with Specification 21.

(3) For the purposes of (1) and (2), reference to 'the building' being provided with specified measures, means to the nominated classes within the building.

**Notes**

(1) Refer to E2D14 to E2D20 for specific provisions applicable to a Class 6 (in a *fire compartment* having a *floor area* of more than 2000 $m^2$) and Class 9b building or part of a building.

(2) Refer to E2D5 and E2D8 where a Class 5, 6, 7b, 8 and 9b building contains a Class 2, 3 or 4 part.

## E2D11 Buildings not more than 25 m in effective height: Class 9a and 9c buildings

(1) A Class 9a *health-care building* or a Class 9c building, or a building containing a part thereof, which is not more than 25 m in *effective height*, must be provided throughout with—

(a) an *automatic* smoke detection and alarm system complying with Specification 20; and

(b) *automatic* shutdown of any air-handling system which does not form part of a zone pressurisation system (other than individual room units with a capacity not more than 1000 L/s, systems serving critical treatment areas and ~~miscellaneous exhaust air systems~~ventilation systems installed in accordance with Sections 5 and 6 of AS 1668.1) on the activation of—

(i) smoke detectors installed in accordance with (a); and

(ii) any other installed fire detection and alarm system including a sprinkler system complying with Specification 17; and

(c) in a building having a *rise in storeys* of more than 2 and not more than 25 m *effective height* (not being a Class 9c building)—

(i) a zone pressurisation system between vertically separated *fire compartments* in accordance with AS 1668.1; or

(ii) a sprinkler system complying with Specification 17 throughout with residential sprinkler heads in *patient care areas*.

(2) For the purposes of (1), 'vertically separated *fire compartments*' are *fire compartments* above and below each other, and not *fire compartments* within the same *storey*.

**Notes**

Refer to S11C2 for the provisions for smoke dampers.

## E2D12 Class 7a buildings

A Class 7a building, including a basement, provided with a mechanical ventilation system in accordance with AS 1668.2, must operate the car ventilation system in fire mode in accordance with~~comply with clause 5.5 of~~ AS 1668.1.

## E2D13 Basements (other than Class 7a buildings)

(1) A basement, other than a Class 7a basement, not counted in the *rise in storeys* in accordance with C2D3, must—

(a) comply with measures in accordance with this Part applicable to the building generally; and

(b) where the basement has a total *floor area* of more than 2000 $m^2$, be provided with—

(i) if not more than 2 below ground *storeys*—

(A) a zone pressurisation system between vertically separated *fire compartments* in accordance with AS 1668.1, if the basement has more than one *fire compartment*; or

(B) an *automatic* smoke detection and alarm system complying with Specification 20; or

(C) a sprinkler system (other than a FPAA101D or FPAA101H system) complying with Specification 17; or

(ii) if more than 2 below ground *storeys*, a sprinkler system (other than a FPAA101D or FPAA101H system) complying with Specification 17.

(2) For the purposes of (1), 'vertically separated *fire compartments*' are *fire compartments* above and below each other, and not *fire compartments* within the same *storey*.

**Notes**

(1) Refer to E2D14 to E2D20 for specific provisions applicable to a Class 6 (in a *fire compartment* having a *floor area* of more than 2000 $m^2$) and Class 9b building or part of a building.

(2) Basements with more than 3 below ground *storeys* or containing Class 6 or 9b occupancies with a large number of occupants may require special consideration in accordance with E2D21.

(a) is a *school* assembly, church or community hall, and has a *stage* and any *backstage* area with a total *floor area* of more than 300 $m^2$; or

(b) is not a *school* assembly, church or community hall, and has a *stage* and any *backstage* area with a total *floor area* of more than 200 $m^2$; or

(c) has a *stage* with an associated rigging loft.

(2) A building or part of a building referred to in (1) must be provided with—

(a) an *automatic* smoke exhaust system complying with Specification 21; or

(b) if the building is single *storey*, *automatic smoke-and-heat vents* complying with Specification 22.

*NSW E2D19*

## E2D19 Class 9b – assembly buildings: theatres and public halls (not listed in E2D18) including lecture theatres and cinema/auditorium complexes

(1) This clause applies to a Class 9b *assembly building* where the building or part of the building is used as a theatre or public hall not listed in E2D18 and includes lecture theatres and cinema/auditorium complexes.

(2) A building or part of a building referred to in (1)—

(a) must be provided with *automatic* shutdown of any air-handling system (other than miscellaneous exhaust air systems installed in accordance with Sections 5 and 6 of AS 1668.1) which does not form part of the smoke hazard management system, on the activation of—

(i) smoke detectors installed complying with Specification 20; and

(ii) any other installed fire detection and alarm system, including a sprinkler system complying with Specification 17; and

(b) other than in the case of a *school* lecture theatre, where the *floor area* of the Class 9b part of a~~the~~ *fire compartment* is more than 2000 $m^2$~~—~~, the Class 9b building or part must be provided with—

(i) an *automatic* smoke exhaust system complying with Specification 21; or

(ii) if the building is single *storey*, *automatic smoke-and-heat vents* complying with Specification 22; or

(iii) if the *floor area* of the *fire compartment* is not more than 5000 $m^2$ and the building has a *rise in storeys* of not more than 2—

(A) an *automatic* smoke detection and alarm system complying with Specification 20; or

(B) a sprinkler system (other than a FPAA101D or FPAA101H system) complying with Specification 17.

*NSW E2D20*

## E2D20 Class 9b assembly buildings: other assembly buildings (not listed in E2D16 to E2D19)

(1) The requirements of (2)—

(a) apply to a Class 9b *assembly building* where the building or part of the building is used for a purpose other than—

(i) as described in E2D16 to E2D19; or

(ii) a *school*; and

(b) do not apply to—

(i) sporting complexes (including sports halls, gymnasiums, *swimming pools*, ice and roller rinks, and the like) other than an indoor sports stadium with total spectator seating for more than 1000; or

(ii) churches and other places used solely for religious worship.

(2) Each *fire compartment*, other than one in a building referred to in (1)(b), where the~~having a~~ *floor area* of the Class 9b part is more than 2000 $m^2$ must be provided with—

(a) an *automatic* smoke exhaust system complying with Specification 21; or

(b) if the building is single *storey*, *automatic smoke-and-heat vents* complying with Specification 22; or

(c) if the *floor area* of the *fire compartment* is not more than 5000 $m^2$ and the building has a *rise in storeys* of not more than 2—

(i) an *automatic* smoke detection and alarm system complying with Specification 20; or

(ii) a sprinkler system (other than a FPAA101D or FPAA101H system) complying with Specification 17.

(3) A building containing a Class 9b *early childhood centre* must be provided with an *automatic* smoke detection and alarm system complying with Specification 20 throughout the whole building, including any part of another class.

## E2D21 Provision for special hazards

Additional smoke hazard management measures may be necessary due to the—

(a) special characteristics of the building; or

(b) special function or use of the building; or

(c) special type or quantity of materials stored, displayed or used in a building; or

(d) special mix of classifications within a building or *fire compartment*,

which are not addressed in E2D4 to E2D20.

*SA E2D22*

(b) be provided via a sound system complying with the relevant provisions of AS 1670.4; and

(c) have a flashing warning sign installed in accordance with AS 1670.4 displaying the words “do not use lift”.

## Deemed-to-Satisfy Provisions

### E3D1 Deemed-to-Satisfy Provisions

(1) Where a *Deemed-to-Satisfy Solution* is proposed, *Performance Requirements* E3P1 to E3P4 are satisfied by complying with—

(a) E3D2 to E3D12; and

(b) for a building containing an *occupiable outdoor area*, Part G6; and

(c) for public transport buildings, Part I2.

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

### E3D2 Lift installations

An *electric passenger lift* installation and an *electrohydraulic passenger lift* installation must comply with Specification 24.

### E3D3 Stretcher facility in lifts

(1) A stretcher facility in accordance with (2) must be provided—

(a) in at least one emergency lift *required* by E3D5; or

(b) where an emergency lift is not *required*, if passenger lifts are installed to serve any storey above an *effective height* of 12 m, in at least one of those lifts to serve each floor served by the lifts.

(2) A stretcher facility must accommodate a raised stretcher with a patient lying on it horizontally by providing a clear space not less than 600 mm wide x 2000 mm long x 1400 mm high above the floor level.

### E3D4 Warning against use of lifts in fire

(1) A warning sign must be displayed where it can be readily seen near every call button for a passenger lift or group of lifts throughout a building.

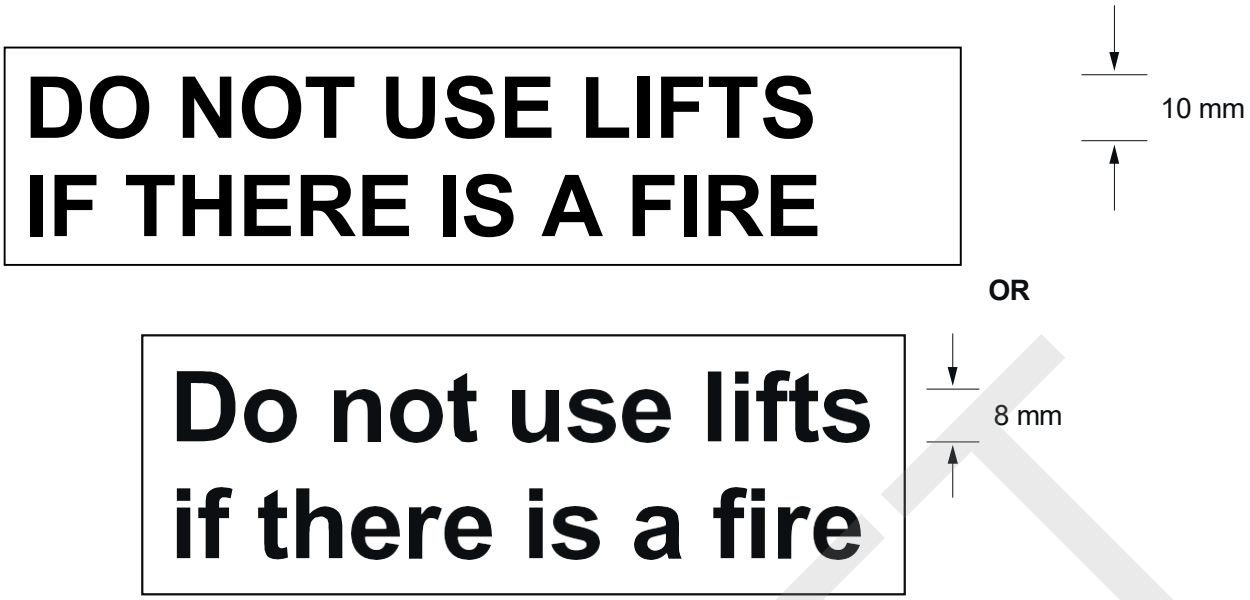
(2) The requirements of (1) do not apply to a small lift such as a dumb-waiter or the like that is for the transport of goods only.

(3) Each warning sign *required* by (1) must comply with the details and dimensions of Figure E3D4 and consist of—

(a) incised, inlaid or embossed letters in a colour contrasting with the background on a metal, wood, plastic or similar plate securely and permanently attached to the wall; or

(b) letters in a colour contrasting with the background, incised or inlaid directly into the surface of the material forming the wall.

**Figure E3D4: Warning sign for passenger lifts**




## E3D5 Emergency lifts

(1) At least one emergency lift complying with (4<u>5</u>) must be installed in—

(a) a building which has an *effective height* of more than 25 m; and

(b) a Class 9a building in which *patient care areas* are located at a level that does not have direct egress to a road or *open space*.

(2) An emergency lift may be combined with a passenger lift and must serve those *storeys* served by the passenger lift so that all *storeys* of the building served by passenger lifts are served by at least one emergency lift.

~~(3)~~ Where <u>a *storey* is served by</u> two or more passenger lifts<u>, that *storey* must be served by at least two emergency lifts.</u> ~~are installed and serve the same *storeys*, excluding a lift that is within an *atrium*~~

<u>(3)</u> ~~and not contained wholly within a *shaft*—~~

~~(a) at least two emergency lifts must be provided to serve those *storeys*; and~~

~~(b) if located within different *shafts*, at least one emergency lift must be provided in each *shaft*.~~

<u>(4) Where a *storey* is served by two or more lift shafts, the emergency lifts *required* by (3) must not be provided in the same *shaft*.</u>

~~(4)~~<u>(5)</u> An emergency lift must—

(a) be contained within a *fire-resisting shaft* in accordance with C3D11; and

(b) in a Class 9a building serving a *patient care area*—

(i) have minimum dimensions, measured clear of all obstructions, including handrails, etc complying with Table E3D5; and

(ii) be connected to a standby power supply system where installed; and

(c) if the building has an *effective height* of more than 75 m, have a rating of at least—

(i) 600 kg if not provided with a stretcher facility; or

(ii) 900 kg if provided with a stretcher facility.

**Table E3D5: Minimum emergency lift dimensions in Class 9a buildings**

| Lift component | Minimum dimension (mm) |
|---|---|
| Minimum depth of car | 2280 |
| Minimum width of car | 1600 |

| Lift component | Minimum dimension (mm) |
|---|---|
| Minimum door height | 2100 |
| Minimum door width | 1300 |

## E3D6 Landings

Access and egress to and from lift well landings must comply with Parts D2, D3 and D4.

## E3D7 Passenger lift types and their limitations

(1) In an *accessible* building, every passenger lift must be one of the following lift types, subject to the limitations (if any) of each lift type:

(a) There are no limitations on the use of *electric passenger lifts*, *electrohydraulic passenger lifts* or *inclined lifts*.

(b) *Stairway platform lifts* must not—

(i) be used to serve a space in a building accommodating more than 100 persons calculated according to D2D18; or

(ii) be used in a high traffic public use area such as a theatre, cinema, auditorium, transport interchange, shopping centre or the like; or

(iii) be used where it is possible to install another type of passenger lift; or

(iv) connect more than 2 *storeys*; or

(v) where more than 1 stairway lift is installed, serve more than 2 consecutive *storeys*; or

(vi) when in the folded position, encroach on the minimum width of a stairway *required* by D2D8 to D2D11.

(c) A *low-rise platform lift* must not travel more than 1000 mm.

(d) A *low-rise, low-speed constant pressure lift* must not—

(i) for an enclosed type, travel more than 4 m; or

(ii) for an unenclosed type, travel more than 2 m; or

(iii) be used in a high traffic public use areas in buildings such as a theatre, cinema, auditorium, transport interchange, shopping complex or the like.

~~(e) A *small-sized, low-speed automatic lift* must not travel more than 12 m.~~

(2) A passenger lift referred to in (1) must not rely on a constant pressure device for its operation if the lift car is fully enclosed.

## E3D8 Accessible features required for passenger lifts

In an *accessible* building, every passenger lift must have the following features where applicable:

(a) A handrail complying with the provisions for a mandatory handrail in AS 1735.12 for all lifts except—

(i) a *stairway platform lift*; and

(ii) a *low-rise platform lift*.

(b) Lift floor dimensions of not less than 1400 mm wide x 1600 mm deep for all lifts which travel more than 12 m.

(c) Lift floor dimensions of not less than 1100 mm wide x 1400 mm deep for all lifts which travel not more than 12 m, except a *stairway platform lift*.

(d) Lift floor dimensions of not less than 810 mm wide x 1200 mm deep for a *stairway platform lift*.

(e) Minimum clear door opening complying with AS 1735.12 for all lifts except a *stairway platform lift*.

(f) Passenger protection system complying with AS 1735.12 for all lifts with power-operated doors.

(g) Lift landing doors at the upper landing for all lifts except a *stairway platform lift*.

(h) Lift car and landing control buttons complying with AS 1735.12 for all lifts except—

(i) a *stairway platform lift*; and

(ii) a *low-rise platform lift*.

(i) Lighting in accordance with AS 1735.12 for all enclosed lift cars.

(j) For all lifts serving more than 2 levels—

(i) automatic audible information within the lift car to identify the level each time the car stops; and

(ii) audible and visual indication at each lift landing to indicate the arrival of the lift car; and

(iii) audible information and audible indication *required* by (i) and (ii) is to be provided in a range of between 20 - 80 dB(A) at a maximum frequency of 1500 Hz.

(k) Emergency hands-free communication, including a button that alerts a call centre of a problem and a light to signal that the call has been received, for all lifts except a *stairway platform lift*.

## E3D9 Fire service controls

Where lifts serve any *storey* above an *effective height* of 12 m, the following must be provided:

(a) A fire service recall control switch complying with E3D11 for—

(i) a group of lifts; or

(ii) a single lift not in a group that serves the *storey*.

(b) A lift car fire service drive control switch complying with E3D12 for every lift.

## E3D10 Residential care buildings

(1) Where residents in a Class 9c *residential care building* are on levels which do not have direct access to a road or *open space*, the building must be provided with either—

(a) at least one lift to accommodate a stretcher in accordance with E3D3(2); or

(b) a ramp in accordance with AS 1428.1.

(2) The lift or ramp *required* by (1) must discharge at a level providing direct access to a road or *open space*.

## E3D11 Fire service recall control switch

(1) Each group of lifts must be provided with a single~~one~~ fire service recall control switch *required* by E3D9 that activates the fire service recall operation at (6).

(2) The switch *required* by (1) must—

(a) be located at the landing nominated by the *appropriate authority*; and

(b) be labelled “FIRE SERVICE” in indelible white lettering on a red background; and

(c) have two positions with an “OFF” and an “ON” position identified; and

(d) be operable only by the use of a key that is removable in either the “OFF” position or the “ON” position.

(3) Adhesive labels must not be used for compliance with (2)(b) and (c).

(4) The key in (2)(d) must be able to turn all fire service recall control switches in the building and must have a different key combination to other keys used for lifts in the building.

(5) The fire service recall operation must be activated by—

(a) switching the fire service recall control switch in (1) to “ON”; or

(b) a signal from a fire management system approved by the *appropriate authority*.

(6) The activation of the fire service recall operation at (5) must—

(a) cancel all registered car and landing calls; and

(b) inactivate all door reopening devices that may be affected by smoke; and

(c) ensure lift cars travelling toward the nominated floor continue to the nominated floor without stopping; and

(d) ensure lift cars travelling away from the nominated floor stop at or before the next available floor without opening the doors (either automatically or by the door open button), reverse direction and travel without stopping to the nominated floor; and

(e) for lifts stopped at a floor other than the nominated floor, close the doors and travel without stopping to the nominated floor; and

(f) ensure that lifts stay at the nominated floor with doors open; and

(g) permit all lifts to return to normal service if the fire service recall control switch at (1) is switched to the “OFF” position during or after the fire service recall operation.

(7) The requirements of (6) do not apply to lifts on inspection service or when the lift car fire service control switch *required* by E3D12 is in the “ON” position.

(8) Lifts having manual controls must signal an alert to the lift for the lift to return to the nominated floor containing the recall switch that activated the signal.

(9) A key required by (2)(d) must be stored within a secure enclosure in accordance with (10) and which is located at one of the following locations—

(a) if there is FDCIE, beside the FDCIE; or

(b) if there is no FDCIE—

(i) within the fire control centre; or

(ii) adjacent to the fire service recall switch.

(10) The secure enclosure in (9) must—

(a) be securely attached to the wall; and

(b) be openable using a device suitable for use by the fire brigade; and

(c) be labelled “FIRE SERVICE LIFT KEYS” in capital letters not less than 20 mm in height and in a colour contrasting with the background.

## E3D12 Lift car fire service drive control switch

(1) The lift car fire service drive control switch *required* by E3D9 must be activated from within the lift car.

(2) The switch must—

(a) be located between 600 mm and 1500 mm above the lift car floor; and

(b) be labelled “FIRE SERVICE” by indelible white lettering on a red background; and

(c) have two positions with an “OFF” and an “ON” position identified; and

(d) operate only by the use of a key that is removable in either the “OFF” position or the “ON” position.

(3) Adhesive labels must not be used for compliance with (2)(b) or (c).

(4) When the lift car fire service drive control switch at (1) is turned to the “ON” position, the lift must—

(a) not respond to the fire service recall control switch; and

(b) cancel all registered lift car and landing calls; and

(c) override all lift car call access control systems; and

(d) inactivate all door reopening devices that may be affected by smoke; and

(e) allow the registration of lift car call by lift car call buttons, however the lift doors must not close in response to the registration of lift car calls; and

(f) activate door closing by constant pressure being applied on the “door close” button unless the button is released before the doors are fully closed, in which case the doors must reopen and any registered lift car calls must be cancelled; and

(g) when the doors are closed, move the lift in response to registered lift car calls while allowing additional lift car calls to also be registered; and

(h) travel to the first possible floor in response to registered lift car calls and cancel all registered lift car calls after the lift stops; and

(i) ensure doors do not open automatically, rather by constant pressure being applied on the “door open” button unless the button is released before the doors are fully open, in which case the doors must re-close.

(5) The requirements of (4) do not apply to a lift operating on inspection service.

(6) A multi-deck lift installation must have systems in place that—

(a) are able to communicate to the fire officer that the fire service drive control switch will not operate until all decks have been cleared of passengers; and

(b) ensure there is an appropriate method of clearing all deck landings of passengers; and

(c) maintain all doors to deck landings not containing the fire service control switch closed and inoperative while the lift is on fire service drive control.

(7) A key required by (2)(d) must be stored in the enclosure *required* by E3D11(9).

## E4D7 Class 2 and 3 buildings and Class 4 parts: exemptions

E4D5 does not apply to—

(a) a Class 2 building in which every door referred to is clearly and legibly labelled on the side remote from the *exit* or balcony—

(i) with the word "EXIT" in capital letters 25 mm high in a colour contrasting with that of the background; or

(ii) by some other suitable method; and

(b) an entrance door of a *sole-occupancy unit* in a Class 2 or 3 building or Class 4 part of a building.

*SA E4D8*

## E4D8 Design and operation of exit signs

Every *required exit* sign must—

(a) comply with—

(i) AS/NZS 2293.1; or

(ii) for a passive photoluminescent *exit* sign, Specification 25; ~~and~~or

~~(ii)~~(iii) for a hybrid photoluminescent *exit* sign, SA TS 5367; and

(b) be clearly visible at all times when the building is occupied by any person having the right of legal entry to the building.

## E4D9 Emergency warning and intercom systems

An emergency warning and intercom system complying, where applicable, with AS 1670.4 must be installed—

(a) in a building with an *effective height* of more than 25 m; and

(b) in a Class 3 building having a *rise in storeys* of more than 2 and used as—

(i) the residential part of a primary or secondary *school*; or

(ii) accommodation for the aged, children or people with a disability; and

(c) in a Class 3 building used as a *residential care building*, except that the system—

(i) must be arranged to provide a warning for occupants; and

(ii) in areas used by the residents, may have its alarm adjusted in volume and content to minimise trauma consistent with the type and condition of residents; and

(d) in a Class 9a building having a *floor area* of more than 1000 $m^2$ or a *rise in storeys* of more than 2, and the system—

(i) must be arranged to provide a warning for occupants; and

(ii) in a *ward area*, may have its alarm adjusted in volume and content to minimise trauma consistent with the type and condition of patients; and

(e) in a Class 9b building—

(i) used as a *school* and having a *rise in storeys* of more than 3; or

(ii) used as a theatre, public hall, or the like, having a *floor area* more than 1000 $m^2$ or a *rise in storeys* of more than 2.

# Specification 17 Fire sprinkler systems

## S17C1 Scope

This Specification sets out requirements for the design and installation of fire sprinkler systems.

*VIC S17C2*

## S17C2 Application of automatic fire sprinkler standards

Subject to this Specification, an *automatic* fire sprinkler system must comply with—

(a) for all building classifications: AS 2118.1; or

(b) for a Class 2 or 3 building with an *effective height* of not more than 25 m and a *rise in storeys* of 4 or more: Specification 18 and the relevant provisions of this Specification as applicable; or

(c) for Class 5, 6, 7, 8, 9a (other than a *residential care building*) or 9b (other than a Class 9b *early childhood centre*) parts of a building with an *effective height* not more than 25 m, which also contains Class 2 or 3 parts: a sprinkler system in accordance with Specification 18 as for a Class 2 or 3 building and the relevant provisions of this Specification except—

(i) a FPAA101D sprinkler system cannot be used where the Class 5, 6, 7, 8, 9a (other than a *residential care building*) or 9b parts—

(A) contain more than 2 *storeys*; or

(B) are more than 25% of the total floor area of the building; or

(C) are located above the fourth *storey*; and

(ii) a FPAA101D or FPAA101H sprinkler system cannot be used where the Class 7a part ~~(other than an *open-deck carpark*)~~ accommodates more than 40 vehicles; or

(d) for a combined sprinkler and fire hydrant system: AS 2118.6; or

(e) for a Class 9a *health-care building* used as a *residential care building*: AS 2118.4 as applicable; or

(f) for a Class 2, 3 or 9c building: AS 2118.4 as applicable.

## S17C3 Separation of sprinklered and non-sprinklered areas

Where a part of a building is not protected with sprinklers, the sprinklered and non-sprinklered parts must be fire-separated with a wall or floor which must—

(a) comply with any specific requirement of the *Deemed-to-Satisfy Provisions* of the BCA; or

(b) where there is no specific requirement, comply with the relevant part of AS 2118, FPAA101D or FPAA101H.

## S17C4 Protection of openings

Any openings, including those for service penetrations, in construction separating sprinklered and non-sprinklered parts of a building, including the construction separating the areas nominated for omitted protection in AS 2118.1, must be protected in accordance with the *Deemed-to-Satisfy Provisions* of Part C4.

## S19C7 Construction of a fire control room

A fire control centre in a building more than 50 m in *effective height* must be in a separate room where—

(a) the enclosing construction is of concrete, masonry or the like, sufficiently impact resistant to withstand the impact of any likely falling debris, and with an FRL of not less than 120/120/120; and

(b) any material used as a finish, surface, lining or the like within the room complies with the requirements of Specification 7; and

(c) services, pipes, ducts and the like that are not directly *required* for the proper functioning of the fire control room do not pass through it; and

(d) openings in the walls, floors or ceiling which separate the room from the interior of the building are confined to doorways, ventilation and other openings for services necessary for the proper functioning of the facility.

## S19C8 Protection of openings in a fire control room

Openings permitted by S19C7 must be protected as follows:

(a) Openings for *windows*, doorways, ventilation, service pipes, conduits and the like, in an *external wall* of the building that faces a road or *open space*, must be protected in accordance with the *Deemed-to-Satisfy Provisions* of Part C4.

(b) Openings in the floors, ceilings and *internal walls* enclosing a fire control room must, except for doorways, be protected in accordance with the *Deemed-to-Satisfy Provisions* of Part C4.

(c) A door opening in the *internal walls* enclosing a fire-control room, must be fitted with a *self-closing* –/120/30 smoke sealed fire door.

(d) Openings associated with natural or mechanical ventilation must—

(i) not be made in any ceiling or floor immediately above or below the fire control room; and

(ii) be protected by a –/120/– fire damper if the opening is for a duct through a wall *required* to have an FRL, other than an *external wall*.

## S19C9 Doors to a fire control room

(1) *Required* doors to a fire control room must open into the room, be lockable and located so that persons using escape routes from the building will not obstruct or hinder access to the room.

(2) The fire control room must be accessible via two paths of travel—

(a) one from the front entrance of the building; and

(b) one direct from a public place or *fire-isolated passageway* which leads to a public place and has a door with an FRL of not less than –/120/30.

## S19C10 Size and contents of a fire control room

(1) A fire control room must contain—

(a) a Fire Indicator Panel and necessary control switches and visual status indication for all *required* fire pumps, smoke control fans and other *required* fire safety equipment installed in the building; and

(b) a telephone connected to the telecommunications network~~directly connected to an external telephone exchange~~; and

(c) a blackboard or whiteboard not less than 1200 mm wide x 1000 mm high; and

(d) a pin-up board not less than 1200 mm wide x 1000 mm high; and

(e) a raked plan layout table of a size suitable for laying out the plans provided under (f); and

(f) colour-coded, durable, tactical fire plans.

(2) In addition, a fire control room may contain—

(a) master emergency control panels, lift annunciator panels, remote switching controls for gas or electrical supplies and emergency generator backup; and

(b) building security, surveillance and management systems if they are completely segregated from all other systems.

(3) A fire control room must—

(a) have a *floor area* of not less than 10 $m^2$ and the length of any internal side must be not less than 2.5 m; and

(b) if only the minimum prescribed equipment is installed — have a net *floor area* of not less than 8 $m^2$ with a clear space of not less than 1.5 $m^2$ in front of the Fire Indicator Panel; and

(c) if additional equipment is installed — have an additional area of not less than 2 $m^2$ net *floor area* for each additional facility and a clear space of not less than 1.5 $m^2$ in front of each additional control or indicator panel; and

(d) be constructed such that the area *required* for any path of travel through the room to other areas is provided in addition to the requirements (b) and (c).

## S19C11 Ventilation and power supply for a fire control room

(1) A fire control room must be ventilated by—

(a) natural ventilation from a *window* or doorway in an *external wall* of the building which opens directly into the fire control room from a road or *open space*; or

(b) a pressurisation system that only serves the fire control room, and—

(i) is installed in accordance with AS 1668.1, except for clause 10.3, as though the room is a *fire-isolated stairway*; and

(ii) is activated *automatically* by operation of the fire alarm, or sprinkler system complying with Specification 17, installed in the building and manually by an over-riding control in the room; and

(iii) provides a flow of fresh air through the room of not less than 30 air changes per hour when the system is operating and any door to the room is open; and

(iv) has fans, motors and ductwork that form part of the system but not contained within the fire control room protected by enclosing construction with an FRL of not less than 120/120/120; and

(v) has any electrical supply to the fire control room or equipment necessary for its operation connected to the supply side of the main disconnection switch for the building.

(2) No openable devices, other than necessary doorways, pressure controlled relief louvres and *windows* that are openable by a key, must be constructed in the fire control room.

## S19C12 Sign for a fire control room

The external face of the door to the fire control room must have a sign with the words—

**FIRE CONTROL ROOM**

in letters not less than 50 mm high and of a colour which contrasts with that of the background.

## S19C13 Lighting for a fire control room

Emergency lighting in accordance with the *Deemed-to-Satisfy Provisions* of Part E4 must be provided in a fire control room, except that an illumination level of not less than 400 lux must be maintained at the surface of the plan table.

*corridors* and other internal public spaces.

(3) In a Class 9a *health-care building* provided with a smoke detection system, the following applies:

(a) Except as provided in (b)—

(i) photoelectric type smoke detectors must be installed in *patient care areas* and in paths of travel to *exits* from *patient care areas*; and

(ii) in areas other than *patient care areas* and paths of travel to *exits* from *patient care areas*, where the use of the area is likely to result in smoke detectors causing spurious signals, any other detector deemed suitable in accordance with AS 1670.1 may be installed in lieu of smoke detectors.

(b) The requirements of (a) do not apply where an area is protected with a sprinkler system complying with Specification 17, smoke detectors need not be installed where the use of the area is likely to result in spurious signals.

(c) Manual call points must be installed in *evacuation routes* so that no point on a floor is more than 30 m from a manual call point.

*VIC S20C4(4)*

(4) In a Class 9c building provided with a smoke detection system, the following applies:

(a) remote automatic indication of each zone must be given in each smoke compartment by means of—

(i) mimic panels with an illuminated display; or

(ii) annunciator panels with alpha numeric display; and

(b) if the building accommodates more than 20 residents, manual call points must be installed in paths of travel so that no point on a floor is more than 30 m from a manual call point.

## S20C5 Combined smoke alarm and smoke detection system

(1) A Class 2 or 3 building or Class 4 part of a building provided with a combination of a smoke alarm system and smoke detection system in accordance with S20C2 must—

(a) be provided with a smoke alarm system complying with S20C3 within *sole-occupancy units*; and

(b) subject to (2), be provided with a smoke detection system complying with S20C4 in areas not within *sole-occupancy units*.

(2) In a Class 2 or 3 building or Class 4 part of a building protected with a sprinkler system complying with Specification 17 (other than a FPAA101D or FPAA101H system), smoke detectors are not *required* in *public corridors* and other internal public spaces.

## S20C6 Smoke detection for smoke control systems

(1) Smoke detectors *required* to activate air pressurisation systems for fire-isolated *exits* and zone pressurisation systems must—

(a) be installed in accordance with Section 7 of AS 1670.1; and

(b) have additional smoke detectors installed adjacent to each bank of lift landing doors set back horizontally from the door openings by a distance of not more than 3 m.

(2) Smoke detectors *required* to activate—

(a) *automatic* shutdown of air-handling systems in accordance with E2D16, E2D17 or E2D19; or

(b) a smoke exhaust system in accordance with Specification 21,

must comply with the requirements of (3).

(3) Smoke detectors referred to in (2) must—

(a) be spaced—

(i) not more than 20 m apart and not more than 10 m from any wall, bulkhead or smoke curtain; and

(ii) in enclosed malls and walkways in a Class 6 building not more than 15 m apart and not more than 7.5 m from any wall, bulkhead or curtain; and

(b) have a sensitivity—

(i) in accordance with Section 7 of AS 1670.1 in areas other than a multi-*storey* walkway and mall in a Class 6 building; and

(ii) not exceeding 0.5% smoke obscuration per metre with compensation for external airborne contamination as necessary, in a multi-*storey* walkway and mall in a Class 6 building.

(4) Smoke detectors provided to activate a smoke control system must—

(a) either—

(i) form part of a building fire or smoke detection system complying with AS 1670.1; or

(ii) be a separate dedicated system incorporating control and indicating equipment complying with AS 1670.1; and

(b) activate a building occupant warning system complying with S20C7, except that smoke detectors provided solely to initiate *automatic* shutdown of air-handling systems in accordance with (2)(a) need not activate a building occupant warning system.

## S20C7 Building occupant warning system

Subject to E4D9, a building occupant warning system provided as part of a smoke hazard management system must comply with clause 3.22 of AS 1670.1 to sound through all occupied areas except—

(a) in a Class 2 and 3 building or Class 4 part of a building provided with a smoke alarm system in accordance with S20C3(2)(c)—

(i) the sound pressure level need not be measured within a *sole-occupancy unit* if a level of not less than 85 dB(A) is provided at the door providing access to the *sole-occupancy unit*; and

(ii) the inbuilt sounders of the smoke alarms may be used to wholly or partially meet the requirements; and

(b) in a Class 2 and 3 building or Class 4 part of a building provided with a smoke detection system in accordance with S20C4(2), the sound pressure level from a building occupant warning system need not be measured within a *sole-occupancy unit* if a level of not less than 100 dB(A) is provided at the door providing access to the *sole-occupancy unit*; and

(c) in a Class 3 building used as a *residential care building*, the system—

(i) must be arranged to provide a warning for occupants; and

(ii) in areas used by residents, may have its alarm adjusted in volume and content to minimise trauma consistent with the type and condition of residents; and

(d) in a Class 9a *health-care building*, in a *patient care area*, the system—

(i) must be arranged to provide a warning for occupants; and

(ii) in a *ward area*, may have its alarm adjusted in volume and content to minimise trauma consistent with the type and condition of the patients; and

(e) in a Class 9c building, the system—

(i) must be arranged to provide a warning for occupants; and

(ii) must notify staff caring for the residents of the building; and

(iii) in areas used by residents, may have its alarm adjusted in volume and content to minimise trauma consistent with the type and condition of residents.

*NSW S20C8*

*VIC S20C8*

operation.

## S21C4 Smoke reservoirs

(1) A *fire compartment* must be divided at ceiling level into smoke reservoirs formed by smoke baffles/curtains of *non-combustible* and non-shatterable construction.

(2) The horizontal area of a smoke reservoir must not exceed 2000 $m^2$ and in enclosed walkways and malls of a Class 6 building must not exceed 60 m in length.

(3) Smoke reservoirs must be of sufficient depth to contain the smoke layer and must not be less than 500 mm below an imperforate ceiling or roof.

(4) Within a multi-*storey fire compartment*—

(a) a *non-combustible* bulkhead or smoke baffle/curtain must be provided around the underside of each opening into a building void to minimise the spread of smoke to other *storeys*; and

(b) the depth of the bulkhead or smoke baffle must be not less than the depth of the smoke reservoir provided under (3) plus an additional 400 mm.

## S21C5 Smoke exhaust fan and vent location

Smoke exhaust fans and vents must be located—

(a) such that each smoke reservoir is served by one or more fans with the maximum exhaust rate at any one point limited to avoid extracting air from below the smoke layer; and

(b) to prevent the formation of stagnant regions resulting in excessive cooling and downward mixing of smoke; and

(c) at natural collection points for the hot smoky gases within each smoke reservoir having due regard to the ceiling geometry and its effect on the migratory path of the smoke; and

(d) away from the intersection of walkways or malls; and

(e) to ensure that any voids containing escalators and/or stairs commonly used by the public are not used as a smoke exhaust path; and

(f) to discharge directly to outdoor with a velocity of not less than 5 m/s, at a suitable point not less than 6 m from any air intake point or *exit*.

## S21C6 Make-up air

(1) Low level make-up air must be provided either *automatically* or via permanent ventilation openings to replace the air exhausted so as to minimise—

(a) any disturbance of the smoke layer due to turbulence created by the incoming air; and

(b) the risk of smoke migration to areas remote from the fire due to the effect of make-up air on the air balance of the total system.

(2) The velocity of make-up air through doorways must not exceed 2.5 m/s.

(3) Within a multi-*storey fire compartment*, make-up air must be provided across each vertical opening from a building void to the fire-affected *storey* at an average velocity of 1 m/s so as to minimise the spread of smoke from the fire-affected *storey* to other *storeys*.

## S21C7 Smoke exhaust system control

(1) Each smoke exhaust fan must be activated sequentially by smoke detectors complying with Specification 20 and arranged in zones to match the smoke reservoir served by the fan(s).

(2) Subject to (3) and (4), an air handling system (other than individual room units less than 1000 L/s and ~~miscellaneous exhaust air~~ventilation systems installed in accordance with Sections 5 and 6 of AS 1668.1) which does not form part of the smoke hazard management system must be *automatically* shut down on the activation of the smoke exhaust system.

(3) In a single *storey fire compartment*, air handling systems in all non fire-affected zones may operate on 100% *outdoor air* to provide make-up air to the fire-affected zone.

(4) Within a multi-*storey fire compartment*, air handling systems in all non fire-affected zones and *storeys* must operate at 100% *outdoor air* to provide make-up air to the fire-affected *storey* via building voids connecting *storeys*.

(5) Manual override control and indication together with operating instructions for use by emergency personnel must be provided adjacent to the fire indicator panel in accordance with the control and indication requirements and the smoke control operating instructions ~~requirements of clauses 4.11 and 4.13~~ of AS 1668.1.

(6) Manual control for the smoke exhaust system must also be provided at a location normally used by the *stage* manager in a theatre.

(7) ~~Power supply wiring to exhaust fans together with detection, control, and indication circuits (and where necessary to *automatic* make-up air supply arrangements)~~Electrical systems must be installed in accordance ~~comply~~ with the requirements of AS 1668.1.

## S21C8 Smoke detection

A smoke detection system must be installed in accordance with Specification 20 to activate the smoke exhaust system.

# Specification 24 Lift installations

## S24C1 Scope

This Specification contains requirements for *electric passenger lift* installations and *electrohydraulic passenger lift* installations.

## S24C2 Lift cars exposed to solar radiation

(1) A lift car exposed to solar radiation directly, or indirectly by re-radiation, must have—

(a) mechanical ventilation at a rate of one air change per minute; or

(b) mechanical cooling.

(2) A 2 hour alternative power source for ventilation or mechanical cooling at (1) must be provided in the event of normal power loss.

## S24C3 Lift car emergency lighting

A lift car must have an emergency lighting system designed—

(a) to come on automatically upon failure of the normal lighting supply; and

(b) to provide at least 20 lux of lighting for 2 hours on the alarm initiation button.

## S24C4 Cooling of lift shaft

While a lift in a lift *shaft* is in service, the cooling of the lift *shaft* must—

(a) ensure that the dry bulb air temperature in the lift *shaft* does not exceed 40°C; and

(b) if the cooling is by a ventilation system, be provided with an air change rate determined using a temperature rise of no more than 5 K.

## S24C5 Lift foyer access

Where there is a security foyer in a building, access may be via locked security doors provided—

(a) security doors revert to the unlocked state in the event of—

(i) power failure; or

(ii) fire alarm; and

(b) locked foyer areas are monitored by closed circuit television and intercom system to a 24 hour staffed location.

## S24C6 Emergency access doors in ~~a single~~ enclosed lift shafts

(1) Where ~~a~~ lifts are~~is~~ installed in ~~a single~~ enclosed lift *shafts*, having a distance between normal landing entrances greater than ~~12.2~~11.0 m, emergency access doors must be provided and constructed as follows:

(a) The clear opening size of emergency doors must be not less than 600 mm wide x 2000~~980~~ mm high.

(b) Hinged doors must not open towards the interior of the lift *shaft*.

(c) Doors must be *self-closing* and self-locking.

(d) Doors must be marked on the landing side with the following words in letters not less than 35 mm high:

**DANGER LIFTWELL ACCESS**

**KEEP FURNITURE AND FIXTURES CLEAR**

(e) Doors from the landing side must only be openable by a tool.

(f) Each emergency door must be provided with a positive breaking electrical contact, wired into the control circuit to prevent movement of the lift until the emergency door is both closed and locked.

(2) Emergency egress from the lift car must be provided in single enclosed lift *shafts* where—

(a) ropes are installed; and

(b) the vertical distance between the lift car sill and the landing door head is less than 600 mm; and

(c) the counterweight is resting on its fully compressed buffer.

(3) Emergency egress *required* by (2) must be in the form of an interlocked door with clear opening dimensions not less than 600 mm x 600 mm, accessible from the lift car entrance or the lift car roof (where the door is located in the wall of the lift *shaft*).

# Specification 25 Passive photoluminescent exit signs

## S25C1 Scope

This Specification contains requirements for passive photoluminescent *exit* signs.

## S25C2 Application

A passive photoluminescent *exit* sign must comply with Section 5 and Appendix D of AS/NZS 2293.1, except where varied by this Specification.

## S25C3 Illumination

A passive photoluminescent *exit* sign must—

(a) be maintained in a continuously charged state by a minimum illumination of 100 lux at the face of the sign by a dedicated light source with a colour temperature not less than 4000 K; and

(b) in the event of a power failure, continue to provide a minimum luminance of 30 mcd/m$^2$ for not less than 90 minutes; and

(c) have its performance verified by testing in accordance with ASTM E2073-10, except the activation illumination in clause 8.3 is replaced with 54 lux.

## S25C4 Pictorial elements

Pictorial elements on a passive photoluminescent *exit* sign must—

(a) where the colour white is used, be replaced with a photoluminescent material; and

(b) be not less than 1.3 times larger than that specified in Table 5.1 of AS/NZS 2293.1; and

(c) have a border of photoluminescent material that extends not less than 15 mm beyond the pictorial elements.

## S25C5 Viewing distance

The maximum viewing distance in clause 5.6 of AS/NZS 2293.1 must not be more than 24 m.

## S25C6 Smoke control systems

Smoke control systems required by clause 5.3 of AS/NZS 2293.1 do not apply to a passive photoluminescent *exit* sign.

# Part F1 ~~Surface w~~Water management~~, rising damp and external~~

## Introduction to this Part

This Part is intended to minimise the risk of water leaking into or accumulating within a building and causing unhealthy conditions or damaging building elements by corrosion or rot. It is also intended to prevent water redirected away from the building damaging nearby properties.

## Objectives

### F1O1 Objective

The Objective of this Part is to—

(a) safeguard occupants from illness or injury and protect the building and its internal surfaces from damage caused by the entry of *water*; and~~—~~

~~(i) *surface water*; and~~

~~(ii) external moisture entering a building; and~~

~~(iii) the accumulation of internal moisture in a building; and~~

(b) protect *other property* from damage caused by redirected ~~*surface water*~~*water*.

## Functional Statements

### F1F1 Protection from ~~redirected surface~~ water

A building, including any associated *sitework*, is to be constructed in a way that protects people and *other property* from the adverse effects of ~~redirected *surface* *water*~~ including *water* that may enter the building and cause damage to internal surfaces.

### F1F2 Resistance to ~~rain, surface water~~rising damp and ground water

A building is to be constructed to provide resistance to moisture ~~penetrating from the outside, including rising~~ from the ground.

## Performance Requirements

**F1P1 Managing ~~rain~~water impact on the building and adjoining properties**

~~*Surface water*, resulting from a storm having an *annual exceedance probability* of 5% and which is collected or concentrated by a building or *sitework*, must be disposed of in a way that avoids the likelihood of damage or nuisance to any *other property*.~~

(1) *Water* collected or concentrated by a building, associated *sitework* or the *allotment*, must be redirected to a *drainage system* to prevent—

(a) unhealthy or dangerous conditions, or loss of amenity for occupants within the building; and

(b) undue damage to internal surfaces and other building elements; and

(c) undue damage or nuisance to other buildings and any *other property*.

(2) *Water* in (1) includes—

(a) *surface water*; and

(b) *sub-surface water*; and

(c) *rainwater*; and

(d) *stormwater*; and

(e) *rising damp*; and

(f) *water services overflow*; and

(g) *irrigation water*; and

(h) *groundwater*; and

(i) *surface water seepage*.

(3) *Water* resulting from a rain event with an *annual exceedance probability*, with a five-minute duration period, up to and including 5% collected or concentrated by a building, *sitework* or an *allotment* satisfies (1) if it is—

(a) disposed of in a way that avoids the likelihood of damage to the building; and

(b) conveyed through a drainage system to an appropriate outfall.

(4) *Water* resulting from a rain event having an *annual exceedance probability*, with a five-minute duration period, up to and including 1% collected or concentrated by building elements satisfies (1) if it does not enter the building.

(5) *Water* resulting from a rain event in (3) and (4), subject to wind action with an *annual exceedance probability*, up to and including 4% collected or concentrated by a building satisfies (1) if it is disposed of in a way that prevents—

(a) unhealthy or dangerous conditions, loss of amenity for occupants within the building; and

(b) undue damage to internal surfaces and other building elements.

**Notes**

For the purposes of F1P1(4)—

(a) building elements include roofs, balconies, podiums, attached awnings with box gutters and stormwater overflow systems; and

~~(a)~~(b) an *annual exceedance probability* of 5% can be applied to awnings and roofs with eaves gutters.

**Exemptions**

F1P1 does not apply to—

(a) *condensation*; or

(b) a *private garage*, tool shed, *sanitary compartment* or the like separate from, or forming part of, a building used for other purposes; or

~~(a)~~(c) parts of a building below the ground surface where an *appropriate authority* determines drainage is not permitted.

## F1P2 ~~Preventing rainwater from entering buildings~~Rising damp and ground water

~~*Surface water*, resulting from a storm having an *annual exceedance probability* of 1%, must not enter the building.~~

**~~Limitations~~**

~~F1P2 does not apply to—~~

~~(a) a Class 7 or 8 building where in the particular case there is no necessity for compliance; or~~

~~(b) a garage, tool shed, *sanitary compartment*, or the like, forming part of a building used for other purposes; or~~

~~(c)~~(a) ~~an *open spectator stand* or *open-deck carpark*.~~

*Rising damp* and *ground water* must be prevented from causing—

(a) undue dampness or deterioration of building elements; and

(b) unhealthy or dangerous conditions, or loss of amenity for occupants.

**Exemptions**

F1P2 does not apply to—

(a) *condensation*; or

(b) a *private garage*, tool shed, *sanitary compartment* or the like separate from, or forming part of, a building used for other purposes; or

(c) parts of a building below the ground surface where an *appropriate authority* determines drainage is not permitted.

## ~~F1P3 Rainwater drainage systems~~

~~A drainage system for the disposal of *surface water* resulting from a storm having an *annual exceedance probability* of—~~

~~(a) 5% must—~~

~~(i) convey *surface water* to an appropriate *outfall*; and~~

~~(ii) avoid *surface water* damaging the building; and~~

~~(b) 1% must avoid the entry of *surface water* into a building.~~

*SA F1P4*

## ~~F1P4 Rising damp~~

~~Moisture from the ground must be prevented from causing—~~

~~(a) undue dampness or deterioration of building elements; and~~

~~(b) unhealthy or dangerous conditions, or loss of *amenity* for occupants.~~

**~~Limitations~~**

~~F1P4 does not apply to—~~

~~(a) a Class 7 or 8 building where in the particular case there is no necessity for compliance; or~~

~~(b) a garage, tool shed, *sanitary compartment*, or the like, forming part of a building used for other purposes; or~~

~~(c) an *open spectator stand* or *open-deck carpark*.~~

## Verification Methods

### ~~F3V1~~F1V1 Weatherproofing

**Consultation draft note:**
With the consolidation of Parts F1 and F3 into a single part, Verification Method F3V1 has been relocated here.

To assist the reader, this relocated text has not been shown as 'new' text. Rather, the changes included illustrate the proposed changes for NCC 2025 to the previous text of F3V1 in NCC 2022.

(1) Compliance with ~~F3~~1~~P1~~F1P1 for weatherproofing of an *external wall* is verified when—

(a) a prototype passes the procedure described in (2); and

(b) the *external wall*—

(i) has a risk score of 20 or less, when the sum of all risk factor scores are determined in accordance with Table F3V1a; and

~~(ii) is not subjected to an ultimate limit state wind pressure of more than 2.5 kPa; and~~

~~(iii)~~(ii) includes only *windows* that comply with AS 2047.

(2) The test procedure referred to in (1)(a) must be as follows:

(a) The test specimen is in accordance with the requirements of (3).

(b) The test procedure is in accordance with the requirements of (4) or (5) as applicable.

(c) The test specimen does not fail the criteria in (6).

(d) The test is recorded in accordance with the requirements of (7).

(3) Test specimen: The test specimen must be a minimum of 2.4 m high and 2.4 m wide and incorporate—

(a) representative samples of openings and joints, including—

(i) vertical and horizontal control joints; and

(ii) wall junctions; and

(iii) *windows* or doors; and

(iv) electrical boxes; and

(v) balcony drainage and parapet flashings; and

(vi) footer and header termination systems; and

(b) for a *cavity wall*—

(i) a transparent material for a proportion of the internal wall lining (to provide an unobstructed view of the *external wall* cladding) with sufficient structural capability and similar air tightness to resist the applied wind pressures; and

(ii) a 15 mm diameter hole in the internal wall lining below a *window*.

(4) The test procedure for a *direct fix cladding wall* or *unique wall* must be as follows:

(a) Apply 100% positive and negative serviceability wind pressures to the external face of the test specimen for a period of not less than 1 minute each.

(b) Apply static pressure of either 300 Pa or 30% serviceability wind pressure, whichever is higher, in accordance with the water penetration test procedure at clause 8.5.2 of AS/NZS 4284.

(c) Apply cyclic pressure in accordance with—

(i) the three stages of Table ~~F3~~1~~V1b~~F1V1b; and

(ii) the water penetration test procedure at clause 8.6.2 of AS/NZS 4284.

(5) The test procedure for a *cavity wall* must be as follows:

(a) Apply 100% positive and negative serviceability wind pressures to the external face of the test specimen for a period of not less than 1 minute each.

(b) Apply static pressure of either 300 Pa or 30% serviceability wind pressure, whichever is higher, in accordance with the water penetration test procedure at clause 8.5.2 of AS/NZS 4284.

(c) Apply cyclic pressure in accordance with—

(i) stage 3 of Table ~~F3~~1~~V1b~~F1V1b and

(ii) the water penetration test procedure at clause 8.6.2 of AS/NZS 4284.

(d) To simulate the failure of the primary weather-defence or sealing, the following procedure must be applied to the test specimen:

(i) Insert 6 mm diameter holes through the external face of the *cavity wall* in all places specified below:

(A) Wall/*window* or wall/door junctions at ¾ height.

(B) Immediately above the head flashing.

(C) Through external sealing of the horizontal and vertical joints.

(D) Above any other penetration detail not covered by (A) to (C).

(ii) Repeat the static and cyclic pressure tests of (b) and (c).

(iii) Within 30 minutes of the completion of (ii), remove the internal lining of the *cavity wall* and check for compliance with (6).

(iv) With the internal lining removed, apply a final static pressure test at 50 Pa for a period of 15 minutes and check for compliance with (6).

(6) Compliance is determined as follows:

(a) A *direct fix cladding wall* and *unique wall* are verified for compliance with ~~F31P1~~F1P1 if there is no presence of water on the inside surface of the facade.

(b) A *cavity wall* is verified for compliance with ~~F31P1~~F1P1 if there is no presence of water on the removed surface of the *cavity*, except that during the simulation of the failure of the primary weather-defence or sealing, water may—

(i) transfer to the removed surface of the *cavity* due to the introduced defects (6 mm holes); and

(ii) contact, but not pool on, battens and other cavity surfaces.

(7) The test report must include the following information:

(a) Name and address of the person supervising the test.

(b) Test report number.

(c) Date of the test.

(d) Cladding manufacturer's name and address.

(e) Construction details of the test specimen, including a description, and drawings and details of the components, showing modifications, if any.

(f) Test sequence with the pressures used in all tests.

(g) For each of the static and cyclic pressure tests, full details of all leakages, including position, extent and timing.

**Table ~~F3V1a~~F1V1a: Risk factors and scores**

| Risk factor | Category | Risk severity | Score |
|---|---|---|---|
| Wind region | Region A0-5 (AS/NZS 1170.2) | Low to medium | 0 |
| | Region B1-2 (AS/NZS 1170.2) | | |
| | Region C (AS/NZS 1170.2) | High | 1 |
| | Region D (AS/NZS 1170.2) | Very high | 2 |
| Number of *storeys* | One *storey* | Low | 0 |
| | Two *storeys* in part | Medium | 1 |
| | Two *storeys* | High | 2 |
| | More than two *storeys* | Very high | 4 |
| Roof/wall junctions | Roof-to-wall junctions fully protected | Low | 0 |
| | Roof-to-wall junctions partially exposed | Medium | 1 |
| | Roof-to-wall junctions fully exposed | High | 3 |
| | Roof elements finishing within the boundaries formed by the *external walls* | Very high | 5 |
| Eaves width | More than 600 mm for single *storey* | Low | 0 |
| | 451-600 mm for single *storey* | Medium | 1 |
| | More than 600 mm for two *storey* | | |
| | 101-450 mm for single *storey* | High | 2 |

| Risk factor | Category | Risk severity | Score |
|---|---|---|---|
| | 451-600 mm for two *storey* | | |
| | More than 600 mm for above two *storey* | | |
| | 0-100 mm for single *storey* | Very high | 5 |
| | 0-450 mm for two *storey* | | |
| | Less than 600 mm for above two *storey* | | |
| Envelope complexity | Simple shape with single cladding type | Low | 0 |
| | Complex shape with not more than two cladding types | Medium | 1 |
| | Complex shape with more than two cladding types | High | 3 |
| | As for high risk but with fully exposed roof-to-wall junctions | Very high | 6 |
| Decks, porches and balconies | None | Low | 0 |
| | Timber slat deck or porch at ground level | | |
| | Fully covered in plan view by roof | Medium | 2 |
| | Timber slat deck attached at first or second floor level | | |
| | Balcony exposed in plan view at first floor level | High | 4 |
| | Balcony cantilevered at first floor level | | |
| | Balcony exposed in plan view at second floor level or above | Very high | 6 |
| | Balcony cantilevered at second floor level or above | | |

**Table Notes**

(1) Eaves width is measured horizontally from the external face of any wall cladding to the outer edge of any overhang, including fascia and external gutters.

(2) Barriers to prevent falling and parapets are considered as 0 mm eaves.

**Table ~~F3V1b~~F1V1b: Cyclic pressure**

| Stage number | Serviceability wind pressure (%) | |
|---|---|---|
| | Min | Max |
| 1 | 15 | 30 |
| 2 | 20 | 40 |
| 3 | 30 | 60 |

## Deemed-to-Satisfy Provisions

### F1D1 Deemed-to-Satisfy Provisions

*SA F1D1(1)*

(1) Where a *Deemed-to-Satisfy Solution* is proposed, *Performance Requirements* F1P1 ~~andto F1P42~~and F1P2 are satisfied by complying with F1D2 to ~~F1D8~~F1D15.

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

## F1D2 Application of Part

(1) ~~F1D4 and~~ F1D5, F1D6 and F1D7 do not apply to a roof with a covering complying with ~~F3D2~~F1D12(a) to (d).

(2) F1D3, ~~to~~ F1D5, F1D6, F1D7 and F1D10 do not apply to a balcony, podium or similar horizontal surface part of a building—

(a) where the flooring is of timber decking or other perforated flooring; or

(b) which is located directly above ground.

## F1D3 Stormwater drainage

Stormwater drainage must be designed and constructed in accordance with AS/NZS 3500.3.

**Explanatory Information**

Where stormwater drainage does not comply with F1D3, a *Performance Solution* is to be used to demonstrate compliance with the relevant *Performance Requirements*.

## F1D4 Provision of drainage and grading to external areas

(1) A concrete roof, balcony or similar part of a building must have—

(a) the *structural substrate* graded with a minimum fall of 1:80 to the floor drain, rainwater outlet or other drainage outlet; and

(b) a floor *drainage system*, rainwater outlet or other drainage outlet that is connected to a stormwater *drainage system* complying with F1D3.

(2) A concrete roof, balcony, podium, or similar part must have a minimum—

(a) 70 mm step down from the internal floor level to the external *structural substrate*; and

(b) 70 mm high integral hob around its perimeter; and

(c) F1D4(2)(b) does not apply where the external *structural substrate* abuts an external wall or door.

**Limitations**

F1D4(b) does not apply to floors of planter boxes.

**Notes**

For the purposes of this part, a tile bed, screed, topping, or similar component is not considered a *structural substrate* except within planter boxes where it can be used to achieve the minimum fall of 1:80.

## F1D5 Substrate materials

(1) In a building or part of a building, a roof, balcony, podium, or similar part of a building must have a *structural substrate* consisting of—

(a) concrete complying with AS 3600; or

(b) fibre cement sheeting manufactured in accordance with AS 2908.2.

(2) The surface of *structural substrates* in (1) must be free of any material or variation in finish that will affect the performance of a membrane.

## F1D46 Exposed joints

*Exposed joints* in the *drainage surface* on a roof, balcony, podium or similar horizontal surface part of a building must—

(a) be located on the ridge line or highest point of the *structural substrate*; and

(b) have a hob with a minimum height of 50 mm formed within the *structural substrate* for the full length of both sides of the *exposed joint*; and

~~(a)~~(c) be protected in accordance with Section 2.9 of AS 4654.2; and

~~(b)~~(d) not be located beneath or run through a planter box, water feature or similar part of the building.

**Notes**

For the purposes of F1D46, an exposed joint is a construction joint, control joint, expansion joint, contraction joint or movement joint and includes an exposed joint which is directly below a drainage surface.

~~**Explanatory Information: Location of exposed joints**~~

~~To minimise the potential of water ingress, the exposed joint should be located at a ridge or high point of the structural substrate, where possible.~~

~~**Explanatory Information: Exposed joints subject to excessive movement**~~

~~Where an exposed joint is subject to excessive movement, such as more than 10 mm, additional measures should be considered to ensure protection of the exposed joint. These additional measures may include use of a hob with a minimum height of 50 mm formed within the structural substrate for the full length of both sides of the exposed joint, and the exposed joint protected by a discontinuous *membrane* in accordance with Section 2.9 of AS 4654.2.~~

## F1D57 External waterproofing membranes

(1) A roof, balcony, podium or similar horizontal surface part of a building must be provided with a waterproofing membrane—

(a) consisting of materials complying with AS 4654.1; and

(b) designed and installed in accordance with AS 4654.2.

(2) Where a membrane *required* by (1) is applied to a concrete roof, balcony, podium or similar horizontal surface, the membrane must be installed directly on a *structural substrate* complying with F1D4(1)(a) and F1D5.

## F1D~~6~~8 Damp-proofing

(1) Except for a building covered by (3), moisture from the ground must be prevented from reaching—

(a) the lowest floor timbers and the walls above the lowest floor joists; and

(b) the walls above the *damp-proof course*; and

(c) the underside of a suspended floor constructed of a material other than timber, and the supporting beams or girders.

*SA F1D6(2)*

(2) Where a *damp-proof course* is provided, it must consist of—

(a) a material that complies with AS/NZS 2904; or

(b) impervious sheet material in accordance with AS 3660.1.

(3) The following buildings need not comply with (1):

~~(a) A Class 7 or 8 building where in the particular case there is no necessity for compliance.~~

~~(b)~~(a) A *~~private garage~~*~~garage~~, tool shed, *sanitary compartment*, or the like, separate from or forming part of a building used for other purposes.

~~(c)~~(b) An *open spectator stand* or *open-deck carpark*.

*SA F1D7*

## F1D~~7~~9 Damp-proofing of floors on the ground

(1) If a floor of a room is laid on the ground or on fill, moisture from the ground must be prevented from reaching the upper surface of the floor and adjacent walls by the insertion of a vapour barrier in accordance with AS 2870.

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

(a) weatherproofing is not *required*; or

(b) the floor is the base of a stair, lift or similar *shaft* which is adequately drained by gravitation or mechanical means.

## F1D10 Surface finishes

In a building or part of a building, the flooring or *surface finish* of a roof, balcony, terrace, podium, or similar part of a building must be—

(a) *self-draining*; or

(b) directly fixed to a membrane complying with F1D7.

**Limitations**

F1D10(a) does not apply to areas subject to vehicular traffic.

## F1D~~8~~11 Subfloor ventilation

(1) Subfloor spaces must—

(a) be provided with openings in *external walls* and internal subfloor walls in accordance with ~~Table F1D8~~Table F1D11 for the climatic zones given in ~~Figure F1D8~~Figure F1D11; and

(b) have clearance between the ground surface and the underside of the lowest horizontal member in the subfloor in accordance with ~~Table F1D8~~Table F1D11.

(2) In addition to (1), a subfloor space must—

(a) be cleared of all building debris and vegetation; and

(b) have the ground beneath the suspended floor graded to prevent *water*~~*surface water*~~ ponding under the building; and

(c) contain no dead air spaces; and

(d) have openings evenly spaced as far as practicable; and

(e) have openings placed not more than 600 mm in from corners.

(3) In double leaf masonry walls, openings specified in (1) must be provided in both leaves of the masonry, with openings being aligned to allow an unobstructed flow of air.

(4) Openings in internal subfloor walls specified in (1) must have an unobstructed area equivalent to that *required* for the adjacent external openings.

(5) Where the ground or subfloor space is excessively damp or subject to frequent flooding, in addition to the requirements

of (1) to (4)—

(a) the subfloor ventilation *required* in (1) must be increased by 50%; or

(b) the ground within the subfloor space must be sealed with an impervious *membrane*; or

(c) subfloor framing must be—

(i) where above ground, above-ground durability Class 1 or 2 timbers or H3 preservative treated timbers in accordance with AS 1684.2, AS 1684.3 or AS 1684.4; or

(ii) where in ground, in-ground durability Class 1 or 2 timbers or H5 preservative treated timbers in accordance with AS 1684.2, AS 1684.3 or AS 1684.4; or

(iii) steel in accordance with NASH Standard 'Residential and Low-Rise Steel Framing' Part 2.

**Table F1D~~8~~11: Subfloor openings and ground clearance**

| Climatic zone (see Figure F1D8) | Minimum aggregate subfloor ventilation openings without a *membrane* ($mm^2$/m of wall) | Minimum aggregate subfloor ventilation openings having the ground sealed with an impervious *membrane* ($mm^2$/m of wall) | Minimum ground clearance height where termite inspection or management system is not required (mm) | Minimum ground clearance height where termite inspection is required (mm) Note 1 |
|---|---|---|---|---|
| A | 2000 | 1000 | 150 | 400 |
| B | 4000 | 2000 | 150 | 400 |
| C | 6000 | 3000 | 150 | 400 |

**Table Notes**

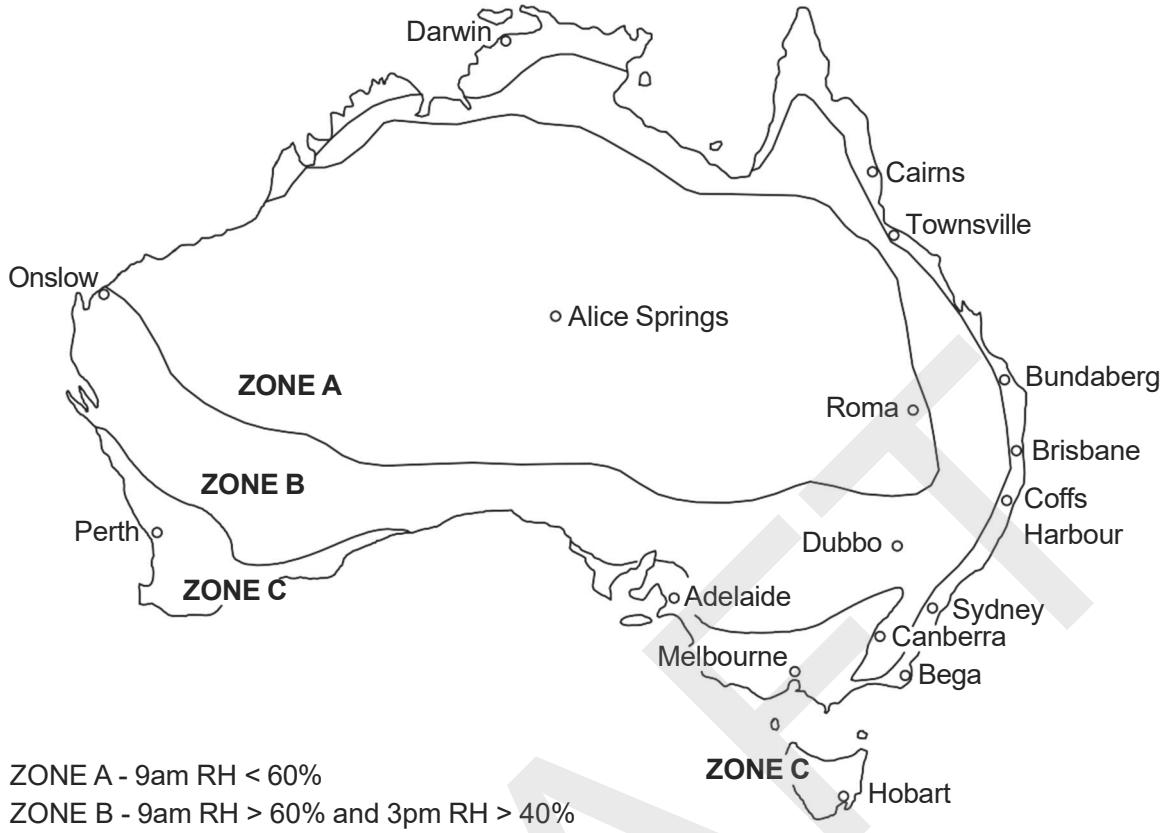
(1) 400 mm clearance *required* only where termite management systems are installed that need to be inspected (see B1D4).

(2) On sloping sites, the 400 mm clearance *required* by (1) may be reduced to 150 mm within 2 m of *external walls*.

(3) In situations where openings in *external walls* and internal subfloor walls are not able to be provided, additional measures must be provided to ensure that the overall level of ventilation of the subfloor space is maintained.

(4) Additional measures referred to in (3) may include measures similar to those in F1D~~8~~11(5), such as providing durability class timbers, or having the ground sealed in the subfloor space with an impervious *membrane*.

**Figure F1D~~8~~11: Climatic zones based on relative humidity**




ZONE A - 9am RH < 60%
ZONE B - 9am RH > 60% and 3pm RH > 40%
ZONE C - 9am RH > 70% and 3pm RH > 60%
RH = Relative Humidity

**Figure Notes**

The season with the highest relative humidity is used. Generally this will be July for southern Australia and January for northern Australia.

**Consultation draft note:**
Similar to F3V1, F3D2 to F3D5 have been relocated here but rather than show this relocated text as 'new' text, the changes included illustrate the proposed changes for NCC 2025 as compared to the previous text of F3D2 to F3D5 in NCC 2022.

## ~~F3D2~~F1D12 Roof coverings

A roof must be covered with—

(a) roof tiles complying with AS 2049, fixed in accordance with AS 2050; or

(b) metal sheet roofing complying with AS 1562.1; or

(c) plastic sheet roofing designed and installed in accordance with AS 1562.3; or

(d) terracotta, fibre-cement and timber slates and shingles designed and installed in accordance with AS 4597, except in cyclonic areas; or

(e) an external waterproofing membrane complying with F1D~~5~~7.

## ~~F3D3~~F1D13 Sarking

*Sarking-type material* used for weatherproofing of roofs and walls must comply with AS 4200.1 and AS 4200.2.

## ~~F3D4~~F1D14 Glazed assemblies

(1) Subject to (2) and (3), the following glazed assemblies in an external wall, must comply with AS 2047 requirements for resistance to water penetration:

(a) Windows.

(b) Sliding and swinging glazed doors with a frame, including French and bi-fold doors with a frame.

(c) Adjustable louvres.

(d) Shopfronts.

(e) Window walls with one piece framing.

(2) The following buildings need not comply with (1):

~~(a) A Class 7 or 8 building where in the particular case there is no necessity for compliance.~~

~~(b)~~(a) A *private garage*~~garage~~, tool shed, sanitary compartment, or the like, forming part of a building used for other purposes, except where the construction of the garage, tool shed, sanitary compartment or the like contributes to the weatherproofing of the other part of the building.

~~(c)~~(b) An open spectator stand or open-deck carpark.

(3) The following glazed assemblies need not comply with (1):

(a) All glazed assemblies not in an external wall.

(b) Revolving doors.

(c) Fixed louvres.

(d) Skylights, roof lights and windows in other than the vertical plane.

(e) Sliding and swinging glazed doors without a frame.

(f) Windows constructed on site and architectural one-off windows, which are not design tested in accordance with AS 2047.

(g) Second-hand windows, re-used windows and recycled windows.

(h) Heritage windows.

## ~~F3D5~~F1D15 Wall cladding

(1) External wall cladding must comply with one or a combination of the following:

(a) Masonry, including masonry veneer, unreinforced and reinforced masonry: AS 3700.

(b) Autoclaved aerated concrete: AS 5146.3.

(c) Metal wall cladding: AS 1562.1.

(2) The following buildings need not comply with (1):

~~(a) A Class 7 or 8 building where in the particular case there is no necessity for compliance.~~

~~(b)~~(a) A *private garage*~~garage~~, tool shed, sanitary compartment, or the like, forming part of a building used for other purposes, except where the construction of the garage, tool shed, sanitary compartment or the like contributes to the weatherproofing of another part of the building that is required to be weatherproofed.

~~(c)~~(b) An open spectator stand or open deck carpark.

# Part F3 Roof and wall cladding

## Introduction to this Part

This Part is intended to minimise the risk of water, including *surface water* and rainwater, entering the building and causing musty, damp and unhealthy conditions or damaging building elements by corrosion or other degradation. It is also intended to prevent water redirected away from the outside of the building damaging nearby properties.

## Objectives

### F3O1 Objective

[New for 2022]

The Objective of this Part is to—

(a) safeguard occupants from illness or injury and protect buildings from damage caused by—

(i) ingress of water from outside the building; and

(ii)(i) the accumulation of internal moisture in the building.

## Functional Statements

### F3F1 Roof and wall cladding

[New for 2022]

A building is to be constructed to prevent penetration of water from the outside.

## Performance Requirements

### F3P1 Weatherproofing

[2019: FP1.4]

A roof and *external wall* (including openings around *windows* and doors) must prevent the penetration of water that could cause—

(a) unhealthy or dangerous conditions, or loss of *amenity* for occupants; and

(b) undue dampness or deterioration of building elements.

**Limitations**

F3P1 does not apply to—

(a) a Class 7 or 8 building where in the particular case there is no necessity for compliance; or

(b) a garage, tool shed, *sanitary compartment*, or the like, forming part of a building used for other purposes; or

(c)(a) an *open spectator stand* or *open-deck carpark*.

## Verification Methods

## F3V1 Weatherproofing

[2019: FV1.1]

(8) Compliance with F3P1 for weatherproofing of an *external wall* is verified when—

(a) a prototype passes the procedure described in (2); and

(b) the *external wall*—

(i) has a risk score of 20 or less, when the sum of all risk factor scores are determined in accordance with Table F3V1a; and

(ii) is not subjected to an ultimate limit state wind pressure of more than 2.5 kPa; and

(iii) includes only *windows* that comply with AS 2047.

(9) The test procedure referred to in (1)(a) must be as follows:

(a) The test specimen is in accordance with the requirements of (3).

(b) The test procedure is in accordance with the requirements of (4) or (5) as applicable.

(c) The test specimen does not fail the criteria in (6).

(d) The test is recorded in accordance with the requirements of (7).

(10) Test specimen: The test specimen must incorporate—

(a) representative samples of openings and joints, including—

(i) vertical and horizontal control joints; and

(ii) wall junctions; and

(iii) *windows* or doors; and

(iv) electrical boxes; and

(v) balcony drainage and parapet flashings; and

(vi) footer and header termination systems; and

(b) for a *cavity wall*—

(i) a transparent material for a proportion of the internal wall lining (to provide an unobstructed view of the *external wall* cladding) with sufficient structural capability and similar air tightness to resist the applied wind pressures; and

(ii) a 15 mm diameter hole in the internal wall lining below a *window*.

(11) The test procedure for a *direct fix cladding wall* or *unique wall* must be as follows:

(a) Apply 100% positive and negative serviceability wind pressures to the external face of the test specimen for a period of not less than 1 minute each.

(b) Apply static pressure of either 300 Pa or 30% serviceability wind pressure, whichever is higher, in accordance with the water penetration test procedure at clause 8.5.2 of AS/NZS 4284.

(c) Apply cyclic pressure in accordance with—

(i) the three stages of Table F3V1b; and

(ii) the water penetration test procedure at clause 8.6.2 of AS/NZS 4284.

(12) The test procedure for a *cavity wall* must be as follows:

(a) Apply 100% positive and negative serviceability wind pressures to the external face of the test specimen for a period of not less than 1 minute each.

(b) Apply static pressure of either 300 Pa or 30% serviceability wind pressure, whichever is higher, in accordance with the water penetration test procedure at clause 8.5.2 of AS/NZS 4284.

(c) Apply cyclic pressure in accordance with—

(i) stage 3 of Table F3V1b; and

(ii) the water penetration test procedure at clause 8.6.2 of AS/NZS 4284.

(d) To simulate the failure of the primary weather-defence or sealing, the following procedure must be applied to the test specimen:

(i) Insert 6 mm diameter holes through the external face of the *cavity wall* in all places specified below:

(A) Wall/*window* or wall/door junctions at ¾ height.

(B) Immediately above the head flashing.

(C) Through external sealing of the horizontal and vertical joints.

(D) Above any other penetration detail not covered by (A) to (C).

(ii) Repeat the static and cyclic pressure tests of (b) and (c).

(iii) Within 30 minutes of the completion of (ii), remove the internal lining of the *cavity wall* and check for compliance with (6).

(iv) With the internal lining removed, apply a final static pressure test at 50 Pa for a period of 15 minutes.

(13) Compliance is determined as follows:

(a) A *direct fix cladding wall* and *unique wall* are verified for compliance with F3P1 if there is no presence of water on the inside surface of the facade.

(b) A *cavity wall* is verified for compliance with F3P1 if there is no presence of water on the removed surface of the *cavity*, except that during the simulation of the failure of the primary weather defence or sealing, water may—

(i) transfer to the removed surface of the *cavity* due to the introduced defects (6 mm holes); and

(ii) contact, but not pool on, battens and other cavity surfaces.

(14) The test report must include the following information:

(a) Name and address of the person supervising the test.

(b) Test report number.

(c) Date of the test.

(d) Cladding manufacturer's name and address.

(e) Construction details of the test specimen, including a description, and drawings and details of the components, showing modifications, if any.

(f) Test sequence with the pressures used in all tests.

(g) For each of the static and cyclic pressure tests, full details of all leakages, including position, extent and timing.

**Table F3V1a: Risk factors and scores**

| Risk factor | Category | Risk severity | Score |
|---|---|---|---|
| Wind region | Region A0-5 (AS/NZS 1170.2) | Low to medium | 0 |
| | Region B1-2 (AS/NZS 1170.2) | | |
| | Region C (AS/NZS 1170.2) | High | 1 |
| | Region D (AS/NZS 1170.2) | Very high | 2 |
| Number of *storeys* | One *storey* | Low | 0 |
| | Two *storeys* in part | Medium | 1 |
| | Two *storeys* | High | 2 |
| | More than two *storeys* | Very high | 4 |
| Roof/wall junctions | Roof-to-wall junctions fully protected | Low | 0 |
| | Roof-to-wall junctions partially exposed | Medium | 1 |
| | Roof-to-wall junctions fully exposed | High | 3 |
| | Roof elements finishing within the boundaries formed by the *external walls* | Very high | 5 |
| Eaves width | More than 600 mm for single *storey* | Low | 0 |
| | 451-600 mm for single *storey* | Medium | 1 |
| | More than 600 mm for two *storey* | | |
| | 101-450 mm for single *storey* | High | 2 |

| Risk factor | Category | Risk severity | Score |
|---|---|---|---|
| | 451-600 mm for two *storey* | | |
| | More than 600 mm for above two *storey* | | |
| | 0-100 mm for single *storey* | Very high | 5 |
| | 0-450 mm for two *storey* | | |
| | Less than 600 mm for above two *storey* | | |
| Envelope complexity | Simple shape with single cladding type | Low | 0 |
| | Complex shape with not more than two cladding types | Medium | 1 |
| | Complex shape with more than two cladding types | High | 3 |
| | As for high risk but with fully exposed roof-to-wall junctions | Very high | 6 |
| Decks, porches and balconies | None | Low | 0 |
| | Timber slat deck or porch at ground level | | |
| | Fully covered in plan view by roof | Medium | 2 |
| | Timber slat deck attached at first or second floor level | | |
| | Balcony exposed in plan view at first floor level | High | 4 |
| | Balcony cantilevered at first floor level | | |
| | Balcony exposed in plan view at second floor level or above | Very high | 6 |
| | Balcony cantilevered at second floor level or above | | |

**Table Notes**

(3) Eaves width is measured horizontally from the external face of any wall cladding to the outer edge of any overhang, including fascia and external gutters.

(4) Barriers to prevent falling and parapets are considered as 0 mm eaves.

**Table F3V1b: Cyclic pressure**

| Stage number | Serviceability wind pressure (%) | |
|---|---|---|
| | Min | Max |
| 1 | 15 | 30 |
| 2 | 20 | 40 |
| 3 | 30 | 60 |

## Deemed-to-Satisfy Provisions

### F3D1 Deemed-to-Satisfy Provisions

[New for 2022]

(2) Where a *Deemed-to-Satisfy Solution* is proposed, *Performance Requirement* F3P1 is satisfied by complying with F3D2 to F3D5.

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

## F3D2 Roof coverings

[2019: F1.5]

A roof must be covered with—

(a) roof tiles complying with AS 2049, fixed in accordance with AS 2050; or

(b) metal sheet roofing complying with AS 1562.1; or

(c) plastic sheet roofing designed and installed in accordance with AS 1562.3; or

(d) terracotta, fibre-cement and timber slates and shingles designed and installed in accordance with AS 4597, except in cyclonic areas; or

(e) an external waterproofing *membrane* complying with F1D5.

## F3D3 Sarking

[2019: F1.6]

*Sarking-type material* used for weatherproofing of roofs and walls must comply with AS 4200.1 and AS 4200.2.

## F3D4 Glazed assemblies

[2019: F1.13]

(4) Subject to (2) and (3), the following glazed assemblies in an *external wall*, must comply with AS 2047 requirements for resistance to water penetration:

(a) Windows.

(b) Sliding and swinging glazed doors with a frame, including French and bi-fold doors with a frame.

(c) Adjustable louvres.

(d) Shopfronts.

(e) Window walls with one piece framing.

(5) The following buildings need not comply with (1):

(a) A Class 7 or 8 building where in the particular case there is no necessity for compliance.

(b) A garage, tool shed, *sanitary compartment*, or the like, forming part of a building used for other purposes, except where the construction of the garage, tool shed, *sanitary compartment* or the like contributes to the weatherproofing of the other part of the building.

(c) An *open spectator stand* or *open-deck carpark*.

(6) The following glazed assemblies need not comply with (1):

(a) All glazed assemblies not in an *external wall*.

(b) Revolving doors.

(c) Fixed louvres.

(d) Skylights, roof lights and windows in other than the vertical plane.

(e) Sliding and swinging glazed doors without a frame.

(f) Windows constructed on site and architectural one-off windows, which are not design tested in accordance with AS 2047.

(g) Second-hand windows, re-used windows and recycled windows.

(h) Heritage windows.

## F3D5 Wall cladding

[New for 2022]

(3) External wall cladding must comply with one or a combination of the following:

(a) Masonry, including masonry veneer, unreinforced and reinforced masonry: AS 3700.

(b) Autoclaved aerated concrete: AS 5146.3.

(c) Metal wall cladding: AS 1562.1.

(4) The following buildings need not comply with (1):

(a) A Class 7 or 8 building where in the particular case there is no necessity for compliance.

(b) A garage, tool shed, *sanitary compartment*, or the like, forming part of a building used for other purposes, except where the construction of the garage, tool shed, *sanitary compartment* or the like contributes to the weatherproofing of another part of the building that is *required* to be weatherproofed.

(c) An *open spectator stand* or *open deck carpark*.

(2) Unless the premises are used predominantly by one sex, sanitary facilities must be provided on the basis of equal numbers of males and females.

(3) In calculating the number of sanitary facilities to be provided under F4D2 and F4D4, a unisex facility *required* for people with a disability (other than a facility provided under F4D12) may be counted once for each sex.

(4) For the purposes of this Part, a unisex facility comprises one closet pan, one washbasin and means for the disposal of sanitary products.

## F4D4 Facilities in Class 3 to 9 buildings

(1) Except where permitted by (3), (4), (7), F4D5(a), F4D5(b) and F4D12(1), separate sanitary facilities for males and females must be provided for Class 3, 5, 6, 7, 8 or 9 buildings in accordance with Tables F4D4a, F4D4b, F4D4c, F4D4d, F4D4e, F4D4f, F4D4g, F4D4h, F4D4i, F4D4j, F4D4k and F4D4l, as appropriate.

(2) In Tables F4D4a, F4D4b, F4D4c, F4D4d, F4D4e, F4D4f, F4D4g, F4D4h, F4D4i, F4D4j, F4D4k and F4D4l—

(a) 'Number' means the number of facilities *required*; and

(b) '>' means greater than; and

(c) a hyphen means no data (refer to the row above for the highest value applicable); and

(d) 'N/A' means not applicable; and

(e) a reference to—

(i) 'employees' includes owners and managers using the building; and

(ii) 'add 1 per 100 or 150, 250, 500, etc.' includes any part thereof of that number.

(3) If not more than 10 people are employed, a unisex facility may be provided instead of separate facilities for each sex.

(4) If the majority of employees are of one sex, not more than 2 employees of the other sex may share toilet facilities if the facilities are separated by means of walls, partitions and doors to afford privacy.

(5) Employees and the public may share the same facilities in a Class 6 and 9b building (other than a *school* or *early childhood centre*) provided the number of facilities provided is not less than the total number of facilities *required* for employees plus those *required* for the public.

(6) ~~Adequate means of disposal of sanitary products must be provided i~~In sanitary facilities for use by females~~.~~, the following must be provided:

(a) A dispenser for sanitary products.

~~(6)~~(b) Adequate means of disposal of sanitary products.

(7) Separate sanitary facilities for males and females need not be provided for patients in a *ward area* of a Class 9a building.

(8) A Class 9a *health-care building* must be provided with—

(a) one kitchen or other adequate facility for the preparation and cooking or reheating of food including a kitchen sink and washbasin; and

(b) laundry facilities for the cleansing and drying of linen and clothing or adequate facilities for holding and dispatch or treatment of soiled linen and clothing, sanitary products and the like and the receipt and storage of clean linen; and

(c) one shower for each 8 patients or part thereof; and

(d) one island-type plunge bath in each *storey* containing a *ward area*.

*VIC F4D4(9)*

(9) A Class 9b *early childhood centre* must be provided with—

(a) a kitchen or food preparation area with a kitchen sink, separate hand washing facilities, space for a refrigerator and space for cooking facilities, with—

(i) the facilities protected by a door or gate with child proof latches to prevent unsupervised access to the facilities by children younger than 5 years old; and

(ii) the ability to facilitate supervision of children from the facilities if the *early childhood centre* accommodates children younger than 2 years old; and

| User group | Facility type | Design occupancy | Number |
|---|---|---|---|
| Female spectators or patrons | Closet pans | 1 - 10 | 1 |
| | | 11 - 50 | 2 |
| | | >50 | Add 1 per 60 |
| | Washbasins | 1 - 80 | 1 |
| | | 81 - 250 | 2 |
| | | 251 - 430 | 3 |
| | | >430 | Add 1 per 200 |

**Table F4D4i: Sanitary facilities in Class 9b buildings – single auditorium theatres and cinemas**

| User group | Facility type | Design occupancy | Number |
|---|---|---|---|
| Male patrons | Closet pans | 1 - 50 | 0 |
| | | 51 - 250 | 1 |
| | | 251 - 500 | 2 |
| | | >500 | Add 1 per 500 |
| | Urinals | 1 - 50 | 0 |
| | | 51 - 100 | 1 |
| | | >100 | Add 1 per 100 |
| | Washbasins | 1 - 50 | 0 |
| | | 51 - 150 | 1 |
| | | >150 | Add 1 per 150 |
| Female patrons | Closet pans | 1 - 50 | 0 |
| | | 51 - ~~110~~75 | ~~3~~4 |
| | | 76 - 110 | 5 |
| | | 111 - 170 | ~~4~~6 |
| | | 171 - 230 | ~~5~~7 |
| | | 231 - 250 | ~~6~~9 |
| | | >250 | Add 1 per ~~8~~60 |
| | Washbasins | 1 - 50 | 0 |
| | | 51 - 150 | 1 |
| | | >150 | Add 1 per 150 |

**Table F4D4j: Sanitary facilities in Class 9b buildings – sports venues or the like**

| User group | Facility type | Design occupancy | Number |
|---|---|---|---|
| Male participants | Closet pans | 1 - 20 | 1 |
| | | >20 | Add 1 per 20 |
| | Urinals | 1 - 10 | 1 |
| | | >10 | Add 1 per 10 |
| | Washbasins | 1 - 10 | 1 |
| | | >10 | Add 1 per 10 |
| Female participants | Closet pans | 1 - 10 | 1 |
| | | >10 | Add 1 per 10 |
| | Washbasins | 1 - 10 | 1 |
| | | >10 | Add 1 per 10 |

## F4D11 Waste management

(1) In a Class 9a *health-care building*, at least one slop-hopper or other device, other than a water closet pan or urinal, must be provided—

(a) on any *storey* containing *ward areas* or bedrooms to facilitate emptying of containers of sewage or dirty water; and

(b) with a flushing apparatus, tap and grating.

(2) In a Class 9c building, the following facilities must be provided for every 60 beds or part thereof on each storey containing *resident use areas*:

(a) One slop-hopper or other device other than a water closet pan or urinal for the safe handling and disposal of liquid and solid wastes with a flushing apparatus, tap and grating.

(b) An appliance for the disinfection of pans or an adequate means to dispose of receptacles.

## F4D12 Accessible adult change facilities

(1) One unisex *accessible* adult change facility must be provided in an *accessible* part of a—

(a) Class 6 building that is a shopping centre having a design occupancy of not less than 3,500 people, calculated on the basis of the *floor area* and containing a minimum of 2 *sole-occupancy units*; and

(b) Class 9b sports venue or the like that—

(i) has a design occupancy of not less than 35,000 spectators; or

(ii) contains a *swimming pool* that has a perimeter of not less than 70 m and that is *required* by D4D2 to be *accessible*; and

(c) museum, art gallery or the like having a design occupancy of not less than 1,500 patrons; and

(d) theatre or the like having a design occupancy of not less than 1,500 patrons; and

(e) passenger use area of an airport terminal building within an airport that accepts domestic and/or international flights that are public transport services as defined in the Disability Standards for Accessible Public Transport 2002.

(2) *Accessible* adult change facilities *required* by (1)—

(a) must be constructed in accordance with Specification 27; and

(b) cannot be combined with another *sanitary compartment*.

(3) For the purposes of (1), design occupancy must be calculated in accordance with D2D18, but excluding any area that—

(a) can only be accessed by staff, employees, contractors, maintenance personnel and the like; or

(b) is subject to an exemption under D4D5.

*TAS F4D13*

*TAS F4D14*

*VIC F4D13*

**Explanatory Information: Cross-volume considerations**

NCC Volume Three contains a number of plumbing and drainage provisions which are relevant to facilities and the design of buildings. These include, but are not limited to, those listed in Table F4.

Some Volume Three provisions necessitate the inclusion of spaces in buildings for plumbing and *drainage* systems, as well as the ability to access concealed systems for the purposes of maintenance. Therefore, building designers should consider Volume Three provisions alongside those found in the BCA and co-ordinate with plumbing and *drainage* system designs where necessary.

**Table F4: Cross-volume considerations**

| Item | NCC Volume Three - Plumbing Code of Australia |
|---|---|
| Access for maintenance of plumbing and drainage | B1 Cold water services |
| | B2 Heated water services |
| | B3 Non-drinking water services |
| | C1 Sanitary plumbing systems |
| | C2 Sanitary drainage systems |
| | C3 On-site wastewater management |
| Heated water temperature control for facilities used for personal hygiene | B2 Heated water services |

## Deemed-to-Satisfy Provisions

*VIC F5D1*

### F5D1 Deemed-to-Satisfy Provisions

(1) Where a *Deemed-to-Satisfy Solution* is proposed, *Performance Requirement* F5P1 is satisfied by complying with—

(a) F5D2; and

(b) for *farm sheds*, Part I3.

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

### F5D2 Height of rooms and other spaces

(1) The height of rooms and other spaces in a Class 2 or 3 building or Class 4 part of a building must be not less than—

(a) for a kitchen, laundry, or the like — 2.1 m; and

(b) for a corridor, passageway or the like — 2.1 m; and

(c) for a *habitable room* excluding a kitchen — 2.4 m; and

(d) in a *habitable room*, or space within a *habitable room*, with a sloping ceiling or projections below the ceiling line—

(i) in an attic — a height of not less than 2.2 m for not less than two-thirds of the *floor area* of the room or space; and

(ii) in other rooms — a height of not less than 2.4 m for not less than two-thirds of the *floor area* of the room or space; and

(e) in a non-habitable room, or space within a non-habitable room, with a sloping ceiling or projections below the ceiling line — a height of not less than 2.1 m for not less than two-thirds of the *floor area* of the room or space.

(2) For the purposes of (1), when calculating the *floor area* of a room or space, any part that has a ceiling height of less than 1.5 m is not included.

(3) The height of rooms and other spaces in a Class 5, 6, 7 or 8 building must be not less than—

(a) except as allowed in (b) and (8) — 2.4 m; and

(b) for a corridor, passageway, or the like — 2.1 m.

(4) The height of rooms and other spaces in a Class 9a *health-care building* must be not less than—

(a) for a *patient care area* — 2.4 m; and

(b) for an operating theatre or delivery room — 3 m; and

(c) for a treatment room, clinic, waiting room, passageway, corridor, or the like — 2.4 m.

(5) The height of rooms and other spaces in a Class 9b building must be not be less than—

(a) for a *school* classroom or other *assembly building* or part that accommodates not more than 100 persons — 2.4 m; and

(b) for a theatre, public hall or other *assembly building* or part that accommodates more than 100 persons — 2.7 m; and

(c) for a corridor—

(i) that serves an *assembly building* or part that accommodates not more than 100 persons — 2.4 m; or

(ii) that serves an *assembly building* or part that accommodates more than 100 persons — 2.7 m.

(6) For the purposes of (5) the number of persons accommodated must be calculated according to D2D18.

(7) The height of rooms and other spaces in a Class 9c building must be not be less than—

(a) for a kitchen, laundry, or the like — 2.1 m; and

(b) for a corridor, passageway or the like — 2.4 m; and

(c) for a *habitable room* excluding a kitchen — 2.4 m.

(8) The height of rooms and other spaces in any building must be not be less than—

(a) for a bathroom, shower room, *sanitary compartment*, other than an *accessible* adult change facility, airlock, tea preparation room, pantry, store room, garage, car parking area, or the like — 2.1 m; and

(b) for a commercial kitchen — 2.4 m; and

(c) above a stairway, ramp (other than a *threshold ramp*), landing or the like — 2 m measured vertically above the nosing line of stairway treads or the floor surface of the ramp, landing or the like; and

(d) for a *required accessible* adult change facility — 2.4 m.

*VIC F5D3*

(2) The artificial lighting system must comply with AS/NZS 1680.0.

(3) The system may provide a lesser level of illumination to the following spaces during times when the level of lighting would be inappropriate for the use:

(a) A theatre, cinema or the like, when performances are in progress, with the exception of aisle lighting *required* by Part I1.

(b) A museum, gallery or the like, where sensitive displays require low lighting levels.

(c) A discotheque, nightclub or the like, where to create an ambience and character for the space, low lighting levels are used.

*NSW F6D6*

*SA F6D6*

## F6D6 Ventilation of rooms

A *habitable room*, office, shop, factory, workroom, *sanitary compartment*, bathroom, shower room, laundry and any other room or space, occupied by a person for any purpose must have—

(a) natural ventilation complying with ~~F6D7; or~~

(i) F6D7; or

~~(a)~~(ii) AS 1668.4; or

(b) a mechanical ventilation or air-conditioning system complying with AS 1668.2 and AS/NZS 3666.1.

**Exemptions**

F6D6 does not apply to rooms or spaces of a specialised nature occupied neither frequently nor for extended periods.

## F6D7 Natural ventilation

(1) Natural ventilation provided in accordance with F6D6(a) must consist of openings, *windows*, doors or other devices which can be opened—

(a) with a ventilating area not less than 5% of the *floor area* of the room *required* to be ventilated; and

(b) open to—

(i) a suitably sized court, or space open to the sky; or

(ii) an open verandah, carport, or the like; or

(iii) an adjoining room in accordance with F6D8.

(2) The requirements of (1)(a) do not apply to a Class 8 *electricity network substation*.

## F6D8 Ventilation borrowed from adjoining room

Natural ventilation to a room may come through a *window*, opening, door or other device from an adjoining room (including an enclosed verandah) if both rooms are within the same *sole-occupancy unit* or the enclosed verandah is common property, and—

(a) in a Class 2 building, a *sole-occupancy unit* of a Class 3 building or Class 4 part of a building—

(i) the room to be ventilated is not a *sanitary compartment*; and

(ii) the *window*, opening, door or other device has a ventilating area of not less than 5% of the *floor area* of the room to be ventilated; and

(c) the ventilating areas specified in (a) and (b) may be reduced as appropriate if direct natural ventilation is provided from another source.

## F6D9 Restriction on location of sanitary compartments

A *sanitary compartment* must not open directly into—

(a) a kitchen or pantry; or

(b) a public dining room or restaurant; or

(c) a dormitory in a Class 3 building; or

(d) a room used for public assembly (which is not an *early childhood centre*, primary *school* or *open spectator stand*); or

(e) a workplace normally occupied by more than one person.

## F6D10 Airlocks

If a *sanitary compartment* is prohibited under F6D9 from opening directly to another room—

(a) in a *sole-occupancy unit* in a Class 2 or 3 building or Class 4 part of a building—

(i) access must be by an airlock, hallway or other room; or

(ii) the *sanitary compartment* must be provided with mechanical exhaust ventilation; and

(b) in a Class 5, 6, 7, 8 or 9 building (which is not an *early childhood centre*, primary *school* or *open spectator stand*)—

(i) access must be by an airlock, hallway or other room with a *floor area* of not less than 1.1 $m^2$ and fitted with *self-closing* doors at all access doorways; or

(ii) the *sanitary compartment* must be provided with mechanical exhaust ventilation and the doorway to the room adequately screened from view.

## F6D11 Carparks

Every *storey* of a *carpark*, except an *open-deck carpark*, must have—

(a) a system of mechanical ventilation complying with AS 1668.2; or

(b) a system of natural ventilation complying with Section 4 of AS 1668.4.

## F6D12 Kitchen local exhaust ventilation

A commercial kitchen must be provided with a kitchen exhaust hood system complying with AS 1668.1 and AS 1668.2 where—

(a) any cooking apparatus has—

(i) a total maximum electrical power input exceeding 8 kW; or

(ii) a total gas power input exceeding 29 MJ/hour; or

(b) the total maximum power input to more than one apparatus exceeds, per $m^2$ of *floor area* of the room or enclosure—

(i) 0.5 kW electrical power; or

(ii) 1.8 MJ/hour gas.

# Part F8 Condensation management

## Introduction to this Part

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

~~**Notes**~~

~~From 1 May 2023 to 30 September 2023 Part F6 of NCC 2019 Volume One Amendment 1 may apply instead of Part F8 of NCC 2022 Volume One. From 1 October 2023 Part F8 of NCC 2022 Volume One applies.~~

## Objectives

### F8O1 Objective

[2019: FO6]

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

**Applications**

F8O1 only applies to a *sole-occupancy unit* of a Class 2, 3, or 9c building or Class 4 part of a building.

## Functional Statements

### F8F1 Condensation

[2019: FF6.1]

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

**Applications**

F8F1 only applies to a *sole-occupancy unit* of a Class 2, 3, or 9c building or Class 4 part of a building.

## Performance Requirements

*TAS F8P1*

### F8P1 Condensation and water vapour management

[2019: FP6.1]

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

**Applications**

F8P1 only applies to a *sole-occupancy unit* of a Class 2, 3, or 9c building or Class 4 part of a building.

## Verification Methods

### F8V1 Condensation management

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

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

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

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

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

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

## Deemed-to-Satisfy Provisions

### F8D1 Deemed-to-Satisfy Provisions

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

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

**Explanatory Information**

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

### F8D2 Application of Part

The *Deemed-to-Satisfy Provisions* of this Part only apply to a *sole-occupancy unit* of a Class 2, 3, or 9c building and a Class 4 part of a building.

### F8D3 External wall construction

(1) Where a *pliable building membrane* *or a sarking-type material* is installed ~~in an *external wall*~~, it must—

(a) comply with AS 4200.1; and

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

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

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

~~(a) in *climate zones* 4 and 5, 0.143 µg/N.s; and~~
~~(b) in *climate zones* 6, 7 and 8, 1.14 µg/N.s.~~

(2) Subject to (5), any control layer, sheathing or water barrier incorporated between the cladding and the exterior side of the *primary insulation layer* in an *external wall* must achieve the *vapour permeance* specified in Table F8D3.

~~(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.~~

(3) Subject to (4) and (5), an *external wall* without a control layer, sheathing or a water barrier must incorporate a drained and vented cavity.

(4) Subject to (5), for the purposes of (2) and (3), a drained and vented cavity must—

(a) be located between the cladding and the external side of the *primary insulation layer*, control layer, water barrier or sheathing, whichever is outermost; and

(b) be at least 18 mm wide; and

(c) be drained to the exterior at the base of the cavity, including where cavities are vertically compartmentalised in a multi-*storey* building; and

(d) have openings with a free area of not less than 1,000 $mm^2$/m of wall provided at the base and top of the cavity at each *storey* or level.

(5) The requirements of (2), (3) and (4) do not apply to a—

(a) single skin masonry wall in *climate zones* 1, 2 and 3; or

(b) single skin concrete wall in *climate zones* 1, 2 and 3; or

(c) wall constructed from insulated sandwich panels; or

(d) wall that does not form part of the building *envelope*.

**Table F8D3: *Vapour permeance* requirements**

| Climate zone | Wall construction | *Vapour permeance* (µg/N.s) |
|---|---|---|
| 1 | No cavity | ≥ 0.0022 to < 1.1403 |
| | Drained and vented cavity | ≥ 0 to < 1.1403 |
| 2, 3 | No cavity | ≥ 0.1429 |
| | Drained and vented cavity | ≥ 0.0022 |
| 4, 5 | No cavity | ≥ 1.1403 |
| | Drained and vented cavity | ≥ 0.1429 |
| 6, 7, 8 | No cavity | X |
| | Drained and vented cavity | ≥ 1.1403 |

**Table Notes**

X = not permitted.

**Explanatory Information**

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

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

A control layer is a continuous layer that is intended for air, vapour or thermal control (insulation). A *pliable building membrane* is subject to F8D3(2) on account of being a water barrier whilst a *sarking-type material* is subject to F8D3(2) on account of being a thermal control layer or a water barrier.

In cooler climates, a continuous air or vapour control layer or a water barrier with higher *vapour permeance* is desirable to allow outward drying of internal moisture. In tropical climates, materials with a relatively lower *vapour permeance* are desirable to limit outdoor moisture being driven inward.

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

*Deemed-to-Satisfy Provisions* require *external walls* that form part of the building *envelope* of *sole-occupancy units* in *climate zones* 6, 7 and 8 to incorporate a drained and vented cavity, unless the wall is constructed from insulated sandwich panels.

Components or devices which restrict vermin entry may be used if they facilitate drainage and ventilation as *required* by this Part.

The *vapour permeance* range listed in Table F8D3 corresponds to the classes (as defined in AS 4200.1) listed in Explanatory Table F8D3, when tested in accordance with ASTM-E96 Procedure B – Water Method at 23°C and 50% relative humidity.

**Table F8D3 (explanatory): *Vapor permeance* classes**

| Climate zone | Wall construction | *Vapour permeance* class as defined in AS 4200.1 |
|---|---|---|
| 1 | No cavity | 2 or 3 |
| | Drained and vented cavity | 1, 2 or 3 |
| 2, 3 | No cavity | 3 or 4 |
| | Drained and vented cavity | 2, 3 or 4 |
| 4, 5 | No cavity | 4 |
| | Drained and vented cavity | 3 or 4 |
| 6, 7, 8 | No cavity | X |
| | Drained and vented cavity | 4 |

**Table Notes**

X = not permitted.

## F8D4 Exhaust systems

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

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

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

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

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

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

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

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

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

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

**Explanatory Information**

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

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

## F8D5 Ventilation of a roof spaces with a ceiling not parallel to the roof plane

(1) In *climate zones* 4, 5, 6, 7 and 8, a roof with a ceiling not parallel to the roof plane, onto which the insulation is laid, must have a roof space that—

~~(a) is located—~~

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

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

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

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

~~(c) is either—~~

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

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

(a) has a height not less than 18 mm at any point; and

(b) is located immediately above the ceiling insulation; and

(c) is ventilated to *outdoor air* in accordance with Table F8D5.

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

(a) concrete roof; or

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

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

**Table F8D5: Roof space ventilation requirements**

| Roof pitch | Ventilation openings |
|---|---|
| <10° | ~~25,000~~20,000 mm$^2$/m ~~provided at each of two opposing ends~~ provided at roof perimeter, or at each of two opposing ends for gable roofs or at each of the low and high sides of a skillion roof |
| ≥10° and <~~1~~75° | ~~25,000~~7,000 mm$^2$/m ~~provided at the eaves and 5,000 mm$^2$/m at high level~~ provided at the eaves or low level and 5,000 mm$^2$/m provided at high level or ridge |
| ~~≥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~~Total low level ventilation openings are calculated based on twice the longest total plan dimension of the roof, except for mono pitch roofs that are calculated based on the longest total plan dimension of the roof. Total high-level ventilation is calculated based on the longest total plan dimension of the roof.

(2) ~~For the purposes of this table, h~~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 or 1/3 of the height of the roof below highest point of the roof, whichever is least.

**Explanatory Information**

Ventilation openings are to be evenly distributed to avoid creating pockets of stagnant air.

Openings created by roof cladding profile can help meet ventilation opening requirements. Examples include openings underneath a metal cladding profile or inherent openings in a profiled tile roof, provided these openings are directly connected to the roof void to be ventilated.

For roof pitches greater than 10 degrees, total low level ventilation openings must be greater than total high level ventilation openings to minimise drawing air from occupied spaces and ensure intake of outdoor air.

Components such as spacers, battens and the like greater than 18 mm height are acceptable provided they do not create excessive resistance to airflow.

## F8D6 Ventilation of a roof space with a ceiling parallel to the roof plane

(1) In *climate zones* 4, 5, 6, 7 and 8, a roof system with a ceiling installed parallel to the roof plane must have a ventilated cavity that—

(a) is located immediately above—

i. the *primary insulation layer*; or

ii. any control layer or water barrier installed in accordance with (2); and

(b) is not obstructed by insulation; and

(c) is not less than 18 mm as measured perpendicular to the plane of the roof; and

(d) is ventilated to outdoor air through openings not less than —

i. 20,000 $mm^2/m$ at the eaves or low level; and

iii. 5,000 $mm^2/m$ at the high level or ridge.

(2) Where a control layer, or water barrier is installed in *climate zones* 4, 5, 6, 7 and 8, it must—

(a) have a *vapour permeance* of not less than 1.14 µg/N.s; and

(b) be located immediately above the *primary insulation layer*.

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

(a) concrete roof; or

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

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

(d) tiled roof without a control layer or water barrier located above the *primary insulation layer*.

**Applications**

G1P2(2) only applies to a *swimming pool* with a depth of water more than 300 mm.

## G1P3 Cool rooms

Any refrigerated or cooling chamber, or the like which is of sufficient size for a person to enter must—

(a) have adequate means of communicating with or alerting other occupants in the building in the case of an emergency; and

(b) have a door which is—

(i) of adequate dimensions to allow occupants to readily escape; and

(ii) openable from inside without a key at all times.

## G1P4 Vaults

Any strong-room, vault or the like which is of sufficient size for a person to enter must—

(a) have adequate means of communicating with or alerting other occupants in the building in the case of an emergency; and

(b) have internal lighting controllable only from within the room; and

(c) have an external indicator that the room is occupied.

## G1P5 Outdoor play spaces in early childhood centres

Fencing or other barriers must be provided around any outdoor play space, in which the design and height of the fencing or other barriers, including the—

(a) design of gates and fittings; and

(b) proximity of the barriers to any permanent structure on the property,

must ensure that children cannot go through, over or under the fencing or other barriers.

**Applications**

G1P5 only applies to a Class 9b *early childhood centre*.

*TAS G1P6*

# Deemed-to-Satisfy Provisions

## G1D1 Deemed-to-Satisfy Provisions

~~(1) *Performance Requirement* G1P1 must be complied with.~~

*TAS G1D1(2)*

~~(2)~~(1) Where a *Deemed-to-Satisfy Solution* is proposed, *Performance Requirements* G1P~~2~~1 to G1P5 are satisfied by complying with G1D2 to G1D~~4~~5.

~~(3)~~(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**~~

~~There are no *Deemed-to-Satisfy Provisions* for G1P1.~~

*NSW G1D2*
*NT G1D2*
*QLD G1D2*
*SA G1D2*
*TAS G1D2*
*VIC G1D2*

## G1D2 Swimming pools

(1) A *swimming pool* with a depth of water more than 300 mm and which is associated with a Class 2 or 3 building or Class 4 part of a building, must have suitable barriers to restrict access by young children to the immediate pool surrounds in accordance with AS 1926.1 and AS 1926.2.

(2) A water recirculation system in a *swimming pool* with a depth of water more than 300 mm must comply with AS 1926.3.

**Explanatory Information: Cross-volume considerations**

Part C2 of NCC Volume Three sets out the requirements for pumped discharge from *swimming pools*.

## G1D3 Refrigerated chambers, strong-rooms and vaults

(1) A refrigerated or cooling chamber, strongroom or vault that is of sufficient size for a person to enter must have—

(a) a door which is capable of being opened by hand from inside without a key; and

(b) internal lighting controlled only by a switch which is located adjacent to the entrance doorway inside the chamber, strongroom or vault; and

(c) an indicator lamp positioned outside the chamber, strongroom or vault which is illuminated when the interior lights *required* by (b) are switched on; and

(d) an alarm that is—

(i) located outside but controllable only from within the chamber, strongroom or vault; and

(ii) able to achieve a sound pressure level outside the chamber, strongroom or vault of 90 dB(A) when measured 3 m from the sounding device.

(2) A door *required* by (1)(a) in a refrigerated or cooling chamber must have a doorway with a clear width of not less than 600 mm and a clear height not less than 1.5 m.

## G1D4 Outdoor play spaces

(1) Any outdoor play space in a Class 9b *early childhood centre* must be enclosed on all sides with a barrier which—

(a) where the edge of the trafficable surface of the outdoor play space is at the same level or less than 2 m above the surface beneath — complies with AS 1926.1; and

(b) where the edge of the trafficable surface of the outdoor play space is 2 m or more above the surface beneath—

(i) is not less than 1.8 m high, as measured from above the trafficable surface; and

(ii) is non-climbable and does not contain horizontal or other elements that could facilitate climbing; and

(iii) does not have any openings or apertures through which a 100 mm or greater sphere could pass; and

(iv) is not within 1.8 m, as measured directly from the top of the barrier, of any elements within the outdoor play space that facilitate climbing; and

(v) is not within 900 mm of elements in a wall that facilitate climbing; and

(c) has strength and rigidity complying with AS 1926.1.

(2) For the purposes of (1)(a), AS 1926.1 is applied as if there is a *swimming pool* located outside the outdoor play space, so that the barrier restricts children from exiting the premises without the knowledge of staff in the centre.

(3) The requirements of (1) do not apply to a wall, including doors and *windows*, which form part of the Class 9b *early childhood centre*, except where the wall is within a non-climbable zone for a barrier provided under (1)(a).

*NSW G1D5*

## G1D5 Swimming pool drainage

Pumped discharge from a *swimming pool* must connect to the sanitary drainage system in accordance with AS/NZS 3500.2.

## G6D4 Provision for escape

For the purposes of the *Deemed-to-Satisfy Provisions* of Part D2, a reference to a *storey* or room includes an *occupiable outdoor area*.

## G6D5 Construction of exits

For the purposes of the *Deemed-to-Satisfy Provisions* of Part D3, a reference to a *storey* or room includes an *occupiable outdoor area*.

## G6D6 Fire fighting equipment

Except for S17C7(2)(a), for the purposes of the *Deemed-to-Satisfy Provisions* of Part E1, a reference to a *storey* includes an *occupiable outdoor area*.

**Notes**

An *occupiable outdoor area* is not a *storey* for the purposes of Schedule ~~2~~1 of the NCC and therefore is not included in the determination of *rise in storeys*.

## G6D7 Lift installations

For the purposes of the *Deemed-to-Satisfy Provisions* of Part E3, a reference to a *storey* includes an *occupiable outdoor area*.

## G6D8 Visibility in an emergency, exit signs and warning systems

For the purposes of the *Deemed-to-Satisfy Provisions* of Part E4, a reference to a *storey* includes an *occupiable outdoor area*.

## G6D9 Light and ventilation

For the purposes of the *Deemed-to-Satisfy Provisions* of F6D5, F6D9 and F6D10, a reference to a room includes an *occupiable outdoor area*.

## G6D10 Fire orders

For the purposes of the *Deemed-to-Satisfy Provisions* of G4D8, a reference to a *storey* includes an *occupiable outdoor area*.

# Specification 30 Installation of boilers and pressure vessels

## S30C1 Scope

This Specification sets out the requirements for the installation of *boilers* and *pressure vessels* in buildings.

## S30C2 Explosion relief

The distance between the vent of any explosion relief device for a *boiler* or *pressure vessel* and any adjacent wall, roof, ceiling or other solid construction shall be calculated in accordance with Table S30C2.

**Table S30C2: Minimum clearances for explosion relief**

| Clearance from | Minimum clearance (metres) |
|---|---|
| Adjacent wall or ceiling/roof | $0.4\,(VI3)^{1I3}$ or 0.4 m, whichever is the greater |
| Two walls at right angles; or one wall and a ceiling/roof | $0.6\,(VI3)^{1I3}$ or 0.6 m, whichever is the greater |

**Table Notes**

For the purposes of this Table, $V$ is the internal volume of the *boiler* or *pressure vessel* being vented up to the connection of the flue.

## S30C3 Floors and drainage

(1) Floor surfaces beneath *boilers* and *pressure vessels* shall be *water resistant* and formed to drain away from supports and structural building elements.

(2) Where a safe tray is provided to trap liquids, it must be manufactured from a material resistant to corrosion from the contents of the *boiler* or *pressure vessel*.

## S30C4 Protection from heat

Building elements surrounding a *boiler* must be protected from any surface heat by refractory material or effective air spaces so that—

(a) steel elements do not exceed a temperature of more than 300°C; and

(b) concrete elements do not exceed a temperature of more than 200°C; and

(c) timber elements do not exceed a temperature of more than 150°C.

more than 3.5 m from the *atrium well* if a Class 2, 3, 5 or 9 part of the building is open to the *atrium*; or

(ii) 20 m above the floor of an *atrium* or the floor of the highest *storey* where the bounding wall is set back more than 3.5 m from the *atrium well* if a Class 6, 7 or 8 part of the building is open to the *atrium*.

(c) On the side of the glazing away from the *atrium well* — to all glazing forming part of the bounding wall at each *storey*.

(2) Sprinklers must be located in positions allowing full wetting of the glazing surfaces without wetting adjacent sprinkler heads.

(3) Sprinkler heads must be of the quick response type and have a maximum temperature rating of 74°C.

(4) The rate of water discharge to protect glazing must be not less than—

(a) on the *atrium* side of the glazing—

(i) 0.25 L/s.m$^2$ where glazing is not set back from the *atrium well*; or

(ii) 0.167 L/s.m$^2$ where glazing is set back from the *atrium well*; and

(b) on the side away from the *atrium well* — 0.167 L/s.m$^2$.

(5) In addition to that of the basic sprinkler protection for the building, the water supply to *required* wall wetting systems must be of adequate capacity to accommodate the following on the *atrium* side of the glazing:

(a) Where the bounding walls are set back less than 3.5 m from the *atrium well* — wall wetting of a part not less than 6 m long for a height of not less than—

(i) 12 m above the floor of an *atrium* or the floor of the highest *storey* where the bounding wall is set back more than 3.5 m from the *atrium well* if a Class 2, 3, 5 or 9 part of the building is open to the *atrium*; or

(ii) 20 m above the floor of an *atrium* or the floor of the highest *storey* where the bounding wall is set back more than 3.5 m from the *atrium well* if a Class 6, 7 or 8 part of the building is open to the *atrium*.

(b) Where the walls are set back 3.5 m or more from the *atrium well* — wetting of a part not less than 12 m long on one *storey*.

## S31C6 Stop valves

(1) Basic sprinkler and wall wetting systems protecting a building containing an *atrium* must be provided with easily accessible and identified stop valves.

(2) Sprinkler and wall wetting systems must be provided with independent stop valves.

(3) Sprinkler heads protecting the roof of the *atrium* must be provided with a stop valve.

(4) Stop valves to wall wetting and roof sprinklers may be of the gate type.

(5) All sprinkler and wall wetting stop valves must be monitored to detect unauthorised closure.

# Smoke control system

## S31C7 General requirements — smoke control system

Except where varied or superseded by this Specification, hot layer smoke control ~~mechanical air-handling~~ systems in a building containing an *atrium* must comply with AS 1668.1.

## S31C8 Operation of atrium mechanical air-handling systems

Mechanical air-handling systems serving an *atrium* must be designed to operate so that during a fire—

(a) a tenable atmosphere is maintained in all paths of travel along balconies to *required exits* during the period of

# Part J1 Energy efficiency performance requirements

*NSW Part J1*

*NT Part J1*

## Introduction to this Part

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

~~**Notes**~~

~~From 1 May 2023 to 30 September 2023 Section J of NCC 2019 Volume One Amendment 1 may apply instead of Section J of NCC 2022 Volume One. From 1 October 2023 Section J of NCC 2022 Volume One applies.~~

~~**Notes: Tasmania Section J Energy Efficiency**~~

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

## Objectives

### J1O1 Objective

The Objective of this Section is to—

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

(b) reduce greenhouse gas emissions; and

(c) improve occupant health and *amenity*.

## Functional Statements

### J1F1 Energy efficiency

A building must—

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

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

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

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

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

## Performance Requirements

### J1P1 Energy use and greenhouse gas emissions

A building, other than a *sole-occupancy unit* of a Class 2 building or a Class 4 part of a building, including its *services*, must have features that ~~facilitate the efficient use of energy appropriate to~~—

(a) facilitate the efficient near zero use of operational energy and greenhouse gas emissions appropriate to—

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

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

~~(b) solar radiation being—~~

~~(i) utilised for heating; and~~

~~(ii) controlled to minimise energy for cooling; and~~

~~(c) the energy source of the *services*; and~~

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

~~(c)~~(b) for the ~~a~~ *conditioned space*, achieve an hourly *regulated energy* consumption and associated greenhouse gas emissions, averaged over the annual *hours of operation*, of not more than—

a. for a Class 6 building, ~~80~~40 kJ/m².hr and 4 g of $CO_2$-e/m².hr; and

b. for a Class 5, 7b, 8 or 9a building other than a ward area, or a Class 9b school, ~~43~~22 kJ/m².hr and 2.2 g of $CO_2$-e/m².hr; and

c. for all other building classifications, ~~15~~8 kJ/m².hr and 1 g of $CO_2$-e/m².hr.

*NSW J1P2*

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

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

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

(3) The total *thermal energy load* of the *habitable rooms* and *conditioned spaces* in a *sole-occupancy unit* of a Class 2

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

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

(b) the geographic location of the building; and

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

(d) the energy source.

## J1P4 Renewable energy and electric vehicle charging

(1) A building must have features that facilitate the future installation of—

(a) on-site renewable energy generation and storage equipment, except where on-site renewable energy generation equipment is already installed to the maximum practicable extent; and

(b) in a Class 2 building, electric vehicle charging equipment sufficient to serve the daily driving needs of all building occupants; and

(2) A Class 3 building or Class 5 to 9 building must contain electric vehicle charging equipment capable of serving at least 20% of the daily driving needs of all building occupants.

## Verification Methods

## J1V1 NABERS Energy

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

(a) a minimum ~~5.5-star~~6-star *NABERS Energy* base building Commitment Agreement is obtained; and

(b) the energy model required for (a) demonstrates that~~— (i)~~ the base building's greenhouse gas emissions are not more than ~~67% of~~ the ~~5.5-star~~ 6.6-star level when excluding—

~~(A)~~(i) tenant supplementary heating and cooling systems; and

~~(B)~~(ii) external lighting; and

~~(C)~~(iii) carpark services; and

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

~~(ii)~~(i) 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; or~~and~~

~~(iii)~~(ii) a room temperature is maintained across not less than 95% of the *floor area* of all occupied zones, other than any room containing an indoor *swimming pool*, for not less than 95% of the annual *hours of operation* between—

(A) 18°C dry bulb and 25°C dry bulb for conditioned spaces with transitory occupancy; and

(B) 21°C dry bulb and 24°C dry bulb for all other conditioned spaces; and

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

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

(a) a minimum ~~4-star~~5.5-star *NABERS Energy* for Apartment Buildings Commitment Agreement is obtained; and

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

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

(i) the greenhouse gas emissions of the *services* are less than 90% of the ~~5-star~~5.5-star level; and

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

~~(iii)~~(ii) a room temperature is maintained across not less than 95% of the *floor area* of all occupied zones, other than any room containing an indoor *swimming pool*, for not less than 95% of the annual *hours of operation* between—

(A) 18°C dry bulb and 25°C dry bulb for conditioned spaces with transitory occupancy; and

(B) 21°C dry bulb and 24°C dry bulb for all other conditioned spaces; and

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

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

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

(a) a minimum ~~4-star~~4.5-star *NABERS Energy* for Hotels Commitment Agreement is obtained; and

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

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

(i) the greenhouse gas emissions of the *services* are less than ~~70%~~55% of the ~~5-star~~4.5-star level; and

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

~~(iii)~~(ii) a room temperature is maintained across not less than 95% of the *floor area* of all occupied zones, other than any room containing an indoor *swimming pool* for not less than 95% of the annual *hours of operation* between—

(A) 18°C dry bulb and 25°C dry bulb for conditioned spaces with transitory occupancy; and

(B) 21°C dry bulb and 24°C dry bulb for all other conditioned spaces; and

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

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

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

(a) a minimum ~~4.5-stars~~6-stars *NABERS Energy* for Shopping Centres Commitment Agreement is obtained; and

(b) the building has:

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

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

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

(i) the greenhouse gas emissions of the *services* covered within the scope of *NABERS Energy* for Shopping Centres ratings are less than ~~80%~~65% of the ~~4.5-star~~6-star level; and

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

(ii) a room temperature is maintained across not less than 95% of the floor area of all occupied zones, other than any room containing an indoor swimming pool, for not less than 95% of the annual hours of operation between—

(A) 18°C dry bulb and 25°C dry bulb for conditioned spaces with transitory occupancy; and

(B) 21°C dry bulb and 24°C dry bulb for all other conditioned spaces; 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

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

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

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

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

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

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

## J1V3 Verification using a reference building

(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 ~~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 *annual greenhouse gas emissions* of the proposed building are not more than 90% of the *annual greenhouse gas emissions* of a *reference building* when the proposed building is modelled with the proposed *services*; and

(ii) the *annual greenhouse gas emissions* of the *services* of the proposed building are not more than the *annual greenhouse gas emissions* of the *services* of the *reference building* when the proposed building is modelled with the same *services* as the *reference building*; and

(b) in the proposed building—~~,~~

(i) if a Class 5 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~~or

(ii) a room temperature is maintained across not less than 95% of the *floor area* of all occupied zones other than any room containing an indoor *swimming pool*, for not less than 95% of the annual *hours of operation* between—

(A) 18°C dry bulb and 25°C for *conditioned spaces* with transitory occupancy; and

(B) 21°C dry bulb and 24°C dry bulb for all other *conditioned spaces*; or

(iii) in *climate zone* 1, the zone peak *cooling loads*, across not less than 95% of the *floor area* of all assessable zones for not less than 98% of the annual *hours of operation*, do not exceed 110% of each corresponding load in the *reference building*; or

(iv) in *climate zone* 8, the zone peak *heating loads*, across not less than 95% of the *floor area* of all assessable zones for not less than 98% of the annual *hours of operation*, do not exceed 110% of each corresponding load in the *reference building*; or

(v) in *climate zones* 2 to 7, the zone peak loads across not less than 95% of the *floor area* of all assessable zones for not less than 98% of the annual *hours of operation* do not exceed—

(A) 120% of each corresponding peak heating load in the *reference building*; and

~~(b)~~(B) 120% of each corresponding peak cooling load in the *reference 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)~~(2) The calculation method used for (1) ~~and (2)~~ must comply with—

(a) ANSI/ASHRAE Standard 140; and

(b) Specification 34; and

~~(b)~~(c) Specification 49.

## J1V4 Verification of building envelope sealing

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

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

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

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

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

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

(i) can be manually overridden; and

(ii) provides outdoor air, either—

(A) continuously; or

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

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

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

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

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

(D) $p$ = the fraction of time within each 4 hour segment that the system is operational; and

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

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

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

(ii) clause 6.4.5 of AS/NZS 5601.1.

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

*NSW J1V5*

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

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

(a) in *climate zones* 2, 3, 4, 5, 6, 7 and 8, has a *heating load* less than or equal to—

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

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

(b) in *climate zones* 1, 2, 3, 4, 5 and ~~5~~6, has a *cooling load* less than or equal to—

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

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

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

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

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

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

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

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

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

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

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

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

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

# Part J2 Energy efficiency

*NT Part J2*

## Introduction to this Part

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

~~**Notes**~~

~~From 1 May 2023 to 30 September 2023 Section J of NCC 2019 Volume One Amendment 1 may apply instead of Section J of NCC 2022 Volume One. From 1 October 2023 Section J of NCC 2022 Volume One applies.~~

~~**Notes: New South Wales Section J Energy Efficiency**~~

~~(1) For a Class 2 building or a Class 4 part of a building, where a relevant *development consent* or an application for a complying development certificate requires compliance with a BASIX Single Dwelling or Multi Dwelling Certificate issued under Version 3.0 or earlier, NSW Section J of NCC 2019 Volume One Amendment 1 applies.~~

~~(2) For a Class 2 building or a Class 4 part of a building, where a relevant *development consent* or an application for a complying development certificate requires compliance with a BASIX Single Dwelling or Multi Dwelling Certificate issued under Version 4.0 or later, Section J of NCC 2022 Volume One applies.~~

~~(3) For a Class 2 building or a Class 4 part of a building, where a relevant *development consent* or an application for a complying development certificate requires compliance with a BASIX Alterations and Additions Certificate, NSW Section J of NCC 2019 Volume One Amendment 1 applies.~~

~~(4) For a Class 3 building or Class 5 to 9 building:~~

~~(a) From 1 May 2023 to 30 September 2023 NSW Section J of NCC 2019 Volume One Amendment 1 may apply instead of Section J of NCC 2022 Volume One.~~

~~From 1 October 2023 Section J of NCC 2022 Volume One applies.~~

~~**Notes: Tasmania Section J Energy Efficiency**~~

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

## Deemed-to-Satisfy Provisions

### J2D1 Deemed-to-Satisfy Provisions

*NSW J2D1(1)*

(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.

*NSW J2D2*

## J2D2 Application of Section J

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

(a) Part J4, for the building *fabric*; and

(b) Part J5, for building sealing; and

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

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

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

(f) J9D3, for facilities for energy monitoring~~.~~; and

~~(f)~~(g) J9D5(2) to (4), for onsite *renewable energy* systems.

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

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

(b) the following—

(i) J3D4, for ceiling fans; and

(ii) J3D5, J3D6, J4D3(1) to J4D3(4), J4D7(3), J4D7(4) and Part J5, for general thermal construction; and

(iii) J3D7, for roofs; and

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

(v) J3D10, for floors.

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

(a) for the net equivalent energy usage—

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

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

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

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

(4) For a Class 2 to 9 building, *Performance Requirement* J1P4 is satisfied by complying with J9D4 and J9D5(1).

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

*NT Part J3*

*TAS Part J3*

## Introduction to this Part

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

~~**Notes**~~

~~From 1 May 2023 to 30 September 2023 Section J of NCC 2019 Volume One Amendment 1 may apply instead of Section J of NCC 2022 Volume One. From 1 October 2023 Section J of NCC 2022 Volume One applies.~~

~~**Notes: New South Wales Section J Energy Efficiency**~~

~~(1) For a Class 2 building or a Class 4 part of a building, where a relevant *development consent* or an application for a complying development certificate requires compliance with a BASIX Single Dwelling or Multi Dwelling Certificate issued under Version 3.0 or earlier, NSW Section J of NCC 2019 Volume One Amendment 1 applies.~~

~~(2) For a Class 2 building or a Class 4 part of a building, where a relevant *development consent* or an application for a complying development certificate requires compliance with a BASIX Single Dwelling or Multi Dwelling Certificate issued under Version 4.0 or later, Section J of NCC 2022 Volume One applies.~~

~~For a Class 2 building or a Class 4 part of a building, where a relevant *development consent* or an application for a complying development certificate requires compliance with a BASIX Alterations and Additions Certificate, NSW Section J of NCC 2019 Volume One Amendment 1 applies.~~

## Deemed-to-Satisfy Provisions

### J3D1 Deemed-to-Satisfy Provisions

*NSW J3D1(1)*

(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.

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

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

(1) A metal-framed roof that—

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

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

must have a thermal break, consisting of a material with an *R-Value* of greater than or equal to R0.2, installed between the metal sheet roofing and its supporting metal purlins, metal rafters, ~~or~~ metal battens or the like.

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

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

~~(1) A metal-framed wall that forms forming part of the building *envelope* that— 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 studs, metal battens, or the like frame; and~~

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

~~must have a thermal break, consisting of a material with an R-Value of greater than or equal to 0.2, installed between the cladding and its supporting metal studs, metal battens, or the like.~~

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

*NSW J3D7*

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

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

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

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

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

**Table J3D8a: Solar absorptance – climate zones 1 to 6**

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

**Table J3D8b: Solar absorptance – climate zones 7 and 8**

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

**Table Notes**

X = not permitted

*NSW J3D9*

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

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

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

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

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

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

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

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

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

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

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

(6) The *solar admittance* of a *wall-glazing construction* must be calculated in accordance with Specification 37 as for a Class 3 building as *required*.

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

**Table J3D9: Maximum wall-glazing construction solar admittance**

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

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

*NSW J3D10(1)*

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

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

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

*NSW J3D10(2)*

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

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

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

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

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

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

*NSW J3D10(4)*

(4) A concrete slab-on ground, other than ~~Except for~~ a waffle-pod slab, must be insulated in accordance with the following:~~—~~

(a) ~~I~~in *climate zones* 6 and 7—

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

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

(b) ~~I~~in *climate zone* 8—

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

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

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

(a) be *water resistant*; and

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

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

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

*NSW J3D11*

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

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

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

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

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

(2) In the formula at (1)(b)—

(a) $A_{1,2,etc}$ = the area of each *glazing* element; and

(b) $U_{1,2,etc}$ = the *Total System U-Value* of each *glazing* element; and

(c) $SHGC_{1,2,etc}$ = the *Total System SHGC* for each *glazing* element, not exceeding 0.7; and

(d) $E_{W1,2,etc}$ = the winter exposure factor for each *glazing* element obtained from Table J3D11b, J3D11c, J3D11d, J3D11e, J3D11f or J3D11g; and

(e) $BC_{1,2,etc}$ = the bedroom conductance factor obtained from Table J3D11h, J3D11i, J3D11j, J3D11k, J3D11l or J3D11m; and

(f) $OC_{1,2,etc}$ = the orientation sector conductance factor obtained from Table J3D11n; and

(g) $R_{W1,2,etc}$ = the room type factor obtained from Table J3D11h, J3D11i, J3D11j, J3D11k, J3D11l or J3D11m; and

(h) $BS_{W1,2,etc}$ = the bedroom solar heat gain factor obtained from Table J3D11h, J3D11i, J3D11j, J3D11k, J3D11l or J3D11m; and

(i) $F_{W1,2,etc}$ = the frame factor obtained from Table J3D11o, J3D11p, J3D11q, J3D11r, J3D11s or J3D11t for each *glazing* element; and

(j) $H_{W1,2,etc}$ = the floor factor obtained from Table J3D11h, J3D11i, J3D11j, J3D11k, J3D11l or J3D11m for each *glazing* element.

(3) For the purpose of J3D11—

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

(b) P/H must be determined in accordance with Figure S37C7a; and

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

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

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

*NSW J3D12*

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

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

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

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

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

(2) In the formula at (1)(b)—

(a) $A_{1,2,etc}$ = the area of each *glazing* element; and

(b) $SHGC_{1,2,etc}$ = the *Total System SHGC* for each *glazing* element, not exceeding 0.7; and

(c) $E_{S1,2,etc}$ = the summer exposure factor for each *glazing* element obtained from Table J3D12b, J3D12c, J3D12d, J3D12e, J3D12f, J3D12g or J3D12h.

(d) $R_{S1,2,etc}$ = the factor obtained from Table J3D12i or Table J3D12j for each *glazing* element located in a bedroom or room which is not a *conditioned space*; and

(e) $F_{S1,2,etc}$ = the frame factor obtained from Table J3D12i or Table J3D12j for *glazing* element; and

(f) $H_{S1,2,etc}$ = the floor factor obtained from Table J3D12i or Table J3D12j for each *glazing* element.

(3) For the purpose of J3D12—

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

(b) P/H must be determined in accordance with Figure S37C7a; and

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

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

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

**Table Notes**

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

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

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

**Table J3D12j: Conductance factors — climate zones 2 to 7**

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

**Table Notes**

Interpolation is allowed for values between those shown.



*NSW J3D13*

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

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

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

(i) extends horizontally on both sides of the *glazing* for a distance greater than or equal to the projection distance P in Figure S37C7a; 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.

*NSW J3D14*

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

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

~~(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 energy usage in (2); and~~

~~(iv) $ES$ = the spa pump energy usage in (3); and~~

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

~~(b)~~ $A \times E_F$, where—

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

~~(c)~~(b) $E_F$ = the energy factor obtained from Table J3D14b.

(2) For the purposes of (1), the net equivalent energy use must be calculated—

(a) where the *sole-occuancy unit* of a Class 2 building or Class 4 part of a building is served by a dedicated heated water system, in accordance with (3); and

(b) where the *sole-occuancy unit* of a Class 2 building or Class 4 part of a building is served by a centralised heated water system, in accordance with (4).

(3) The net equivalent energy usage of a *sole-occupancy unit* of a Class 2 building or Class 4 part of a building served by a dedicated heated water system must be determined in accordance with the following formula:

$(A \times E_E) + E_P + E_S - E_R$, where—

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

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

(c) $E_P$ = the swimming pool pump energy usage in (5); and

(d) $E_S$ = the spa pump energy usage in (6); and

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

(4) The net equivalent energy usage of a *sole-occupancy unit* of a Class 2 building or Class 4 part of a building served by a centralised heated water system must be determined in accordance with the following formula:

$(A \times E_E) + E_P + E_S + E_C - E_R - E_{RC}$, where—

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

(b) $E_E$ = subject to (7), the *main space conditioning* and *main water heater* efficiency factor obtained from the ABCB Standard for Whole-of-Home Efficiency Factors; and

(c) $E_P$ = the *swimming pool* pump energy usage in (5); and

(d) $E_S$ = the spa pump energy usage in (6); and

(e) $E_C$ = the centralised heated water system circulating pump energy usage in (8); and

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

(g) $E_{RC}$ = the installed capacity, in kW, of on-*site* photovoltaics that directly offsets the energy consumption of circulating pumps for a centralised heated water system serving a *sole-occupancy unit* of a Class 2 building or Class 4 part of a building, where—

(i) this value does not exceed circulating pump energy usage ($E_C$); and

(ii) the on-*site* solar photovoltaics is directly connected to the same electrical supply as common area equipment in the building including the circulating pumps; and

~~(2)~~(5) The swimming pool pump energy usage ($E_P$) for a *swimming pool* dedicated solely to the Class 2 building or Class 4 part of a building must be determined in accordance with the following formula:

$E_P = V \times FP / 1000$, where—

(a) $E_P$ = the swimming pool pump energy usage; and

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

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

~~(3)~~(6) The spa pump energy usage ($E_S$) must be determined in accordance with the following formula:

$E_S = V \times FSB / 100$, where—

(a) $E_S$ = the spa pump energy usage; and

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

(c) $FSB$ = the spa pump factor in Table 13.6.2d of the ABCB Housing Provisions.

(7) The *main space conditioning* and *main water heater* efficiency factor for a *sole-occupancy* unit of a Class 2 building or Class 4 part of a building served by a centralised heated water system must be determined in accordance with the following—

(a) for other than a solar boosted centralised heated water system, the equivalent water heater used to the determine the efficiency factor in the ABCB Standard for Whole-of-Home Efficiency Factors must be determined in accordance with Table J3D14e; and

(b) for a solar boosted centralised heated water system, the efficiency factors must be determined in accordance with the following formula:

$E_E = F_1 \times P_1 + F_2 \times P_2$, where—

(i) $E_E$ = the *main space conditioning* and *main water heater* efficiency factor; and

(ii) $F_1$ = the efficiency factor obtained from the ABCB Standard for Whole-of-Home Efficiency Factors using the equivalent water heater in Table J3D14e; and

(iii) $F_2$ = the efficiency factor obtained from the ABCB Standard for Whole-of-Home Efficiency Factors for—

(A) where the solar boosted centralised heated water system uses heat pump type heating as the auxiliary heating source, a heat pump (standard) water heater; and

(B) where the solar boosted centralised heated water system uses gas type heating as the auxiliary heating source, a gas storage water heater; and

(C) for all other types of solar boosted centralised heated water systems, an electric storage (standard) water heater; and

(iv) $P_1$ = the solar percentage factor determined in accordance with the following formula:

$P_1 = (A_C / A_S) / 0.02$, where—

(A) $P_1$ = the solar percentage factor; and

(B) $A_C$ = the total area in $m^2$ of all solar thermal collectors connected to the heated water system; and

(C) $A_S$ = the total floor area in $m^2$ of all *sole-occupancy units* served by the heated water system.

(v) $P_2$ = the non-solar percentage factor determined in accordance with the following formula:

$P_2 = 1 – P_1$ where—

(A) $P_2$ = the non-solar percentage factor; and

(B) $P_1$ = the solar percentage factor in (iv); and

(vi) where the *main space conditioning* and *main water heater* efficiency factor for the heat pump $F_2$ is less than that of the solar boosted system $F_1$ then $P_1$ must be set to 0 and $P_2$ to 1; and

(vii) $P_1$ cannot be greater than 1.0.

(8) The circulating pump energy usage ($E_C$) must be determined in accordance with the following formula:

$E_C = L_F \times (C_P + C_S \times N_F)$, where—

(a) $E_C$ = the circulating pump energy usage; and

(b) $L_F$ = heated water load factor obtained from Table J3D14c; and

(c) $C_P$ = the primary circulating pump energy factor obtained from Table J3D14d; and

(d) $C_S$ = the secondary circulating pump energy factor obtained from Table J3D14d; and

(e) $N_F$ = the factor for the number of *sole-occupancy units* served determined in accordance with the following formula:

$N_F$ = 0.6 + (number of *sole-occupancy units* served -100) x 0.00133; and

(f) $N_F$ cannot be greater than 1.0.

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

| Total floor area $m^2$ | Floor area factor | Total floor area $m^2$ | Floor area factor | Total floor area $m^2$ | Floor area factor | Total floor area $m^2$ | Floor area factor |
|---|---|---|---|---|---|---|---|
| < 50 | 0.0123 | 160–169 | 0.0097 | 280–289 | 0.0087 | 400–409 | 0.0080 |
| 50–59 | 0.0119 | 170–179 | 0.0096 | 290–299 | 0.0086 | 410–419 | 0.0079 |
| 60–69 | 0.0116 | 180–189 | 0.0095 | 300–309 | 0.0085 | 420–429 | 0.0079 |
| 70–79 | 0.0113 | 190–199 | 0.0094 | 310–319 | 0.0085 | 430–439 | 0.0078 |

**Table J3D14c: Heated water load factor for a sole-occupancy unit of a Class 2 building or a Class 4 part of a building**

| Total floor area $m^2$ | Load factor | Total floor area $m^2$ | Load factor | Total floor area $m^2$ | Load factor | Total floor area $m^2$ | Load factor |
|---|---|---|---|---|---|---|---|
| < 50 | 0.20 | 160-169 | 0.48 | 280-289 | 0.59 | 400-409 | 0.66 |
| 50-59 | 0.22 | 170-179 | 0.49 | 290-299 | 0.60 | 410-419 | 0.67 |
| 60-69 | 0.25 | 180-189 | 0.51 | 300-309 | 0.60 | 420-429 | 0.67 |
| 70-79 | 0.28 | 190-199 | 0.52 | 310-319 | 0.61 | 430-439 | 0.68 |
| 80-89 | 0.31 | 200-209 | 0.53 | 320-329 | 0.61 | 440-449 | 0.69 |
| 90-99 | 0.34 | 210-219 | 0.54 | 330-339 | 0.62 | 450-459 | 0.69 |
| 100-109 | 0.37 | 220-229 | 0.55 | 340-349 | 0.62 | 460-469 | 0.70 |
| 110-119 | 0.39 | 230-239 | 0.56 | 350-359 | 0.63 | 470-479 | 0.71 |
| 120-129 | 0.41 | 240-249 | 0.56 | 360-369 | 0.63 | 480-489 | 0.72 |
| 130-139 | 0.43 | 250-259 | 0.57 | 370-379 | 0.64 | 490-499 | 0.72 |
| 140-149 | 0.45 | 260-269 | 0.58 | 380-389 | 0.65 | 500 | 0.73 |
| 150–159 | 0.47 | 270–279 | 0.58 | 390-399 | 0.65 | — | — |

**Table Notes**

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

~~(1)~~(2) Where values fall between ranges given, the floor area must be rounded up to the nearest whole square metres of floor area

**Table J3D14d: Energy factor ($C_P$ or $C_S$) for a circulating pump serving sole-occupancy units of a Class 2 building or a Class 4 part of a building**

| Climate zone | ACT | NSW | NT | QLD | SA | TAS | VIC | WA |
|---|---|---|---|---|---|---|---|---|
| 1 | — | — | 0.064 | 0.115 | — | — | — | 0.148 |
| 2 | — | 0.131 | — | 0.113 | — | — | — | — |
| 3 | — | — | 0.06 | 0.104 | — | — | — | 0.139 |
| 4 | — | 0.134 | — | — | 0.138 | — | 0.112 | 0.153 |
| 5 | — | 0.15 | — | 0.129 | 0.147 | — | — | 0.153 |
| 6 | — | 0.161 | — | — | 0.167 | — | 0.135 | 0.184 |
| 7 | 0.131 | 0.173 | — | — | — | 0.146 | 0.145 | — |
| 8 | — | 0.155 | — | — | — | 0.131 | 0.13 | — |

**Table Notes**

(1) if no primary circulating pump is present, then $C_P = 0$.

~~(1)~~(2) If no secondary circulating pump is present, then $C_S = 0$.

**Table J3D14e: Water heater type to be applied when using the ABCB Standard for Whole-of-Home Efficiency Factors for a sole-occupancy unit of a Class 2 building or a Class 4 part of a building**

| System Number | Type of centralised heated water system | Equivalent heated water system |
|---|---|---|
| 1 | Single electric storage (boiler) | Electric storage (standard or off-peak) |
| 2 | Manifolded electric storage | Electric storage (standard or off-peak) |
| 3 | Manifolded electric instantaneous – no storage | Electric storage (standard or off-peak) |
| 4 | Manifolded electric instantaneous – with storage | Electric storage (standard or off-peak) |
| 5 | Air-sourced heat pump – with storage | Heat pump (standard or off-peak) |
| 6 | Manifolded air source heat pumps – with storage | Heat pump (standard or off-peak) |
| 7 | Electric boosted solar– with storage | Solar electric (standard) |
| 8 | Manifolded electric boosted solar – with storage | Solar electric (standard) |
| 9 | Heat pump boosted solar – with storage | Solar electric (standard) or heat pump (standard or off-peak) |
| 10 | Manifolded heat pump boosted solar – with storage | Solar electric (standard) or heat pump (standard or off-peak) |
| 11 | Gas storage (boiler) | Gas storage |
| 12 | Manifolded gas storage | Gas storage |
| 13 | Manifolded gas instantaneous – no storage | Gas instantaneous |
| 14 | Manifolded gas instantaneous – with storage | Gas storage |
| 15 | Gas boosted solar with storage | Solar gas |
| 16 | Manifolded gas boosted solar with storage | Solar gas |
| 17 | Instantaneous gas boosted solar – with storage | Solar gas |
| 18 | Manifold instantaneous gas boosted solar – with storage | Solar gas |
| 19 | Gas boosted air-sourced heat pump | Heat pump (standard) |
| 20 | All other electrically heated types of central domestic hot water systems | Electric storage (standard or off-peak) |
| 21 | All other gas heated types of central domestic hot water systems | Gas storage |

**Table Notes**

If the electricity tariff of the centralised heated water system is unknown, select “standard” from the ABCB Standard for Whole-of-Home Efficiency Factors.

*NSW J3D15*

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

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

# Part J4 Building fabric

*NT Part J4*

## Introduction to this Part

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

~~**Notes**~~

~~From 1 May 2023 to 30 September 2023 Section J of NCC 2019 Volume One Amendment 1 may apply instead of Section J of NCC 2022 Volume One. From 1 October 2023 Section J of NCC 2022 Volume One applies.~~

~~**Notes: New South Wales Section J Energy Efficiency**~~

~~(1) For a Class 2 building or a Class 4 part of a building, where a relevant *development consent* or an application for a complying development certificate requires compliance with a BASIX Single Dwelling or Multi Dwelling Certificate issued under Version 3.0 or earlier, NSW Section J of NCC 2019 Volume One Amendment 1 applies.~~

~~(2) For a Class 2 building or a Class 4 part of a building, where a relevant *development consent* or an application for a complying development certificate requires compliance with a BASIX Single Dwelling or Multi Dwelling Certificate issued under Version 4.0 or later, Section J of NCC 2022 Volume One applies.~~

~~(3) For a Class 2 building or a Class 4 part of a building, where a relevant *development consent* or an application for a complying development certificate requires compliance with a BASIX Alterations and Additions Certificate, NSW Section J of NCC 2019 Volume One Amendment 1 applies.~~

~~(4) For a Class 3 building or Class 5 to 9 building:~~

~~(i) From 1 May 2023 to 30 September 2023 NSW Section J of NCC 2019 Volume One Amendment 1 may apply instead of Section J of NCC 2022 Volume One.~~

~~(ii)From 1 October 2023 Section J of NCC 2022 Volume One applies.~~

~~**Notes: Tasmania Section J Energy Efficiency**~~

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

## Deemed-to-Satisfy Provisions

### J4D1 Deemed-to-Satisfy Provisions

*NSW J4D1(1)*

(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.

*NSW J4D2*

## J4D2 Application of Part

The *Deemed-to-Satisfy Provisions* of this Part apply to building elements forming the *envelope* of a Class 2 to 9 building other than J4D3(5), J4D4, J4D5, J4D6, ~~and~~ J4D7(1) and J4D7(2) which do not apply to a Class 2 *sole-occupancy unit* or a Class 4 part of a building.

*NSW J4D3*

## J4D3 Thermal construction — general

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

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

(b) is continuous below and around box gutters, parapets and the like; and

~~(a)~~(c) abuts or overlaps adjoining insulation other than at supporting members such as studs, noggings, joists, furring channels, slab edges 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)~~(d) does not affect the safe or effective operation of a *service* or fitting.

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

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

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

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

(d) each adjoining sheet of roll membrane being—

(i) overlapped not less than 50 mm; or

(ii) taped together.

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

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

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

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

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

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

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

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

## J4D4 Roof and ceiling construction

(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.~~

(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*—

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

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

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

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

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

(v) in *climate zones* 1, 3, 4, and 6 — R4.8 for a downward direction of heat flow; and

(vi) in *climate zones* 2 — R4.4 for a downward direction of heat flow; and

(vii) in *climate zone* 5 — R3.7 for a downward direction of heat flow; and

(viii) in *climate zones* 7 and 8 — R5.3 in 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.~~

(2) In *climate zones* 1, 2, 3, 4, 5, 6 and 7 the upper surface of a roof must have—

(a) a total solar reflectance greater than 0.55 and a thermal emittance greater than 0.85; or

(b) a *Solar Reflectance Index* greater than 61.

(3) In *climate zones* 1, 2, 3, 5 and 6 the upper surface of a metal roof, which has outside air intakes, unitary air-conditioning units or air-cooled chillers mounted on it or less than 2 m above it, must have—

(a) a total solar reflectance greater than 0.75 and a thermal emittance greater than 0.87; or

(b) a *Solar Reflectance Index* greater than 92.

## J4D5 Roof lights

*Roof lights* must have—

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

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

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

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

**Table J4D5: Roof lights – Total system SHGC**

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

**Table Notes**

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

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

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

*NSW J4D6*

## J4D6 Walls and glazing

(1) For each *storey*, including any *mezzanine*, ~~T~~the *Total System U-Value* of *wall-glazing construction*, including *wall-glazing construction* which wholly or partly forms the *envelope* internally, must not be greater than the value specified in Table J4D6a.~~—~~

~~(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, including 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) For each *storey*, including any *mezzanine*, ~~W~~wall components of a *wall-glazing construction* must achieve a minimum *Total R-Value* of—

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

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

(5) For each *storey*, including any *mezzanine*, ~~T~~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 J4D6~~b~~c; and

(b) for a Class 3 or 9c building or a Class 9a *ward area*, the values specified in Table J4D6~~c~~d.

(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~~exceed the lesser of—

(a) 0.81 divided by the applicable shading factor specified in S37C7~~.~~; or

~~(7)~~(b) 1.

**Table J4D6a: Maximum Total System U-Value of wall-glazing construction**

| *Climate zone* | Class 2 common area, Class 5, 6, 7, 8, 9b building or a Class 9a building other than a *ward area* | Class 3 or 9c building or a Class 9a *ward area* |
|---|---|---|
| 1 | 1.3 | 0.9 |
| 2 | 1.7 | 1.4 |
| 3 | 1.4 | 1.0 |
| 4 | 1.4 | 1.1 |
| 5 | 1.7 | 1.4 |
| 6 | 1.6 | 1.4 |
| 7 | 1.4 | 1.0 |
| 8 | 1.9 | 0.9 |

**Table J4D6b~~a~~: 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 9a building other than a *ward area* | Class 3 or 9c building or Class 9a *ward area* |
|---|---|---|
| 1 | ~~2.4~~3.0 | ~~3.3~~4.0 |
| 2 | ~~1.4~~1.0 | ~~1.4~~1.0 |
| 3 | ~~1.4~~2.2 | ~~3.3~~2.4 |
| 4 | ~~1.4~~2.0 | ~~2.8~~1.9 |
| 5 | ~~1.4~~1.0 | ~~1.4~~1.0 |
| 6 | ~~1.4~~1.2 | ~~2.8~~1.0 |
| 7 | ~~1.4~~2.2 | ~~2.8~~2.2 |
| 8 | ~~1.4~~3.6 | ~~3.8~~3.6 |

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

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

**Table J4D6c: Maximum wall-glazing construction solar admittance - Class 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 to 7 | 0.08 | 0.07 | 0.08 | 0.07 |
| 8 | 0.09 | 0.10 | 0.20 | 0.07 |

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

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

**Table J4D6d: 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* |
|---|---|---|---|---|
| All | 0.05 | 0.04 | 0.05 | 0.04 |

## J4D7 Floors

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

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

(a) in *climate zone* 8; or

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

(3) A floor must be insulated around the vertical edge of its perimeter with insulation having an *R-Value* greater than or equal to 1.0 when the floor—

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

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

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

(a) be *water resistant*; and

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

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

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

# Part J5 Building sealing

*NT Part J5*

## Introduction to this Part

This Part contains *Deemed-to-Satisfy Provisions* for compliance with Part J1. It sets out provisions for ~~the~~ sealing ~~of~~ a building~~'s *glazing*, doors, exhaust fans and the like in order~~ to prevent air leakage. The provisions are intended to ~~increase~~ improve occupant thermal comfort ~~for occupants~~ by increasing *envelope* efficacy and reduce the energy consumption of any installed *air-conditioning* systems.

~~**Notes**~~

~~From 1 May 2023 to 30 September 2023 Section J of NCC 2019 Volume One Amendment 1 may apply instead of Section J of NCC 2022 Volume One. From 1 October 2023 Section J of NCC 2022 Volume One applies~~.

~~**Notes: New South Wales Section J Energy Efficiency**~~

~~(1) For a Class 2 building or a Class 4 part of a building, where a relevant *development consent* or an application for a complying development certificate requires compliance with a BASIX Single Dwelling or Multi Dwelling Certificate issued under Version 3.0 or earlier, NSW Section J of NCC 2019 Volume One Amendment 1 applies.~~

~~(2) For a Class 2 building or a Class 4 part of a building, where a relevant *development consent* or an application for a complying development certificate requires compliance with a BASIX Single Dwelling or Multi Dwelling Certificate issued under Version 4.0 or later, Section J of NCC 2022 Volume One applies.~~

~~(3) For a Class 2 building or a Class 4 part of a building, where a relevant *development consent* or an application for a complying development certificate requires compliance with a BASIX Alterations and Additions Certificate, NSW Section J of NCC 2019 Volume One Amendment 1 applies.~~

~~(4) For a Class 3 building or Class 5 to 9 building:~~

~~(i) From 1 May 2023 to 30 September 2023 NSW Section J of NCC 2019 Volume One Amendment 1 may apply instead of Section J of NCC 2022 Volume One.~~

~~(ii)From 1 October 2023 Section J of NCC 2022 Volume One applies.~~

~~**Notes: Tasmania Section J Energy Efficiency**~~

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

## Deemed-to-Satisfy Provisions

### J5D1 Deemed-to-Satisfy Provisions

*NSW J5D1(1)*

(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.

*NSW J5D2*

## J5D2 Application of Part

(1) The Deemed-to-Satisfy Provisions of this Part apply to—

(a) elements forming the envelope of ~~a Class 2 to 9 building, other than~~ a Class 2, 3, 5, 6, 7, 8 or 9 building; and

(b) the external building *fabric* of—

(i) a Class 2 *sole-occupancy unit*; and

(ii) a Class 4 part of a building.

(2) Notwithstanding (1), the *Deemed-to-Satisfy Provisions* of this Part do not apply to—

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

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

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

## J5D3 Chimneys and flues

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

## J5D4 Roof lights

~~(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~~must 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.

*NSW J5D5*

## J5D5 Windows and doors

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

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

(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*~~room containing the entrance 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~~an un-conditioned zone at least 3 m deep between the main entrance, including an open front, and ~~the~~ a *conditioned space*; and

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

(c) where the entrance is a moveable external wall with the capability to open for the purposes of creating a temporary *unconditioned space*; or

~~(ii)~~(d) where, for the safety of the building occupants, it is *required* to be left open at an *early childhood centre*, preschool, *school*, or the like.

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

## J5D6 Exhaust fans

An exhaust fan must be fitted with a sealing device such as a self-closing damper or the like unless necessary for the fan to operate continuously. ~~when serving—~~

~~(a) a *conditioned space*; or~~

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

## J5D7 Construction of ceilings, walls and floors

(1) Ceilings, walls, floors and any opening such as a *window* frame, door frame, *roof light* frame, ventilation opening 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, louvres or the like *required* for smoke hazard management.

## J5D8 Evaporative coolers

An evaporative cooler must be fitted with a self-closing damper or the like in *climate zones* 4, 5, 6, 7 and 8.—

~~(a) when serving a heated space; or~~

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

# Part J6 Air-conditioning and ventilation

*NT Part J6*

## Introduction to this Part

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

~~**Notes**~~

~~From 1 May 2023 to 30 September 2023 Section J of NCC 2019 Volume One Amendment 1 may apply instead of Section J of NCC 2022 Volume One. From 1 October 2023 Section J of NCC 2022 Volume One applies.~~

~~**Notes: New South Wales Section J Energy Efficiency**~~

~~(1) For a Class 2 building or a Class 4 part of a building, where a relevant *development consent* or an application for a complying development certificate requires compliance with a BASIX Single Dwelling or Multi Dwelling Certificate issued under Version 3.0 or earlier, NSW Section J of NCC 2019 Volume One Amendment 1 applies.~~

~~(2) For a Class 2 building or a Class 4 part of a building, where a relevant *development consent* or an application for a complying development certificate requires compliance with a BASIX Single Dwelling or Multi Dwelling Certificate issued under Version 4.0 or later, Section J of NCC 2022 Volume One applies.~~

~~(3) For a Class 2 building or a Class 4 part of a building, where a relevant *development consent* or an application for a complying development certificate requires compliance with a BASIX Alterations and Additions Certificate, NSW Section J of NCC 2019 Volume One Amendment 1 applies.~~

~~(4) For a Class 3 building or Class 5 to 9 building:~~

~~(i) From 1 May 2023 to 30 September 2023 NSW Section J of NCC 2019 Volume One Amendment 1 may apply instead of Section J of NCC 2022 Volume One.~~

~~(ii) From 1 October 2023 Section J of NCC 2022 Volume One applies.~~

~~**Notes: Tasmania Section J Energy Efficiency**~~

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

## Deemed-to-Satisfy Provisions

### J6D1 Deemed-to-Satisfy Provisions

*NSW J6D1(1)*

(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.

*NSW J6D2*

## J6D2 Application of Part

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

## J6D3 Air-conditioning system control

(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) must not use a single air-handing unit to serve more than one *air-conditioning* zone where one zone will require heating at the same time another requires cooling; and

~~(b)~~(c) 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) serve diverse loads through modulating airflow; 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~~

(iv) limit zone-level reheating of air cooled by equipment upstream of the zone to not more than 7.5 °C at any intended airflow rate; and

(v) limit zone-level re-cooling of air heated by equipment upstream of the zone to not more than 7.5 °C at any intended airflow rate.

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

~~(d)~~(e) 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,~~ *conditioned space* that opens to a balcony, atrium, courtyard or the like, must not operate when any external door of the *conditioned space* 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 m2 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) where the design maximum heated water temperature is greater than 45°C, 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~~.~~; and

~~(l)~~(m) where fitted with a cooling tower, must automatically vary the condenser water set point temperature across the full range of condenser water inlet temperatures permitted by the equipment being served.

(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)~~(3) A time switch must be provided to control—

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

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

(4) The time switch provided under (3) must

(a) be capable of switching electric power on and off at variable pre-programmed times and on variable pre-programmed days~~.~~; and

(b) have the ability to program public holidays at least one year ahead; and

(c) be capable of being overridden by—

(i) a demand-operated control; and

(ii) a manual switch; and

(d) allow the resumption of normal operation no longer than 2 hours after any override is activated.

~~(b)~~(5) The requirements of (~~a~~3) and (~~b~~4) do not apply to—

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

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

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

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

**Explanatory Information: Demand-operated control in Class 3**

J7D4 requires demand-operated control of *air-conditioning* systems in a Class 3 *sole-occupancy unit*, other than where providing accommodation for people with a disability or the aged.

**Table J6D3: Requirement for an outdoor air economy cycle**

| *Climate zone* | Total air flow rate *requiring* an economy cycle (L/s) |
|---|---|
| 2 | 9000 |
| 3 | 7500 |
| 4 | 3500 |
| 5 | 3000 |
| 6 | ~~2000~~1200 |
| 7 | 2500 |
| 8 | ~~4000~~2000 |

## J6D4 Mechanical ventilation system control

(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 be capable of being deactivated when the building or part of the building served by that system is not occupied.~~—~~

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

~~(b)~~(2) ~~when~~ When serving a *conditioned space*, except in periods when evaporative cooling is being used, a mechanical ventilation system must—

~~(i)~~(a) where specified in Table J6D4, have—

(i) an energy reclaiming system that—~~—~~

(A) preconditions *outdoor air* at a minimum sensible heat transfer effectiveness of 60%; ~~or~~and

(B) enables bypass of the heat reclaiming system when the *outdoor air* entering the heat exchanger is within 6°C dry bulb of the exhaust air; or

(ii) indirect evaporative cooling that—

(A) incorporates an energy reclaiming system meeting the requirements of (i); and

~~(A)~~(B) has a minimum humidification efficiency of 85%; or

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

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

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

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

~~(C)~~(iii) where an energy reclaiming system preconditions all the *outdoor air*.~~; and~~

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

~~(2)~~(3) ~~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)~~(4) ~~*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)~~(5) A time switch must be provided to a mechanical ventilation system with an air flow rate of more than 1000 L/s.

(6) The time switch provided under (5) must—

~~(b)~~(a) be capable of switching electric power on and off at variable pre-programmed times and on variable pre-programmed days~~.~~; and

(b) have the ability to program public holidays at least one year ahead, and

(c) be capable of being overridden by—

(i) a demand-operated control; or

(ii) a manual switch; and

(d) allow the resumption of normal operation no longer than 2 hours after any override is activated.

~~(c)~~(7) The requirements of (2), (~~a~~5) and (~~b~~6) do not apply to a mechanical ventilation system that serves~~—~~

~~(i) a mechanical ventilation system that serves—~~

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

~~(B)~~(b) a Class 4 part of a building.~~; or~~

(8) The requirements of (5) and (6) do not apply to—

(a) a building where mechanical ventilation is needed for 24 hour occupancy~~.~~; or

~~(ii)~~(b) a *carpark* exhaust system.

**Table J6D4: Required outdoor air treatment**

| *Climate zone* | *Outdoor air* flow (L/s) | *Required* measure – variable flow outside air systems | *Required* measure – constant flow outside air systems |
|---|---|---|---|
| 1 | ≤120 | No *required* measure | No *required* measure |
| 1 | ~~>500~~>120 to ≤2000 | Modulating control | No *required* measure |
| 1 | >2000 | Modulating control | Indirect evaporative cooling system |
| 2 | ≤400 | No *required* measure | No *required* measure |
| 2 | ~~Not applicable~~>400 | ~~No *required* measure~~ Modulating control | No *required* measure |
| 3 | ≤400 | No *required* measure | No *required* measure |
| 3 | ~~>1000~~>400 to ≤2000 | Modulating control | No *required* measure |
| 3 | >2000 | Modulating control | Indirect evaporative cooling system |
| 4 | ≤400 | No *required* measure | No *required* measure |
| 4~~ and 6~~ | ~~>500~~>400 to ≤500 | Modulating control~~ or energy reclaiming system~~ | No *required* measure |
| 4 | >500 | Modulating control | Energy reclaiming system |
| 5 | ≤400 | No *required* measure | No *required* measure |
| 5 | >400 to ≤1000 | Modulating control | No *required* measure |
| 5 | >1000 | Modulating control~~ or energy reclaiming system~~ | Energy reclaiming system |
| 6 | ≤500 | No *required* measure | No *required* measure |
| 6 | >500 | Modulating control | Energy reclaiming system |
| 7 | ≤250 | No *required* measure | No *required* measure |
| 7~~ and 8~~ | >250 | Modulating control~~ or energy reclaiming system~~ | Energy reclaiming system |
| 8 | ≤100 | No *required* measure | No *required* measure |
| 8 | >100 to ≤250 | Modulating control | No *required* measure |
| 8 | >250 | Modulating control | Energy reclaiming system |

## J6D5 Fans and duct systems

(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), (6) and (7); 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), (6) and (7) together; or

(2) Subject to (4) and (5), fans must—

(a) have a peak efficiency of not less than $\eta_{min}$, calculated in accordance with the following formula: ~~.~~

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

where—

(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 (kW) at peak efficiency point; and

(iii) $N$ = the minimum performance grade obtained from Table J6D5a; and

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

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

(vi) ln = natural logarithm; and

(b) either—

(i) individually, have a fan power ratio in accordance with Specification 46 of less than 0.84, or

(ii) collectively, have an average fan power ratio in accordance with Specification 46 of less than 0.84

(3) Where a fan's motor power input at the duty point is greater than 750 W—

(a) the fan must be capable of variable speed operation; and

(b) where serving a single room or space, the fan must be capable of operating at reduced flow when conditions in the room or space served are within the control deadband; and

(c) where not serving a single room or space, the fan and the system it serves must—

(i) be capable of variable volume operation; and

(ii) operate to a variable pressure to the extent practicable.

(4) The requirements of (2)(a) do not apply to fans with a motor input power less than or equal to 125 W

(5) The requirements of (2)(a) and (b) do not apply to—

(a) roof mounted ventilation fans with cowling, or

(b) supply fans inside unitary *air-conditioning* equipment that complies with J6D12, or

(c) fans that need to be explosion proof.

~~(b)~~

~~(2) Fans:~~

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

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

~~(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:~~

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

~~(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 (kW); and~~

~~(iii) $N$ = the minimum performance grade obtained from Table J6D5a; and~~

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

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

~~(vi) ln = natural logarithm.~~

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

~~(3) Ductwork:~~

~~(a)~~(6) 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)~~(7) Flexible ductwork must not account for more than 6 m ~~in~~ total length in any index duct run.

~~(c)~~(8) The upstream connection to ductwork ~~bends, elbows and tees~~fittings in the index run must have an equivalent diameter to the connected duct.

~~(d)~~(9) Turning vanes must be included in all rigid ductwork elbows of 90° or more acute than 90° in the index run except where—

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

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

~~(4)~~(10) ~~Ductwork~~ For ductwork components in the index run—

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

(b) ~~A~~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) ~~A~~any other air filter must not exceed—

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

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

(d) ~~T~~the pressure drop across intake louvres, relief louvres and exhaust 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; and~~.~~

(e) ~~T~~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; and~~.~~

(f) ~~R~~rooftop cowls must not exceed a pressure drop of 30 Pa; and~~.~~

(g) ~~A~~attenuators must not exceed a pressure drop of 40 Pa; and~~.~~

(h) ~~F~~rire dampers must not exceed a pressure drop of 15 Pa when open; and~~.~~

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

(j) ~~S~~supply air diffusers and grilles must not exceed a pressure drop of 40 Pa; and..

(k) ~~E~~exhaust grilles must not exceed a pressure drop of 30 Pa; and~~.~~

(l) ~~T~~transfer ducts must not exceed a pressure drop of 12 Pa; and~~.~~

(m) ~~D~~door grilles and door undercuts provided for air balancing must not exceed a pressure drop of 12 Pa; and~~.~~

(n) ~~A~~active chilled beams must not exceed a pressure drop of 150 Pa.

~~(5)~~(11) The requirements of (1) to (10)~~, (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.

**Notes**

For the purposes of (1)(b), fan motor input power per unit of flowrate may be calculated for *air-conditioning* systems and mechanical ventilation systems together.

**Table J6D5a: Minimum fan performance grade**

| Fan type | Installation type A or C | Installation type B or D |
|---|---|---|
| ~~Axial — as a component of an air handling unit or fan coil unit~~ | ~~46.0~~ | ~~51.5~~ |
| All fans as a component of an air handling unit or fan coil unit | 61 | 64 |
| Axial ~~— other~~ | ~~42.0~~40 | ~~61.0~~58 |
| Mixed flow~~— as a component of an air handling unit or fan coil unit~~ | ~~46.0~~50 | ~~51.5~~62 |
| ~~Mixed flow — other~~ | ~~52.5~~ | ~~65.0~~ |
| Centrifugal forward — curved | ~~46.0~~44 | ~~51.5~~49 |
| Centrifugal radial bladed | ~~46.0~~44 | ~~51.5~~49 |
| Centrifugal backward-curved | ~~64.0~~61 | 64~~.0~~ |

**Table Notes**

(1) Installation type A means an arrangement where the fan is installed with free inlet and outlet conditions.

(2) Installation type B means an arrangement where the fan is installed with a free inlet and a duct at its outlet.

(3) Installation type C means an arrangement where the fan is installed with a duct fitted to its inlet and with free outlet conditions.

(4) Installation type D means an arrangement where the fan is installed with a duct fitted to its inlet and outlet.

**Table J6D5b: Fan regression coefficient a**

| Fan type | Fan motor input power < 10 kW | Fan motor input power ≥ 10 kW |
|---|---|---|
| Axial | 2.74 | 0.78 |
| Mixed flow | 4.56 | 1.1 |
| Centrifugal forward-curved | 2.74 | 0.78 |
| Centrifugal radial bladed | 2.74 | 0.78 |
| Centrifugal backward-curved | 4.56 | 1.1 |

**Table J6D5c: Fan regression coefficient b**

| Fan type | Fan motor input power < 10 kW | Fan motor input power ≥ 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 |

| Number of rows | Maximum pressure drop (Pa) |
|---|---|
| 2 | 50 |
| 4 | 90 |
| 6 | 130 |
| 8 | 175 |
| 10 | 220 |

**Table J6D5e: Maximum clean filter pressure drop**

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

## J6D6 Ductwork insulation

(1) Ductwork and fittings in an *air-conditioning* system must be provided with insulation—

(a) complying with AS/NZS 4859.1; and

(b) having an insulation *R-Value* greater than or equal to—

(i) for flexible ductwork, 1.0; or

(ii) for cushion boxes, that of the connecting ductwork; or

(iii) that specified in Table J6D6.

(2) Insulation must—

(a) be protected against the effects of weather and sunlight; and

(b) be installed so that it—

(i) abuts adjoining insulation to form a continuous barrier; and

(ii) maintains its position and thickness, other than at flanges and supports; and

(c) when conveying cooled air—

(i) be protected by a vapour barrier on the outside of the insulation; and

(ii) where the vapour barrier is a membrane, be installed so that adjoining sheets of the membrane—

(A) overlap by at least 50 mm; and

(B) are bonded or taped together.

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

(a) ductwork and fittings located within the only or last room served by the system; or

(b) fittings that form part of the interface with the *conditioned space*; or

(c) return air ductwork in, or passing through, a *conditioned space*; or

(d) ductwork for *outdoor air* and exhaust air associated with an *air-conditioning* system; or

(e) the floor of an in-situ air-handling unit; or

~~(f) packaged air conditioners, split systems, and variable refrigerant flow *air-conditioning* equipment complying with *MEPS*; or~~

~~(g)~~(f) flexible fan connections.

(4) For the purposes of (1), (2) and (3), fittings—

(b) exclude active components such as air-handling unit components.

**Table J6D6: Ductwork and fittings – Minimum insulation R-Value**

| Location of ductwork and fittings | *Climate zone* 1, 2, 3, 4, 5, 6 or 7 | *Climate zone* 8 |
|---|---|---|
| Within a conditioned space | 1.2 | 2.0 |
| Where exposed to direct sunlight | 3.0 | 3.0 |
| All other locations | 2.0 | 3.0 |

## J6D7 Ductwork sealing

Ductwork in an *air-conditioning* system with a capacity of 3000 L/s or greater, not located within the only or last room served by the system, must be sealed against air loss in accordance with the duct sealing requirements of AS 4254.1 and AS 4254.2 for the static pressure in the system.

## J6D8 Pump systems

(1) General — Pumps and pipework that form part of an *air-conditioning* system must either—

(a) separately comply with (2), (3), ~~and~~ (4) and (5); 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) and (5) together.

(2) Where the pump motor power input at the duty point is greater than 750 W, a pump must be capable of—

(a) variable speed operation; and

(b) where serving a distributive system—

(i) variable volume operation; and

(ii) variable pressure operation to the extent permitted by—

(A) static head requirements; and

(B) the requirements of downstream equipment.

(3) A distributive system must not have—

(a) uncontrolled bypasses; or

(b) three port valves.

~~(2)~~(4) 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)~~(5) 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)~~(6) 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~~ volume systems, the values nominated in Table J6D8a; or

(ii) for variable ~~speed~~ volume systems, the values nominated in Table J6D8b; or

(b) in any other pipework system, must achieve an average pressure drop of not more than—

(i) for constant ~~speed~~ volume systems, the values nominated in Table J6D8c; or

(ii) for variable ~~speed~~ volume systems, the values nominated in Table J6D8d.

~~(5)~~(7) The requirements of ~~(4)~~(6) do not apply—

(a) to valves and fittings; or

(b) where the smallest pipe size compliant with (4) results in a velocity of 0.7 m/s or less at design flow.

**Table J6D8a: Maximum pipework pressure drop – Non-distributive constant ~~speed~~volume 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 |

| 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) |
|---|---|---|
| 40 | 400 | 400 |
| 50 | 400 | 350 |
| 65 | 400 | 350 |
| 80 | 400 | 350 |
| 100 | 400 | 200 |
| 125 | 400 | 200 |
| 150 or more | 400 | 200 |

**Table J6D8b: Maximum pipework pressure drop – Non-distributive variable ~~speed~~ volume systems**

| Nominal pipe diameter (mm) | Maximum pressure drop in systems operating 5000 hours/annum or less (Pa/m) | Maximum pressure drop in systems operating more than 5000 hours/annum (Pa/m) |
|---|---|---|
| Not more than 20 | 400 | 400 |
| 25 | 400 | 400 |
| 32 | 400 | 400 |
| 40 | 400 | 400 |
| 50 | 400 | 400 |
| 65 | 400 | 400 |
| 80 | 400 | 400 |
| 100 | 400 | 300 |
| 125 | 400 | 300 |
| 150 or more | 400 | 300 |

**Table J6D8c: Maximum pipework pressure drop – Distributive constant ~~speed~~ volume systems**

| Nominal pipe diameter (mm) | Maximum pressure drop in systems operating 2000 hours/annum or less (Pa/m) | Maximum pressure drop in systems operating between 2000 hours/annum and 5000 hrs/yr (Pa/m) | Maximum pressure drop in systems operating more than 5000 hours/annum (Pa/m) |
|---|---|---|---|
| Not more than 20 | 400 | 300 | 150 |
| 25 | 400 | 220 | 100 |
| 32 | 400 | 220 | 100 |
| 40 | 400 | 220 | 100 |
| 50 | 400 | 220 | 100 |
| 65 | 400 | 400 | 170 |
| 80 | 400 | 400 | 170 |
| 100 | 400 | 400 | 170 |
| 125 | 400 | 400 | 170 |
| 150 or more | 400 | 400 | 170 |

**Table J6D8d: Maximum pipework pressure drop – Distributive variable ~~speed~~ volume 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 |

## J6D9 Pipework insulation

(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 within appliances covered by *MEPS*, must be provided with insulation—

(a) complying with AS/NZS 4859.1; and

(b) for *piping* of heating and cooling fluids, having an insulation *R-Value* in accordance with Table J6D9a; and

(c) for vessels, heat exchangers or tanks, having an insulation *R-Value* in accordance with Table J6D9b; and

(d) for refill or pressure relief *piping*, having an insulation *R-Value* equal to the *required* insulation *R-Value* of the connected pipe, vessel or tank within 500 mm of the connection.

(2) Insulation must—

(a) be protected against the effects of weather and sunlight; and

(b) be able to withstand the temperatures within the *piping*, vessel, heat exchanger or tank.

(3) Insulation provided to *piping*, vessels, heat exchangers or tanks containing cooling fluid must be protected by a vapour barrier on the outside of the insulation.

(4) The requirements of (1) and (2) do not apply to *piping*, vessels or heat exchangers—

(a) located within the only or last room served by the system and downstream of the control device for the regulation of heating or cooling service to that room; or

(b) encased within a concrete slab or panel which is part of a heating or cooling system; or

(c) supplied as an integral part of a chiller, *boiler* or unitary air-conditioner complying with the requirements of J6D10, J6D11 and J6D12; or

(d) inside an air-handling unit, fan-coil unit, or the like.

(5) For the purposes of (1), (2), (3) and (4)—

(a) heating fluids include ~~refrigerant,~~ heated water, steam and condensate; and

(b) cooling fluids include refrigerant, chilled water, brines and glycol mixtures, but do not include condenser cooling water.

**Table J6D9a: Piping — Minimum insulation R-Value**

| Fluid temperature | Minimum insulation *R-Value* nominal pipe diameter ≤ 40 mm | Minimum insulation *R-Value* — nominal pipe diameter > 40 mm and ≤ 80 mm | Minimum insulation *R-Value* — nominal pipe diameter between > 80 mm and ≤ 150 mm | Minimum insulation *R-Value* — nominal pipe diameter > 150 mm |
|---|---|---|---|---|
| Low temperature chilled — ≤ 2°C | 1.3 | 1.7 | 2.0 | 2.7 |
| Chilled — > 2°C but ≤ 20°C | 1.0 | 1.5 | 2.0 | 2.0 |
| Heated — > 30°C but ≤ 85°C | 1.7 | 1.7 | 1.7 | 1.7 |
| High Temperature heated — > 85°C | 2.7 | 2.7 | 2.7 | 2.7 |

**Table Notes**

The minimum *required R-Value* may be halved for *piping* penetrating a structural member.

**Table J6D9b: Vessels, heat exchangers and tanks — Minimum insulation R-Value**

| Fluid temperature range | Minimum insulation *R-Value* |
|---|---|
| Low temperature chilled — ≤ 2°C | 2.7 |
| Chilled — > 2°C but ≤ 20°C | 1.8 |
| Heated — > 30°C but ≤ 85°C | 3.0 |
| High temperature heated — > 85°C | 3.0 |

## J6D10 Space heating

(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 resistance heater ~~if—~~with a heating capacity of not more than 40 W/m$^2$; or

~~(i) the heating capacity is not more than—~~

~~(A) 10 W/m$^2$ of the *floor area* of the *conditioned space* in *climate zone* 1; or~~

~~(B) 40 W/m$^2$ of the *floor area* of the *conditioned space* in *climate zone* 2; or~~

~~(C) the value specified in Table J6D10 where reticulated gas is not available at the allotment boundary; or~~

~~(ii) the annual energy consumption for heating is not more than 15 kWh/m$^2$ of the *floor area* of the *conditioned space* in *climate zones* 1, 2, 3, 4 and 5; or~~

~~(iii) the in-duct heater complies with J6D3(1)(b)(iii); or~~

(f) any combination of (a) to (e).

*NSW J6D10(2)*

(2) An electric resistance heater may be used for heating a bathroom ~~if—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.~~

(a) the heating capacity is not more than 1.2 kW; and

(b) the heater has a time switch configured to deactivate the heater after a run-on period not more than 15 minutes from when there are no occupants in the space served.

(3) A fixed heating or cooling appliance that moderates the temperature of an outdoor space must— ~~be configured to automatically shut down when—~~

(a) be a radiant heater or evaporative cooler; and

(b) be configured to automatically shut down when—

~~(a)~~(i) there are no occupants in the space served; or

~~(b)~~(ii) a period of one hour has elapsed since the last activation ~~of the heater~~; or

~~(c)~~(iii) the space served has reached the design temperature~~.~~ for heating; or

(iv) the space served has reached the design temperature for 30 minutes for cooling.

(4) A gas water heater, that is used as part of an *air-conditioning* system, must achieve a minimum gross thermal efficiency of 90%.~~—~~

~~(a) if rated to consume 500 MJ/hour of gas or less, achieve a minimum gross thermal efficiency of 86%; or~~

~~(b) if rated to consume more than 500 MJ/hour of gas, achieve a minimum gross thermal efficiency of 90%.~~

**~~Table J6D10: Maximum electric heating capacity~~**

| ~~*Floor area of the conditioned space*~~ | ~~W/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~~ |

(5) A building with gas space heating must be provided with—

(a) a reserved electrical capacity sufficient to support future installation of—

(i) electric resistance space heating system with a heating capacity of not more than 40 W/m²; or

(ii) air-source heat pump water heating equipment with a coefficient of performance of 3.25; or

(iii) a combination of (i) and (ii); and

(b) reserved space within the main electrical distribution board, labelled accordingly, sized to facilitate future installation of switchgear and electrical supply for electric space heating equipment sized in accordance with

(a); and,

(c) reserved space in the electrical riser or supply pathway to facilitate supply for future electric space heating equipment sized in accordance with (a).

(6) Where reserved capacity for air-source heat pump water heating equipment is *required* by (5), the building must be provided with—

(a) reserved space for an open-roofed plant room or rooftop plant area with—

(i) an area of at least 36 m² plus 0.04 m²/kW of heating capacity to facilitate future installation of air-source heat pump water heating equipment; and

(ii) sufficient ventilation openings to achieve airflow of at least 100 L/s per kW of heating capacity to facilitate future air-source heat pump equipment, with no recirculation of air; and

(iii) connection to the space heating hot water system; and

(b) a hot water circulation system that operates at a peak temperature of less than 50°C.

(7) Capacity and space *required* by (5) and (6) must be sufficient to serve all of the *conditioned space* with the same design load used to specify the gas space heater equipment.

(8) Each connected group of one or more air-source heat pump water heaters, including 4-pipe chillers, must—

(a) when operating in heating mode have a capacity-weighted average coefficient of performance for heating mode operation of not less than 3.25 $W_r/W_{input\ power}$ at intermediate temperature and standard rating conditions as specified in Table 13 of EN 14511-2:2022; and

(b) when operating in cooling mode—

(i) have a capacity-weighted average energy efficiency ratio at full load of greater than 3.0 $W_r/W_{input}$ power when rated to AHRI 551/591; and

(ii) have a capacity-weighted average integrated part load value of 4.85 $W_r/W_{input}$ power when rated to AHRI 551/591.

(9) The capacity-weighted average of each efficiency metric in (8) must be calculated in accordance with the following formula:

$$Capacity\ weighted\ average\ = \frac{\sum_{i=1}^{i=n} Ci\ Efficiency_i}{\sum_{i=1}^{i=n} Ci}$$

where—

(i) $n$ = the number of heat pump water heaters in the group; and

(ii) $Ci$ = the capacity of each heater, $i$, in either heating or cooling mode as applicable; and

(iii) $Efficiency_i$ = the rated coefficient of performance, energy efficiency ratio, or integrated part load value of each heater, $i$, as applicable.

## J6D11 Refrigerant chillers

~~An *air-conditioning* system refrigerant chiller must comply with *MEPS* and the full load operation energy efficiency ratio and integrated part load energy efficiency ratio in Table J6D11a or Table J6D11b when determined in accordance with AHRI 551/591.~~

**Table J6D11a: Minimum energy efficiency ratio for refrigerant chillers – Option 1**

| Chiller type | Full load operation ($W_r/W_{input\ power}$) | Integrated part load ($W_r/W_{input\ power}$) |
|---|---|---|
| Air-cooled chiller with a capacity ≤ 528 kWr | 2.985 | 4.048 |
| Air-cooled chiller with a capacity > 528 kWr | 2.985 | 4.137 |
| Water-cooled positive displacement chiller with a capacity ≤ 264 kWr | 4.694 | 5.867 |
| Water-cooled positive displacement chiller with a capacity > 264 kWr but ≤ 528 kWr | 4.889 | 6.286 |
| Water-cooled positive displacement chiller with a capacity > 528 kWr but ≤ 1055 kWr | 5.334 | 6.519 |
| Water-cooled positive displacement chiller with a capacity > 1055 kWr but ≤ 2110 kWr | 5.800 | 6.770 |
| Water-cooled positive displacement chiller with a capacity > 2110 kWr | 6.286 | 7.041 |
| Water-cooled centrifugal chiller with a capacity ≤ 528 kWr | 5.771 | 6.401 |
| Water-cooled centrifugal chiller with a capacity > 528 kWr but ≤ 1055 kWr | 5.771 | 6.519 |
| Water-cooled centrifugal chiller with a capacity > 1055 kWr but ≤ 1407 kWr | 6.286 | 6.770 |
| Water-cooled centrifugal chiller with a capacity > 1407 kWr | 6.286 | 7.041 |

~~**Table J6D11b: Minimum energy efficiency ratio for refrigerant chillers – Option 2**~~

| Chiller type | Full load operation ($W_r/W_{input\ power}$) | Integrated part load ($W_r/W_{input\ power}$) |
|---|---|---|
| ~~Air-cooled chiller with a capacity ≤ 528 kWr~~ | ~~2.866~~ | ~~4.669~~ |
| ~~Air-cooled chiller with a capacity > 528 kWr~~ | ~~2.866~~ | ~~4.758~~ |
| ~~Water-cooled positive displacement chiller with a capacity ≤ 264 kWr~~ | ~~4.513~~ | ~~7.041~~ |
| ~~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~~ |

Each connected group of one or more air-conditioning system refrigerant chillers, other than 4-pipe chillers or air source heat pump water heaters, must achieve a climate specific part load value in accordance with Specification 47 greater than—

(a) where all chillers in the group are water-cooled, the applicable value specified in Table J6D11a; or

(b) where all chillers in the group are air-cooled, the applicable value specified in Table J6D11b; or

(c) where the group has both water-cooled and air-cooled chillers, the average of the applicable values specified in Table J6D11a and Table J6D11b weighted according to the total full-load capacity of the chillers.

**Table J6D11a. Minimum climate specific part load value for a connected group of water-cooled chiller plant**

| Climate zone | Design load range (kW) | Climate specific part load value – Class 2 common area, a Class 5, 6, 7, 8 or 9b building or a Class 9a building other than a ward area | Climate specific part load value – Class 3 or 9c building or a Class 9a ward area |
|---|---|---|---|
| 1 | 0 ≤ 440 | 4.82 | 4.76 |
| 1 | > 440 ≤ 880 | 4.87 | 5.34 |
| 1 | > 880 ≤ 1760 | 4.88 | 4.84 |
| 1 | > 1760 ≤ 2345 | 4.93 | 4.89 |
| 1 | > 2345 | 5.16 | 5.16 |
| 2 | 0 ≤ 440 | 5.38 | 5.38 |
| 2 | > 440 ≤ 880 | 6.07 | 6.2 |
| 2 | > 880 ≤ 1760 | 6.45 | 6.4 |
| 2 | > 1760 ≤ 2345 | 6.46 | 6.47 |
| 2 | > 2345 | 6.91 | 6.91 |
| 3 | 0 ≤ 440 | 5.2 | 5.19 |
| 3 | > 440 ≤ 880 | 5.57 | 5.69 |
| 3 | > 880 ≤ 1760 | 5.87 | 5.82 |
| 3 | > 1760 ≤ 2345 | 5.89 | 6.21 |
| 3 | > 2345 | 6.28 | 6.28 |
| 4 | 0 ≤ 440 | 5.48 | 5.52 |
| 4 | > 440 ≤ 880 | 6.36 | 6.5 |
| 4 | > 880 ≤ 1760 | 6.95 | 6.92 |
| 4 | > 1760 ≤ 2345 | 6.98 | 6.98 |
| 4 | > 2345 | 7.52 | 7.52 |
| 5 | 0 ≤ 440 | 5.54 | 5.58 |
| 5 | > 440 ≤ 880 | 6.4 | 6.5 |
| 5 | > 880 ≤ 1760 | 6.92 | 7.07 |
| 5 | > 1760 ≤ 2345 | 6.98 | 6.98 |
| 5 | > 2345 | 7.68 | 7.68 |
| 6 | 0 to ≤ 440 | 5.65 | 5.74 |
| 6 | > 440 ≤ 880 | 6.87 | 7.26 |
| 6 | > 880 ≤ 1760 | 7.93 | 7.89 |
| 6 | > 1760 ≤ 2345 | 7.83 | 7.83 |
| 6 | > 2345 | 8.25 | 8.25 |
| 7 | 0 ≤ 440 | 5.63 | 5.71 |
| 7 | > 440 ≤ 880 | 6.74 | 7.04 |
| 7 | > 880 ≤ 1760 | 7.63 | 7.59 |
| 7 | > 1760 ≤ 2345 | 7.58 | 7.58 |
| 7 | > 2345 | 8.27 | 8.27 |
| 8 | 0 ≤ 440 | 5.8 | 5.95 |
| 8 | > 440 ≤ 880 | 7.38 | 8.04 |
| 8 | > 880 ≤ 1760 | 8.98 | 8.92 |

| | | | |
|---|---|---|---|
| 8 | > 1760 ≤ 2345 | 8.72 | 8.72 |
| 8 | > 2345 | 10.02 | 10.02 |

**Table Notes**

Where a connected group of chillers serves buildings or parts of buildings with different climate specific part load value requirements, the value must be calculated in accordance with the following formula:

$$CSPLV = \frac{CSPLV_{DT}D_{DT} + CSPLV_{ON}D_{ON}}{D_{DT} + D_{ON}}$$

where—

(a) $CSPLV_{DT}$ = the climate specific part load value calculated according to J6D11(1) 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; and

(b) $CSPLV_{ON}$ = the climate specific part load value calculated in J6D11(1) for a Class 3 or 9c building or a Class 9a ward area; and

(c) $D_{DT}$ = the total design load across all Class 2 common areas, Class 5, 6, 7, 8 or 9b buildings or Class 9a buildings other than ward areas served by the group of chillers; and

(d) $D_{ON}$ = the total design load across all Class 3 or 9c buildings or Class 9a ward areas served by the group of chillers.

**Table J6D11b: Minimum climate specific part load value for a connected group of air-cooled chiller plant**

| Climate zone | Design load range (kWth) | *Climate specific part load value – Class 2 common area, a Class 5, 6, 7, 8 or 9b building or a Class 9a building other than a ward area* | *Climate specific part load value – Class 3, 9c or 9a ward area* |
|---|---|---|---|
| 1 | 0 – 880 kW | 4.03 | 4.08 |
| 1 | > 880 kW | 3.76 | 3.9 |
| 2 | 0 – 880 kW | 4.93 | 4.98 |
| 2 | > 880 kW | 4.56 | 4.66 |
| 3 | 0 – 880 kW | 4.61 | 4.58 |
| 3 | > 880 kW | 4.39 | 4.22 |
| 4 | 0 – 880 kW | 5.17 | 5.35 |
| 4 | > 880 kW | 4.73 | 4.92 |
| 5 | 0 – 880 kW | 5.26 | 5.36 |
| 5 | > 880 kW | 4.94 | 4.99 |
| 6 | 0 – 880 kW | 5.73 | 5.87 |
| 6 | > 880 kW | 5.33 | 5.39 |
| 7 | 0 – 880 kW | 5.54 | 5.6 |
| 7 | > 880 kW | 5.21 | 5.21 |
| 8 | 0 – 880 kW | 6.05 | 6.35 |
| 8 | > 880 kW | 5.88 | 6.16 |

**Table Notes**

Where a connected group of chillers serves buildings or parts of buildings with different climate specific part load value requirements, the value must be calculated in accordance with the following formula:

$$CSPLV = \frac{CSPLV_{DT}D_{DT} + CSPLV_{ON}D_{ON}}{D_{DT} + D_{ON}}$$

where—

(a) $CSPLV_{DT}$ = the climate specific part load value calculated according to J6D11(1) 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; and

(b) $CSPLV_{ON}$ = the climate specific part load value calculated in J6D11(1) for a Class 3 or 9c building or a Class 9a ward area; and

(c) $D_{DT}$ = the total design load across all Class 2 common areas, Class 5, 6, 7, 8 or 9b buildings or Class 9a buildings other than ward areas served by the group of chillers; and

(d) $D_{ON}$ = the total design load across all Class 3 or 9c buildings or Class 9a ward areas served by the group of chillers.

## J6D12 Unitary air-conditioning equipment

~~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.~~

(1) Water-cooled unitary air conditioners with a capacity greater than or equal to 65 kWr, including packaged air-conditioners, split system, and variable refrigerant flow units, must have a minimum energy efficiency ratio of 4.0 $Wr/W_{input\ power}$ for cooling when tested in accordance with AS/NZS ISO 13256.1 at test condition C3, where input power includes both compressor and fan input power.

(2) Assessed collectively, a building's air-cooled unitary air-conditioning equipment, including packaged air-conditioners, split systems, and variable refrigerant flow systems, must have a weighted efficiency index, calculated in accordance with Specification 48, greater than 1.

(3) Air-cooled unitary air-conditioners, including packaged air-conditioners, split systems, and variable refrigerant flow systems, must—

(a) have at least one—

(i) digital scroll compressor; or

(ii) inverter driven compressor; and

(b) have variable speed condenser fans.

(4) The requirements of (2) and (3) do not apply to unitary air-conditioners with a capacity less than 10 kWr.

## J6D13 Heat rejection equipment

(1) The motor rated power of a fan in a cooling tower, closed circuit cooler or evaporative condenser must not exceed the allowances in Table J6D13.

(2) The fan in an air-cooled condenser must have a motor rated power of not more than 42 W for each kW of heat rejected from the refrigerant, when determined in accordance with AHRI 460 except for—

(a) a refrigerant chiller in an *air-conditioning* system that complies with the energy efficiency ratios in J6D11; or

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

(3) A fan with a three-phase motor in heat rejection equipment must be capable of variable speed operation.

(4) The requirements of (3) do not apply to—

(a) a fan in a refrigerant chiller of an *air-conditioning* system that complies with J6D11; and

(b) a fan in unitary *air-conditioning* equipment that complies with J6D12; and

(c) a fan in a 4-pipe chiller or air source heat pump water heater that complies with J6D10(8).

# Part J7 Artificial lighting and power

*NT Part J7*

## Introduction to this Part

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

**~~Notes~~**

~~From 1 May 2023 to 30 September 2023 Section J of NCC 2019 Volume One Amendment 1 may apply instead of Section J of NCC 2022 Volume One. From 1 October 2023 Section J of NCC 2022 Volume One applies.~~

**~~Notes: New South Wales Section J Energy Efficiency~~**

~~(1) For a Class 2 building or a Class 4 part of a building, where a relevant *development consent* or an application for a complying development certificate requires compliance with a BASIX Single Dwelling or Multi Dwelling Certificate issued under Version 3.0 or earlier, NSW Section J of NCC 2019 Volume One Amendment 1 applies.~~

~~(2) For a Class 2 building or a Class 4 part of a building, where a relevant *development consent* or an application for a complying development certificate requires compliance with a BASIX Single Dwelling or Multi Dwelling Certificate issued under Version 4.0 or later, Section J of NCC 2022 Volume One applies.~~

~~(3) For a Class 2 building or a Class 4 part of a building, where a relevant *development consent* or an application for a complying development certificate requires compliance with a BASIX Alterations and Additions Certificate, NSW Section J of NCC 2019 Volume One Amendment 1 applies.~~

~~(4) For a Class 3 building or Class 5 to 9 building:~~

~~(i) From 1 May 2023 to 30 September 2023 NSW Section J of NCC 2019 Volume One Amendment 1 may apply instead of Section J of NCC 2022 Volume One.~~

~~From 1 October 2023 Section J of NCC 2022 Volume One applies.~~

**~~Notes: Tasmania Section J Energy Efficiency~~**

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

## Deemed-to-Satisfy Provisions

### J7D1 Deemed-to-Satisfy Provisions

*NSW J7D1(1)*

(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.

*NSW J7D2*

## J7D2 Application of Part

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

## J7D3 Artificial lighting

*NSW J7D3(1)*

(1) In a *sole-occupancy unit* of a Class 2 building or a Class 4 part of a building—

(a) the *lamp power density* or *illumination power density* of artificial lighting must not exceed the allowance of—

(i) 5 W/m$^2$ within a *sole-occupancy unit*; and

(ii) 4 W/m$^2$ on a verandah, balcony or the like attached to a *sole-occupancy unit*; and

(b) the *illumination power density* allowance in (a) may be increased by dividing it by the *illumination power density* adjustment factor for a control device in Table J7D3b as applicable; and

(c) when designing the *lamp power density* or *illumination power density*, the power of the proposed installation must be used rather than nominal allowances for exposed batten holders or luminaires; and

(d) halogen lamps must be separately switched from fluorescent lamps.

*NSW J7D3(2)*

(2) In a building other than a *sole-occupancy unit* of a Class 2 building or a Class 4 part of a building—

(a) for artificial lighting, the aggregate design illumination power load must not exceed the sum of the allowances obtained by multiplying the area of each space by the maximum *illumination power density* in Table J7D3a; and

(b) the aggregate design illumination power load in (a) is the sum of the design illumination power loads in each of the spaces served; and

(c) where there are multiple lighting systems serving the same space, the design illumination power load for (b) is—

(i) the total illumination power load of all systems; or

(ii) where a control system permits only one system to operate at a time based on the highest illumination power load; or determined by the formula—

$$[H \times T/2 + P \times (100 - T/2)]/100$$

(d) In the formula at (c)(ii)—

(i) $H$ = the highest illumination power load; and

(ii) $T$ = the time for which the maximum illumination power load will occur, expressed as a percentage; and

(iii) $P$ = the predominant illumination power load.

(3) The requirements of (1) and (2) do not apply to the following:

(a) Emergency lighting provided in accordance with Part E4.

(b) Signage, display lighting within cabinets and display cases that are fixed in place.

(c) Lighting for accommodation within the residential part of a *detention centre*.

(d) A heater where the heater also emits light, such as in bathrooms.

(e) Lighting of a specialist process nature such as in a surgical operating theatre, fume cupboard or clean workstation.

(f) Lighting of performances such as theatrical or sporting.

(g) Lighting for the permanent display and preservation of works of art or objects in a museum or gallery other than for retail sale, purchase or auction.

(h) Lighting installed solely to provide photosynthetically active radiation for indoor plant growth on green walls and the like.

(4) For the purposes of Table J7D3b, the following control devices must comply with Specification 40:

~~(a) Lighting timers.~~

~~(b)~~(a) ~~Motion detectors.~~Demand-operated controls.

~~(c)~~(b) Daylight sensors and dynamic lighting control devices.

**Table J7D3a: Maximum illumination power density**

| Space | Maximum *illumination power density* (W/m$^2$) |
|---|---|
| Auditorium, church and public hall | 8 |
| Board room and conference room | 5 |
| *Carpark* - general | 2 |
| *Carpark* - entry zone (first 15 m of travel) during the daytime | 11.5 |
| *Carpark* - entry zone (next 4 m of travel) during the day | 2.5 |
| *Carpark* - entry zone (first 20 m of travel) during night time | 2.5 |
| Common rooms, spaces and corridors in a Class 2 building | 4.5 |
| Control room, switch room and the like - intermittent monitoring | 3 |
| Control room, switch room and the like - constant monitoring | 4.5 |
| Corridors | 5 |
| Courtroom | 4.5 |
| Dormitory of a Class 3 building used for sleeping only | 3 |
| Dormitory of a Class 3 building used for sleeping and study | 4 |
| Entry lobby from outside the building | 9 |
| Health-care - infants' and children's wards and emergency department | 4 |
| Health-care - examination room | 4.5 |
| Health-care - examination room in intensive care and high dependency ward | 6 |
| Health-care - all other *patient care areas* including wards and corridors | 2.5 |
| Kitchen and food preparation area | 4 |
| Laboratory - artificially lit to an ambient level of 400 lx or more | 6 |
| Library - stack and shelving area | 2.5 |
| Library - reading room and general areas | 4.5 |
| Lounge area for communal use in a Class 3 or 9c building | 4.5 |
| Museum and gallery - circulation, cleaning and service lighting | 2.5 |
| Office - artificially lit to an ambient level of 200 lx or more | 4.5 |
| Office - artificially lit to an ambient level of less than 200 lx | 2.5 |

| Space | Maximum *illumination power density* (W/m$^2$) |
|---|---|
| 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~~5.5 |

**Table Notes**

(1) In areas not listed above, the maximum *illumination power density* is—

(i) for an illuminance not more than 80 lx, 2 W/m$^2$; and

(ii) for an illuminance more than 80 lx and not more than 160 lx, 2.5 W/m$^2$; and

(iii) for an illuminance more than 160 lx and not more than 240 lx, 3 W/m$^2$; and

(iv) for an illuminance more than 240 lx and not more than 320 lx, 4.5 W/m$^2$; and

(v) for an illuminance more than 320 lx and not more than 400 lx, 6 W/m$^2$; and

(vi) for an illuminance more than 400 lx and not more than 600 lx, 10 W/m$^2$; and

(vii) for an illuminance more than 600 lx and not more than 800 lx, 11.5 W/m$^2$.

(2) For enclosed spaces with a Room Aspect Ratio of less than 1.5, the maximum *illumination power density* may be increased by dividing it by an adjustment factor for room aspect which is 0.5 + (Room Aspect Ratio/3).

(3) The Room Aspect Ratio of the enclosed space is determined by the formula: A/(H x C), where—

(i) A is the area of the enclosed space; and

(ii) H is the height of the space measured from the floor to the highest part of the ceiling; and

(iii) C is the perimeter of the enclosed space at floor level.

(4) In addition to 2, the maximum *illumination power density* may be increased by dividing it by the *illumination power density* adjustment factor in Table J7D3b and Table J7D3c. ~~and where the control device is not installed to comply with J6D4.~~

(5) Circulation spaces are included in the allowances listed in ~~the~~ this ~~T~~table.

**Table J7D3b: Illumination power density adjustment factor for a control device**

| Item Notes 1 and 2 | Description | *illumination power density* adjustment factor |
|---|---|---|
| Demand-operated controls~~Motion detector~~ | In a toilet or change room, other than a public toilet, in a Class 6 building | 0.4 |
| Demand-operated controls~~Motion detector~~ | Where a group of light fittings serving less than 100 m$^2$ is controlled by one or more detectors | 0.6 |

| Item Notes 1 and 2 | Description | *illumination power density* adjustment factor |
|---|---|---|
| Demand-operated controls~~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 |
| 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 × (B/2 + 0.5), ~~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) For lighting controlled by daylight sensors, the illumination power density adjustment factor is only applied between 8:00 am and 7:00 pm.~~The *illumination power density* adjustment factor is only applied to lights controlled by daylight sensors between 8:00 am and 7:00 pm~~.

**Table J7D3c: Illumination power density adjustment factor for light colour**

| Light source | Description | *Illumination power density* adjustment factor |
|---|---|---|
| CRI ≥ 90 | Where lighting with good colour rendering is used | 0.9 |
| CCT ≤ 3500 K Note | Where lighting with a warm appearance is used | 0.8 |
| CCT ≥ 4500 K | Where lighting with a cool appearance is used | 1.1 |

**Table Notes**

Includes luminaires that can adjust their CCT to 3500 K or below.

## J7D4 Interior artificial lighting and power control

(1) In a *sole-occupancy unit* of a Class 2 building or a Class 4 part of a building, ~~A~~all artificial lighting of a room or space must be individually operated by—~~–~~

(a) ~~A~~a manual switch; or

(b) other control device; or

(c) a combination of (a) and (b);~~.~~

in accordance with Specification 40.

(2) Subject to (3) to (13), other than in a sole-occupancy unit of a Class 2 building or a Class 4 part of a building, all artificial lighting must be controlled by demand-operated control devices in accordance with Specification 40.

(3) A room or space with regular occupancy may have a time switch installed that—

(a) overrides demand-operated controls during the period of regular occupancy; and

(b) complies with Specification 40.

(4) A room or space with less than 20 W of artificial lighting that is situated within a larger room or space, may be controlled by manual switch when the artificial lighting within the larger room or space is activated.

(5) A space within a carpark with regular occupancy for greater than 5000 hours per annum need not have demand-operated control.

(6) For the purposes of (3), (4) and (5), "regular occupancy" is when a room or space is—

(a) occupied by more than 1 person per 40 m2; or

(b) used more than once every 15 minutes.

~~(2)~~(7) ~~An occupant activated device, such as a room security device, a motion detector in accordance with Specification 40, or the like,~~ Demand-operated control 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~~disable the artificial lighting, air-condition~~er~~ing, local ~~exhaust~~ fans and bathroom heat~~er~~ing when the *sole-occupancy unit* is unoccupied.

~~(3)~~(8) A demand-operated control required by (2) must, for other than a single functional space such as an auditorium, theatre, swimming pool, sporting stadium or warehouse, not operate more than 250 m2 of lighting ~~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 $m^2$.

*NSW J7D4(4)*

~~(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)~~(9) 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.

(10) Artificial lighting in a fire-isolated stairway, fire-isolated passageway or fire-isolated ramp, must be controlled by demand-operated control ~~motion detector~~ in accordance with Specification 40.

~~(6)~~(11) 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.

~~(7)~~(12) 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.

~~(8)~~(13) The requirements of (1)~~, (2), (3), (4), (5), (6), (7) and (8)~~ to (12) 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.

~~(9) The requirements of (4) do not apply to the following:~~

~~(a) Artificial lighting in a space where the sudden loss of artificial lighting would cause an unsafe situation such as—~~

~~(i) in a *patient care area* in a Class 9a building or in a Class 9c building; or~~

~~(ii) a plant room or lift motor room; or~~

~~(iii) a workshop where power tools are used.~~

~~(b) A heater where the heater also emits light, such as in bathrooms~~.

## J7D5 Interior decorative and display lighting

(1) Interior decorative and display lighting, such as for a foyer mural or art display, must be controlled—

(a) separately from other artificial lighting; and

(b) by a manual switch for each area other than when the operating times of the displays are the same in a number of areas such as in a museum, art gallery or the like, in which case they may be combined; and

(c) by a time switch in accordance with Specification 40 where the display lighting exceeds 1 kW.

(2) Window display lighting must be controlled separately from other display lighting.

## J7D6 Exterior artificial lighting

(1) Exterior artificial lighting attached to or directed at the facade of a building, must—

(a) be controlled by—

(i) a daylight sensor; or

(ii) a time switch that is capable of switching on and off electric power to the system at variable pre-programmed times and on variable pre-programmed days; and

(b) when the total lighting load exceeds 100 W—

(i) use LED luminaires for 90% of the total lighting load; or

(ii) be controlled by a motion detector in accordance with Specification 40; or

(iii) when used for decorative purposes, such as façade lighting or signage lighting, have a separate time switch in accordance with Specification 40.

(2) The requirements of (1)(b) do not apply to the following:

(a) Emergency lighting in accordance with Part E4.

(b) Lighting around a *detention centre*.

## J7D7 Boiling water and chilled water storage units

Power supply to a boiling water or chilled water storage unit must be controlled by a time switch in accordance with Specification 40.

## J7D8 Lifts

Lifts must—

(a) be configured to ensure artificial lighting and ventilation in the car are turned off when it is unused for 15 minutes; and

(b) achieve the idle and standby energy performance level in Table J7D8a; and

(c) achieve—

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

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

**Table J7D8a: Lift idle and standby energy performance level**

| Rated load | Idle and standby energy performance level in accordance with ISO 25745-2 Note |
|---|---|
| ~~Less than or equal to~~≤ 800 kg | 2 |
| ~~801 kg to less than or equal to~~ > 800 kg to ≤ 2000 kg | 3 |
| ~~2001 kg to less than or equal to~~ > 2000 kg to ≤ 4000 kg | 4 |
| ~~Greater than~~> 4000 kg | 5 |

**Table Notes**

Applies to the standby power used after 30 minutes.

**Table J7D8b: Lift energy efficiency class**

| Usage category in accordance with ISO 25745-2 | Energy efficiency class in accordance with ISO 25745-2 |
|---|---|
| 1-4 | C |
| ~~>~~≥ 5 | D |

# Part J8 Heated water supply and swimming pool and spa pool plant

*NT Part J8*

## Introduction to this Part

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

~~**Notes**~~

~~From 1 May 2023 to 30 September 2023 Section J of NCC 2019 Volume One Amendment 1 may apply instead of Section J of NCC 2022 Volume One. From 1 October 2023 Section J of NCC 2022 Volume One applies.~~

~~**Notes: New South Wales Section J Energy Efficiency**~~

~~(1) For a Class 2 building or a Class 4 part of a building, where a relevant *development consent* or an application for a complying development certificate requires compliance with a BASIX Single Dwelling or Multi Dwelling Certificate issued under Version 3.0 or earlier, NSW Section J of NCC 2019 Volume One Amendment 1 applies.~~

~~(2) For a Class 2 building or a Class 4 part of a building, where a relevant *development consent* or an application for a complying development certificate requires compliance with a BASIX Single Dwelling or Multi Dwelling Certificate issued under Version 4.0 or later, Section J of NCC 2022 Volume One applies.~~

~~(3) For a Class 2 building or a Class 4 part of a building, where a relevant *development consent* or an application for a complying development certificate requires compliance with a BASIX Alterations and Additions Certificate, NSW Section J of NCC 2019 Volume One Amendment 1 applies.~~

~~(4) For a Class 3 building or Class 5 to 9 building:~~

~~(i) From 1 May 2023 to 30 September 2023 NSW Section J of NCC 2019 Volume One Amendment 1 may apply instead of Section J of NCC 2022 Volume One.~~

~~(ii) From 1 October 2023 Section J of NCC 2022 Volume One applies.~~

~~**Notes: Tasmania Section J Energy Efficiency**~~

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

## Deemed-to-Satisfy Provisions

### J8D1 Deemed-to-Satisfy Provisions

*NSW J8D1(1)*

(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.

## J8D2 Application of Part

The Deemed-to-Satisfy Provisions of this Part do not apply to a Class 2 sole-occupancy unit or a Class 4 part of a building.

## J8D~~2~~3 Heated water supply

~~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.~~

(1) Pipework circulating heated water for food preparation and sanitary purposes must be insulated in accordance with J6D9, including 500 mm along each branch line.

(2) Trace-heated pipework carrying heated water for food preparation and sanitary purposes must be insulated.

(3) A building with gas heated water for food preparation and sanitary purposes must be provided with—

(a) reserved electrical supply capacity sufficient to support future installation of air-source heat pump water heating equipment for food preparation and sanitary purposes with a coefficient of performance of 3.25; and

(b) reserved space within the main electrical distribution board—

(i) comprising at least one empty three-phase circuit breaker slot and 4 DIN rail spaces per 35 kW of water heating capacity; and

(ii) labeled to indicate reservation for future installation of heated water supply; and

(c) reserved space in the electrical riser or supply pathway to supply water heating equipment, sized in accordance (a); and

(d) reserved plant area with—

(i) space to accommodate heating plant of 7 m² plus 0.04 m²/kW of heating capacity for the future installation of air-source heat pump water heating equipment for food preparation and sanitary purposes; and

(ii) sufficient ventilation to achieve airflow for future air-source heat pump water heating equipment for food preparation and sanitary purposes of 115 L/s per kW of heating, with no recirculation of air.

(4) The capacity and space required by (2) must be sufficient to serve the same design load used to specify any gas-powered water heating equipment for food preparation and sanitary purposes.

*NSW J8D3*

## J8D~~3~~4 Swimming pool heating and pumping

(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 achieves a minimum gross thermal efficiency of 90%; or—

~~(i) if rated to consume 500 MJ/hour or less, achieves a minimum gross thermal efficiency of 86%; or~~

~~(ii) if rated to consume more than 500 MJ/hour, achieves a minimum gross thermal efficiency of 90%; or~~

(e) a heat pump; or

(f) a combination of (a) to (e).

(2) Where some or all of the heating *required* by (1) is by a gas heater or a heat pump, the *swimming pool* must have—

(a) a cover with a minimum *R-Value* of 0.05; and

(b) a time switch to control the operation of the heater.

(3) A time switch must be provided to control the operation of a circulation pump for a *swimming pool*.

(4) Where *required*, a time switch must be capable of switching electric power on and off at variable pre-programmed times and on variable pre-programmed days.

(5) Pipework carrying heated or chilled water for a *swimming pool* must comply with the insulation requirements of J6D9.

(6) A building with gas heated water for a *swimming pool* must be provided with—

(a) reserved electrical capacity sufficient to support future installation of air-source heat pump water heating equipment for the swimming pool with a coefficient of performance of 3.25; and

(b) at least one empty three-phase circuit breaker slot and 4 DIN rail spaces per 35 kW of swimming pool water heating capacity labelled to indicate reservation for future installation of swimming pool water heating equipment in the main electrical distribution board; and

(c) reserved space in the electrical riser or supply pathway to supply swimming pool heating equipment sized in accordance with (a); and

(d) reserved room area with—

(i) space to accommodate heating plant of 7 m² plus 0.04 m²/kW of heating capacity for future installation of air-source heat pump water heating equipment for the swimming pool; and

(ii) sufficient ventilation openings to achieve airflow for future air-source heat pump equipment for the swimming pool of 115 L/s per kW of heating capacity with no recirculation of air; and

(e) a hot water circulation system that operates at a peak temperature of less than 50°C.

~~(5)~~(7) The capacity and space *required* by (6) must be sufficient to serve the same design load used to specify any gas-powered *swimming pool* heater equipment.

~~(6)~~(8) For the purpose of J8D3, a *swimming pool* does not include a spa pool.

*NSW J8D4*

## J8D45 Spa pool heating and pumping

(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 achieves a minimum gross thermal efficiency of 90%; or—

~~(i) if rated to consume 500 MJ/hour or less, achieves a minimum gross thermal efficiency of 86%; or~~

~~(ii) if rated to consume more than 500 MJ/hour, achieves a minimum gross thermal efficiency of 90%; or~~

(e) a heat pump; or

(f) a combination of (a) to (e).

(2) Where some or all of the heating *required* by (1) is by a gas heater or a heat pump, the spa pool must have—

(a) a cover with a minimum *R-Value* of 0.05; and

(b) a push button and a time switch to control the operation of the heater.

(3) A time switch must be provided to control the operation of a circulation pump for a spa pool having a capacity of 680 L or more.

(4) Where *required*, a time switch must be capable of switching electric power on and off at variable pre-programmed times and on variable pre-programmed days.

(5) Pipework carrying heated or chilled water for a spa pool must comply with the insulation requirements of J6D9.

(6) A building with gas heated water for spa pool heating must be provided with —

(a) reserved electrical supply capacity sufficient to support future installation of air-source heat pump water heating equipment for the spa pool with a coefficient of performance of 3.25; and

(b) at least one empty three-phase circuit breaker slot and 4 DIN rail spaces per 35 kW of spa water heating capacity labelled to indicate reservation for future installation of spa water heating equipment in the main electrical distribution board; and

(c) reserved space in the electrical riser or supply pathway to supply the spa pool heating equipment sized in accordance with (a); and

(d) reserved plant area with—

(i) space to accommodate heating plant of 7 m² plus 0.04 m²/kW for future installation of air-source heat pump water heating equipment for the spa pool; and

(ii) sufficient ventilation openings to achieve airflow for future air-source heat pump equipment for the spa pool of 115 L/s per kW of heating capacity, with no recirculation of air; and

(e) a hot water circulation system and associated coils and heat exchangers serving the spa pool, designed to operate a peak temperature of less than 50°C.

(7) The capacity and space *required* by (6) must be sufficient to serve the same design load used to specify any gas-powered spa pool heater equipment.

# Part J9 Energy monitoring and on-site distributed energy resources

*NT Part J9*

## Introduction to this Part

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

~~**Notes**~~

~~From 1 May 2023 to 30 September 2023 Section J of NCC 2019 Volume One Amendment 1 may apply instead of Section J of NCC 2022 Volume One. From 1 October 2023 Section J of NCC 2022 Volume One applies.~~

~~**Notes: New South Wales Section J Energy Efficiency**~~

~~(1) For a Class 2 building or a Class 4 part of a building, where a relevant *development consent* or an application for a complying development certificate requires compliance with a BASIX Single Dwelling or Multi Dwelling Certificate issued under Version 3.0 or earlier, NSW Section J of NCC 2019 Volume One Amendment 1 applies.~~

~~(2) For a Class 2 building or a Class 4 part of a building, where a relevant *development consent* or an application for a complying development certificate requires compliance with a BASIX Single Dwelling or Multi Dwelling Certificate issued under Version 4.0 or later, Section J of NCC 2022 Volume One applies.~~

~~(3) For a Class 2 building or a Class 4 part of a building, where a relevant *development consent* or an application for a complying development certificate requires compliance with a BASIX Alterations and Additions Certificate, NSW Section J of NCC 2019 Volume One Amendment 1 applies.~~

~~(4) For a Class 3 building or Class 5 to 9 building:~~

~~(i) From 1 May 2023 to 30 September 2023 NSW Section J of NCC 2019 Volume One Amendment 1 may apply instead of Section J of NCC 2022 Volume One.~~

~~From 1 October 2023 Section J of NCC 2022 Volume One applies.~~

~~**Notes: Tasmania Section J Energy Efficiency**~~

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

## Deemed-to-Satisfy Provisions

### J9D1 Deemed-to-Satisfy Provisions

*NSW J9D1(1)*

(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.

## J9D2 Application of Part

The *Deemed-to-Satisfy Provisions* of this Part do not apply—

(a) within a *sole-occupancy unit* of a Class 2 building or a Class 4 part of a building; or

(b) to a Class 8 *electricity network substation*.

## J9D3 Facilities for energy monitoring

(1) A building or *sole-occupancy unit* with a *floor area* of more than 500 $m^2$ must have energy meters configured to record the time-of-use consumption of gas and electricity.

(2) A building with a *floor area* of more than 2 500 $m^2$ must have energy meters configured to enable individual time-of-use energy data recording, in accordance with (3), of—

(a) *air-conditioning* plant including, where appropriate, heating plant, cooling plant and air handling fans; and

(b) artificial lighting; and

(c) appliance power; and

(d) central hot water supply; and

(e) internal transport devices including lifts, escalators and moving walkways where there is more than one serving the building; and

(f) on-site *renewable energy* equipment; and

(g) on-site electric vehicle charging equipment; and

(h) on-site *battery systems*; and

(i) other ancillary plant.

(3) Energy meters *required* by (2) must be interlinked by a communication system that collates the time-of-use energy data to a single interface monitoring system where it can be stored, analysed and reviewed.

(4) The provisions of (2) do not apply to energy meters serving—

(a) a Class 2 building where the total *floor area* of the common areas is less than 500 $m^2$; or

(b) individual *sole-occupancy units* with a *floor area* of less than 2 500 $m^2$.

## J9D4 Facilities for electric vehicle charging equipment

(1) Subject to (2), a *carpark* associated with a Class 2, 3, 5, 6, 7b, 8 or 9 building must be provided with— ~~electrical distribution boards dedicated to electric vehicle charging—~~

(a) electrical distribution boards dedicated to electric vehicle charging—

~~(a)~~(i) in accordance with Table J9D4 in each *storey* of the carpark; and

(ii) labelled to indicate use for electric vehicle charging equipment~~.~~; and

(iii) installed such that a cable run from the distribution board to the car spaces described in (2)(e) will be no longer than 50 m; or

(b) busduct dedicated to electric vehicle charging—

(i) labelled to indicate use for electric vehicle charging equipment; and

(ii) installed such that the car spaces described in (2)(e) are within 10 m of busduct; or

(c) a combination of (a) and (b).

(2) Electrical distribution boards or busduct dedicated to ~~serving~~ electric vehicle charging in a carpark must—

(a) be ~~fitted~~ equipped with a charging control system with the ability to manage and schedule charging of electric vehicles in response to total building demand; and

(b) when associated with a Class 2 building, have capacity for each circuit to support an electric vehicle charger able to deliver a minimum of 12 kWh from 11:00 pm to 7:00 am daily; and

(c) when associated with a Class 5 to 9 building, have capacity for each circuit to support an electric vehicle charger able to deliver a minimum of 12 kWh from 9:00 am to 5:00 pm daily; and

(d) when associated with a Class 3 building, have capacity for each circuit to support an electric vehicle charger able to deliver a minimum of 48 kWh from 11:00 pm to 7:00 am daily; and

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

(i) 100% of the car~~-~~parking spaces associated with a Class 2 building; or

(ii) 10% of car~~-~~parking spaces associated with a Class 5 or 6 building in addition to electric vehicle chargers required by J9D4(3)(a); or

(iii) ~~20~~5% of car~~-~~parking spaces associated with a Class 3, 7b, 8 or 9 building in addition to electric vehicle chargers required by J9D4(3)(b); and

(f) if a distribution board—

~~(f)~~(i) contain space of at least 36 mm width of DIN rail per outgoing circuit for individual sub-circuit electricity metering to record electricity use of electric vehicle charging equipment; and

~~(g)~~(ii) be labelled to indicate the use of the space required by (~~f~~i) is for the future installation of metering equipment.

(3) In a *carpark* or carparking area with more than 40 carparking spaces, electrical vehicle charging equipment with a capacity of at least 7kW (32A) must be installed to serve at least—

10% of carparking spaces associated with a Class 5 or 6 building; or

15% of carparking spaces associated with a Class 3, 7b, 8 or 9 building; and

10% of carparking spaces *required* to be *accessible* associated with a Class 3, 5, 6, 7b, 8 or 9 building.

(4) A *carpark* or carparking area with 40 or less carparking spaces associated with a Class 3 building or Class 5 to 9 building must have at least one electric vehicle charger with a capacity of at least 7kW (32A).

(5) The electric vehicle charging equipment *required* by (3) and (4) must incorporate or be connected to—

(b) the distribution boards or busduct *required* by (1); and

(c) the charge control equipment *required* by 2(a).

**Notes**

(1) For the purposes of J9D4(1), (3) and (4), a *carpark* or carparking area is associated with another building if it is on the same allotment as the building and is provided to serve that building.

(2) J9D4(3)(a) and (b) do not apply to carparking spaces that are *required* to be accessible.

~~**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**

(1) Where there are more than 168 *carpark* spaces per *storey*, one additional distribution board must be provided for each additional 24 spaces or part thereof.

(2) The number of distribution boards *required* is determined by application of J9D4(2)(e) and J9D4(3).

## J9D5 Facilities for solar photovoltaic and battery systems

(1) The main electrical switchboard of a building must— contain at least 2 empty three-phase circuit breaker slots and 4 DIN rail spaces labelled to indicate the use of each space for a battery system.

(2) A building must be provided with an on-site solar photovoltaic system—

(a) that covers 100% of the roof space, excluding areas—

(i) shaded for more than 10% of daylight hours; or,

(ii) where the roof pitch exceeds 45° relative to horizontal; or,

(iii) used as a terrace, carpark, roof garden, roof/sky light or the like; or

(iv) designated as trafficable area, access for height safety systems or plant maintenance access; or

(v) used for plant equipment, services installations or the like; or

(vi) above exhaust air flows from heat rejection equipment: or

(vii) where provision of solar photovoltaic panels is impractical on account of panel size or mounting system limitations; or,

(b) with a peak system output rating per m2 of building conditioned area not less than those specified in Table J9D5a.

(3) In addition to (2), a building where gas is used for building services must be provided with further on-site photovoltaic system peak output capacity not less than the value specified in Table J9D5b.

(4) If the on-site solar photovoltaic system in (3) is placed on a building roof, the panels must—

(a) not be shaded for more than 10% of daylight hours; and

~~(a)~~(b) not have a pitch of more than 45°.

~~(a) contain at least two empty three-phase circuit breaker slots and four DIN rail spaces labelled to indicate the use of each space for; and —~~

~~(i) a solar photovoltaic system; and~~

~~(ii) a *battery system*; and~~

~~(b) be sized to accommodate the installation of solar photovoltaic panels producing their maximum electrical output on at least 20% of the building roof area.~~

~~(2) At least 20% of the roof area of a building must be left clear for the installation of solar photovoltaic panels, except for buildings—~~

~~(a) with installed solar photovoltaic panels on—~~

~~(i) at least 20% of the roof area; or~~

~~(ii) an equivalent generation capacity elsewhere on-site; or~~

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

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

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

**Limitations**

(1) The requirements of J9D5(1)~~(a)(ii) and (b)~~ do not apply to a building with battery systems installed.

(2) ~~-~~The requirements of J9D5(~~1~~2)~~(a)(i) and (b)~~ do not apply to a building—~~ with solar photovoltaic panels installed on at least 20% of the roof area.~~

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

(b) provided with an on-site renewable energy generation system, other than a solar photovoltaic system, with a generation capacity at least equivalent to a solar photovoltaic system described under J9D5(2).

**Table J9D5a: Minimum solar photovoltaic system installed peak output (W) per $m^2$ of conditioned space, for buildings without gas**

| Building Class | *Climate zone 1* | *Climate zones 2 to 7* | *Climate zone 8* |
|---|---|---|---|
| 5,6,7 and 8 | 95 | 65 | 55 |
| 2, 3, 4 and 9 | 70 | 40 | 35 |

**Table J9D5b: Minimum solar photovoltaic system installed peak output (W) per $m^2$ of conditioned space for buildings with gas, in addition to the requirements of J9D5(2)**

| Building Class | *Climate zones 1 and 3.* | *Climate zone 2 and 5* | *Climate zones 4 and 6* | *Climate zone 7* | *Climate zone 8* |
|---|---|---|---|---|---|
| 5,6,7 and 8 | 0 | 0 | 1 | 1.7 | 4.7 |
| 2, 3, 4 and 9 | 2.6 | 0.9 | 4.4 | 0.9 | 0 |

# Specification 33 Additional requirements

## S33C1 Scope

This Specification contains requirements that must be complied with in addition to the modelling requirements of J1V1, J1V2, J1V3 and J1V5.

## S33C2 Additional requirements — general

(1) In addition to the modelling requirements for J1V1, J1V2, J1V3 and J1V5, a building must comply with—

(a) for general thermal construction, J4D3; and

(b) for floor edge insulation, J4D7(2) and J4D7(3); and

(c) for building sealing, J1V4 or Part J5; and

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

(i) J6D3(1)(a); and

(ii) J6D3(1)(b)(i); and

(iii) J6D3(1)(d); and

(iv) J6D3(1)(f); and

(v) J6D3(2); and

(vi) J6D3(3); and

(vii) J6D4(2); and

(viii) J6D4(4); and

(ix) J6D5; and

(x) J6D6; and

(xi) J6D9; and

(e) for testing package air-conditioning equipment not less than 65 kWr, AS/NZS 3823.1.2 at test condition T1; and

(f) for testing a refrigeration chiller, AHRI 551/591; and

(g) for interior artificial lighting and power control, J7D4; and

(h) for interior decorative and display lighting, J7D5; and

(i) for artificial lighting around the exterior of a building, J7D6; and

(j) for boiling water and chilled water storage units, J7D7; and

(k) for deactivation of swimming pool heating and pumping, J8D3(2)(b) and J8D4 (3);

(l) and for deactivation of spa pool heating and pumping, J8D5(2)(b) and J8D5(3); and

(m) for facilities for energy monitoring, and electric vehicle charge control, Part J9; and

(n) for deactivation of fixed outdoor space heating appliances, clause J6D10(3).

(o) for facilitating the future replacement of gas-powered appliances with electrically-powered appliances—

(i) J6D10(5), (6) and (7); and

(ii) J8D3 (3) and (4); and

(iii) J8D4 (6) and (7); and

(iv) J8D5 (6) and (7).

(2) In addition to the requirements of (1), a building using J1V1 must comply with J9D5(2) to (4) for facilities for solar photovoltaic panels.

# Specification 34 Modelling parameters for J1V3

## S34C1 Scope

This Specification contains the *required* modelling parameters for J1V3.

## S34C2 Reference building

The *annual greenhouse gas emissions* must be calculated for the *reference building* in accordance with the following:

(a) The *reference building* must—

(i) subject to (b), (c) and (d), comply with *Deemed-to-Satisfy Provisions* in Parts J4 to J8; and

(ii) have the minimum amount of mechanical ventilation *required* by Part F6; and

~~(ii)~~(iii) be provided with a solar photovoltaic system that complies with J9D5(2)(b).

(b) The *external walls* must have a solar absorptance of 0.6.

(c) The U-Value of the *wall-glazing construction* must be calculated according to S37C3.

~~(c)~~(d) The *solar admittance* of the *wall-glazing construction* must be calculated according to S37C5.

~~(d)~~(e) Where J1V3(1)(b)(i) or J1V3(1)(b)(ii) applies, the~~The~~ *air-conditioning* must—

(i) for ~~98~~95% of the annual *hours of operation*, achieve temperatures between—

(A) 18°~~CDB~~ C dry bulb to 25°~~CDB~~ C dry bulb for *conditioned spaces* with transitory occupancy; and

(B) subject to (ii), 21°~~CDB~~ C dry bulb to 24°~~CDB~~ C dry bulb 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.

~~(e)~~(f) 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.

~~(f)~~(g) The artificial lighting must achieve the *required* maximum *illumination power density* in Part J7 without applying the control device adjustment factors.

~~(g)~~(h) *Minimum Energy Performance Standards* must be applied to *services* not covered by Parts J6 to J8.

## S34C3 Proposed building and reference building

(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) climatic data, using a projection at year 2050 made under a Representative Concentration Pathway with an 8.5 W/m² increase in radiative forcing; and

~~(d)~~(e) adjacent structures and features; and

~~(e)~~(f) orientation; and

~~(f)~~(g) building form in accordance with (4); and

~~(g)~~(h) testing standards including for insulation, glazing, water heater and unitary air-conditioning equipment; and

~~(h)~~(i) fabric and glazing in accordance with (5); and

~~(i)~~(j) services in accordance with (6) and S34C4.

(2) For the purposes of (1)(b), greenhouse gas emissions factors must be based on the factors in Table S34C3. ~~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~~g), building form must include the same—

(a) ~~the~~ roof geometry; and

(b) ~~the~~ floor plan; and

(c) ~~the~~ number of *storeys*; and

(d) ~~the~~ location, extent and configuration of ground floors and basements; and

(e) ~~the~~ size and location of *glazing*; and

(f) external doors.

(5) For the purposes of (1)(~~h~~i), fabric and *glazing* must include the same—

~~(a) quality of insulation installation; and~~

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

~~(c)~~(b) dimensions of external, internal and separating walls; and

~~(d)~~(c) internal shading devices, including their colour and their criteria for operation~~.~~; and

(d) location and extent of thermal mass.

(6) For the purposes of (1) (j), ~~(i)~~, *services* must include the same—

(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~~

(b) *air-conditioning* zones including—

(i) separate zones for each *storey*; and

(ii) separate zones for each *sole-occupancy unit*; and

(iii) in spaces larger than 20 m², separate perimeter zones, no deeper than 4 m adjacent to external walls with windows facing—

(A) within 45° of true north; and

(B) within 45° of true south; and

(C) within 45° of true east; and

(D) within 45° of true west; and

(iv) separate centre zones comprising the remainder of each *sole-occupancy unit* within each *storey*; and

(v) the same method of calculating the temperature difference across *air-conditioning* zone boundaries; and

(vi) the same method of combining zones with similar heating and cooling requirements, where necessary to simplify the simulation; and

(c) floor coverings and furniture and fittings density; and

(d) internal artificial lighting illumination levels; and

(e) internal heat gains including people, lighting, appliances, meals and other electric power loads; and

(f) *air-conditioning*, including chiller, fan and *boiler* equipment, system configuration and zones; and

(g) profiles for occupancy, *air-conditioning*, lighting and internal heat gains from people, hot meals, appliances, equipment and heated water supply systems based on—

(i) Specification 35; or

(ii) *NABERS Energy* simulation requirements; or

(iii) *Green Star* simulation requirements; or

(iv) the actual building if—

(A) the operating hours per year are not less than ~~2 500~~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) where J1V3(1)(b)(i) applies, 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)~~(j), 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~~ additional sealing provisions to those *required* by Part J5.

(b) ~~An~~ an intended building leakage of less than 10 $m^3/hr.m^2$ at 50 Pa.

(c) ~~Pressure~~ pressure testing to verify achievement of the intended building leakage.

(8) Where J1V3(1)(b)(iii), (iv) or (v) applies, the air-conditioning must—

(a) subject to (b), for 95% of the annual hours of operation, achieve temperatures between—

(i) 18°C dry bulb to 25°C dry bulb for conditioned spaces with transitory occupancy; and

(ii) 21°C dry bulb to 24°C dry bulb in all other conditioned spaces; and

(b) if the proposed building has no mechanically provided cooling or has mixed mode cooling, the proposed building and reference building must have the same method of control and control set points for non-mechanical cooling.

**Table S34C3: Greenhouse gas emissions factors ($kgCO_2$-e/GJ)**

| Energy Source | ACT | NSW | NT | QLD | SA | TAS | VIC | WA |
|---|---|---|---|---|---|---|---|---|
| Electricity | - | ~~236~~51 | ~~162~~110 | ~~254~~120 | ~~101~~22.5 | ~~44~~9 | ~~279~~135 | ~~191~~83 |
| Gas | - | 51.53 | 51.53 | 51.53 | 51.53 | 51.53 | 51.53 | 51.53 |

**Table Notes**

(1) National emissions factors are not applicable to calculations for buildings in the ACT as they do not take into account investments in renewable electricity generation in the national electricity market made by the ACT.

(2) Values for the ACT can be found in the ACT Appendix.

## S34C4 Services — proposed and reference building

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)~~ (f) energy usage of pump systems must be calculated with allowances for the system fixed static pressure head; and

~~(g)~~ (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~~

(i) heated water supply for food preparation and sanitary purposes; or

(ii) lifts and escalators; or

(iii) electric vehicle charging,

~~(h)~~ 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)~~ (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.

**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%~~0% | 25% | Off |
| 1:00am to 2:00am | 0% | ~~15%~~0% | 25% | Off |
| 2:00am to 3:00am | 0% | ~~15%~~0% | 25% | Off |
| 3:00am to 4:00am | 0% | ~~15%~~0% | 25% | Off |
| 4:00am to 5:00am | 0% | ~~15%~~0% | 25% | Off |
| 5:00am to 6:00am | 0% | ~~15%~~0% | 25% | Off |
| 6:00am to 7:00am | 0% | ~~15%~~0% | 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%~~0% | 25% | Off |
| 10:00pm to 11:00pm | 0% | ~~15%~~0% | 25% | Off |
| 11:00pm to 12:00am | 0% | ~~15%~~0% | 25% | Off |

**Table Notes**

(1) The occupancy profile is expressed as a percentage of the maximum number of people that can be accommodated in the building.

(2) The artificial lighting profile is expressed as a percentage of the maximum *illumination power density* permitted under Part J7.

(3) The appliances and equipment profile is expressed as a percentage of the maximum internal heat gain in Table S35C2I.

(4) The *air-conditioning* profile is expressed as the plant status.

**Table S35C2d: Weekend occupancy and operation profiles of a Class 5 building, a Class 7 warehouse, a Class 8 Laboratory or a Class 9a clinic, day surgery or procedure unit**

| Time period (local standard time) | Occupancy (Saturday, Sunday and holidays) | Artificial lighting (Saturday, Sunday and holidays) | Appliances and equipment (Saturday, Sunday and holidays) | *Air-conditioning* (Saturday, Sunday and holidays) |
|---|---|---|---|---|
| 12:00am to 1:00am | 0% | 0%~~15%~~ | 25% | Off |
| 1:00am to 2:00am | 0% | 0%~~15%~~ | 25% | Off |
| 2:00am to 3:00am | 0% | 0%~~15%~~ | 25% | Off |

| Time period (local standard time) | Occupancy (Saturday, Sunday and holidays) | Artificial lighting (Saturday, Sunday and holidays) | Appliances and equipment (Saturday, Sunday and holidays) | *Air-conditioning* (Saturday, Sunday and holidays) |
|---|---|---|---|---|
| 3:00am to 4:00am | 0% | 0%~~15%~~ | 25% | Off |
| 4:00am to 5:00am | 0% | 0%~~15%~~ | 25% | Off |
| 5:00am to 6:00am | 0% | 0%~~15%~~ | 25% | Off |
| 6:00am to 7:00am | 0% | 0%~~15%~~ | 25% | Off |
| 7:00am to 8:00am | 0% | 0%~~15%~~ | 25% | Off |
| 8:00am to 9:00am | 5% | 15%~~25%~~ | 25% | Off |
| 9:00am to 10:00am | 5% | 15%~~25%~~ | 25% | Off |
| 10:00am to 11:00am | 5% | 15%~~25%~~ | 25% | Off |
| 11:00am to 12:00pm | 5% | 15%~~25%~~ | 25% | Off |
| 12:00pm to 1:00pm | 5% | 15%~~25%~~ | 25% | Off |
| 1:00pm to 2:00pm | 5% | 15%~~25%~~ | 25% | Off |
| 2:00pm to 3:00pm | 5% | 15%~~25%~~ | 25% | Off |
| 3:00pm to 4:00pm | 5% | 15%~~25%~~ | 25% | Off |
| 4:00pm to 5:00pm | 5% | 15%~~25%~~ | 25% | Off |
| 5:00pm to 6:00pm | 0% | 0%~~15%~~ | 25% | Off |
| 6:00pm to 7:00pm | 0% | 0%~~15%~~ | 25% | Off |
| 7:00pm to 8:00pm | 0% | 0%~~15%~~ | 25% | Off |
| 8:00pm to 9:00pm | 0% | 0%~~15%~~ | 25% | Off |
| 9:00pm to 10:00pm | 0% | 0%~~15%~~ | 25% | Off |
| 10:00pm to 11:00pm | 0% | 0%~~15%~~ | 25% | Off |
| 11:00pm to 12:00am | 0% | 0%~~15%~~ | 25% | Off |

**Table Notes**

(1) The occupancy profile is expressed as a percentage of the maximum number of people that can be accommodated in the building.

(2) The artificial lighting profile is expressed as a percentage of the maximum *illumination power density* permitted under Part J7.

(3) The appliances and equipment profile is expressed as a percentage of the maximum internal heat gain in Table S35C2l.

(4) The *air-conditioning* profile is expressed as the plant status.

**Table S35C2e: Occupancy and operation profiles of a Class 6 shop or shopping centre**

| Time period (local standard time) | Occupancy (Daily) | Artificial lighting (Daily) | Appliances and equipment (Daily) | *Air-conditioning* (Daily) |
|---|---|---|---|---|
| 12:00am to 1:00am | 0% | 0%~~25%~~ | 25% | Off |
| 1:00am to 2:00am | 0% | 0%~~25%~~ | 25% | Off |
| 2:00am to 3:00am | 0% | 0%~~25%~~ | 25% | Off |
| 3:00am to 4:00am | 0% | 0%~~25%~~ | 25% | Off |
| 4:00am to 5:00am | 0% | 0%~~25%~~ | 25% | Off |
| 5:00am to 6:00am | 0% | 0%~~25%~~ | 25% | Off |
| 6:00am to 7:00am | 0% | 0%~~25%~~ | 25% | Off |
| 7:00am to 8:00am | 10% | 100% | 70% | On |
| 8:00am to 9:00am | 20% | 100% | 70% | On |
| 9:00am to 10:00am | 20% | 100% | 70% | On |

| Time period (local standard time) | Occupancy (Daily) | Artificial lighting (Daily) | Appliances and equipment (Daily) | *Air-conditioning* (Daily) |
|---|---|---|---|---|
| 10:00am to 11:00am | 15% | 100% | 70% | On |
| 11:00am to 12:00pm | 25% | 100% | 70% | On |
| 12:00pm to 1:00pm | 25% | 100% | 70% | On |
| 1:00pm to 2:00pm | 20%~~15%~~ | 100% | 70% | On |
| 2:00pm to 3:00pm | 20%~~15%~~ | 100% | 70% | On |
| 3:00pm to 4:00pm | 20%~~15%~~ | 100% | 70% | On |
| 4:00pm to 5:00pm | 20%~~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% | 0%~~10%~~ | 10% | Off |
| 8:00pm to 9:00pm | 0% | 0%~~10%~~ | 10% | Off |
| 9:00pm to 10:00pm | 0% | 0%~~10%~~ | 10% | Off |
| 10:00pm to 11:00pm | 0% | 0%~~10%~~ | 10% | Off |
| 11:00pm to 12:00am | 0% | 0%~~10%~~ | 10% | Off |

**Table Notes**

(1) The occupancy profile is expressed as a percentage of the maximum number of people that can be accommodated in the building.

(2) The artificial lighting profile is expressed as a percentage of the maximum *illumination power density* permitted under Part J7.

(3) The appliances and equipment profile is expressed as a percentage of the maximum internal heat gain in S35C2l.

(4) The *air-conditioning* profile is expressed as the plant status.

**Table S35C2f: Occupancy and operation profiles of a Class 6 restaurant or cafe**

| Time period (local standard time) | Occupancy (Monday to Saturday) | Artificial lighting (Monday to Saturday) | Appliances and equipment (Monday to Saturday) | *Air-conditioning* (Monday to Saturday) |
|---|---|---|---|---|
| 12:00am to 1:00am | 0% | 5% | 15% | Off |
| 1:00am to 2:00am | 0% | 5% | 15% | Off |
| 2:00am to 3:00am | 0% | 5% | 15% | Off |
| 3:00am to 4:00am | 0% | 5% | 15% | Off |
| 4:00am to 5:00am | 0% | 5% | 15% | Off |
| 5:00am to 6:00am | 0% | 5% | 15% | Off |
| 6:00am to 7:00am | 5% | 40% | 40% | Off |
| 7:00am to 8:00am | 5% | 40% | 40% | On |
| 8:00am to 9:00am | 5% | 60% | 60% | On |
| 9:00am to 10:00am | 5% | 60% | 60% | On |
| 10:00am to 11:00am | 20% | 90% | 90% | On |
| 11:00am to 12:00pm | 50% | 90% | 90% | On |
| 12:00pm to 1:00pm | 80% | 90% | 90% | On |
| 1:00pm to 2:00pm | 70% | 90% | 90% | On |
| 2:00pm to 3:00pm | 40% | 90% | 90% | On |
| 3:00pm to 4:00pm | 20% | 90% | 90% | On |
| 4:00pm to 5:00pm | 25% | 90% | 90% | On |

| Hour | Occupancy (Daily) | Artificial lighting and equipment (Daily) | *Air-conditioning* (Monday to Friday) |
|---|---|---|---|
| 8:00pm to 9:00pm | 10% | 25% | On |
| 9:00pm to 10:00pm | 10% | 25% | On |
| 10:00pm to 11:00pm | 10% | 25% | On |
| 11:00pm to 12:00am | 5% | 25% | Off |

**Table Notes**

(1) The occupancy profile is expressed as a percentage of the maximum number of people that can be accommodated in the building.

(2) The artificial lighting profile is expressed as a percentage of the maximum *illumination power density* permitted under Part J7.

(3) The appliances and equipment profile is expressed as a percentage of the maximum internal heat gain in S35C2l.

(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% | 0%~~5%~~ | 5% | Off |
| 1:00am to 2:00am | 0% | 0%~~5%~~ | 5% | Off |
| 2:00am to 3:00am | 0% | 0%~~5%~~ | 5% | Off |
| 3:00am to 4:00am | 0% | 0%~~5%~~ | 5% | Off |
| 4:00am to 5:00am | 0% | 0%~~5%~~ | 5% | Off |
| 5:00am to 6:00am | 0% | 0%~~5%~~ | 5% | Off |
| 6:00am to 7:00am | 0% | 0%~~5%~~ | 5% | Off |
| 7:00am to 8:00am | 5% | 20%~~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% | 60%~~80%~~ | 70% | On |
| 1:00pm to 2:00pm | 50% | 60%~~80%~~ | 70% | On |
| 2:00pm to 3:00pm | 90% | 95% | 95% | On |
| 3:00pm to 4:00pm | 70% | 90% | 80% | On |
| 4:00pm to 5:00pm | 50% | 70% | 60% | On |
| 5:00pm to 6:00pm | 20% | 20% | 20% | Off |
| 6:00pm to 7:00pm | 20% | 20% | 20% | Off |
| 7:00pm to 8:00pm | 20% | 20% | 20% | Off |
| 8:00pm to 9:00pm | 10% | 5%~~10%~~ | 10% | Off |
| 9:00pm to 10:00pm | 5% | 0%~~5%~~ | 5% | Off |
| 10:00pm to 11:00pm | 5% | 0%~~5%~~ | 5% | Off |
| 11:00pm to 12:00am | 5% | 0%~~5%~~ | 5% | Off |

**Table Notes**

(1) The occupancy profile is expressed as a percentage of the maximum number of people that can be accommodated in the building.

(2) The artificial lighting profile is expressed as a percentage of the maximum *illumination power density* permitted under Part J7.

(3) The appliances and equipment profile is expressed as a percentage of the maximum internal heat gain in S35C2I.

(4) The *air-conditioning* profile is expressed as the plant status.

(5) Saturday and Sunday profiles are 5% continuous artificial lighting and 5% continuous appliances and equipment, where there is no occupancy and the *air-conditioning* is "off".

**Table S35C2k: Occupancy and operation profiles of a Class 9c aged care facility**

| Time period (local standard time) | Occupancy (Monday to Friday) | Occupancy (Saturday, Sunday and holidays) | Artificial lighting (Daily) | *Air-conditioning* (Monday to Friday) | *Air-conditioning* (Saturday, Sunday and holidays) |
|---|---|---|---|---|---|
| 12:00am to 1:00am | 85% | 85% | 5% | On | On |
| 1:00am to 2:00am | 85% | 85% | 5% | On | On |
| 2:00am to 3:00am | 85% | 85% | 5% | On | On |
| 3:00am to 4:00am | 85% | 85% | 5% | On | On |
| 4:00am to 5:00am | 85% | 85% | 5% | On | On |
| 5:00am to 6:00am | 85% | 85% | 25% | On | On |
| 6:00am to 7:00am | 85% | 85% | 80% | On | On |
| 7:00am to 8:00am | 80% | 85% | 80% | On | On |
| 8:00am to 9:00am | 50% | 50% | 50% | On | On |
| 9:00am to 10:00am | 50%~~10%~~ | 50% | 20% | Off | On |
| 10:00am to 11:00am | 50%~~10%~~ | 50%~~20%~~ | 20% | Off | On~~Off~~ |
| 11:00am to 12:00pm | 50%~~10%~~ | 50%~~20%~~ | 20% | Off | On~~Off~~ |
| 12:00pm to 1:00pm | 50%~~10%~~ | 50%~~20%~~ | 20% | Off | On~~Off~~ |
| 1:00pm to 2:00pm | 50%~~10%~~ | 50%~~20%~~ | 20% | Off | On~~Off~~ |
| 2:00pm to 3:00pm | 50%~~10%~~ | 50%~~20%~~ | 20% | Off | On~~Off~~ |
| 3:00pm to 4:00pm | 50%~~10%~~ | 50%~~30%~~ | 20% | Off | On~~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

| Emittance of airspace bounding surfaces | Thickness of roof space | Direction of heat flow | *R-Value* of reflective airspace |
|---|---|---|---|
| Surface 1 emittance 0.9, Surface 2 emittance 0.05 | 60 mm | Down | 1.16 |
| Surface 1 emittance 0.9, Surface 2 emittance 0.05 | 100 mm to ≤ 300 mm | Down | 1.30 |

**Table Notes**

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

(2) Linear interpolation may be used to calculate the *R-Value* of an airspace of intermediate thickness.

(3) *R-Values* are calculated using AS/NZS 4859.2 based on the following:

(a) summer temperatures of 24°C internally and 36°C externally for heat transfer down; and

(b) winter temperatures of 18°C internally and 12°C externally for heat transfer up; and

(c) emittances are normal emittances of bounding surfaces in accordance with AS 4200.1.

**Table S36C2m: Typical R-Values for non-ventilated roof spaces with a reflective surface: Pitched roof with cathedral ceiling, roof space not more than 300 mm thick**

| Emittance of airspace bounding surfaces | Thickness of roof space | Direction of heat flow | *R-Value* of reflective airspace | | |
|---|---|---|---|---|---|
| | | | 15° to not more than 25° pitch | more than 25° to not more than 35° pitch | more than 35° to not more than 45° pitch |
| Surface 1 emittance 0.9, Surface 2 emittance 0.05 | ≤ 300 mm | Up | 0.43 | 0.43 | 0.43 |
| Surface 1 emittance 0.9, Surface 2 emittance 0.05 | 20 mm | Down | 0.59 | 0.59 | 0.59 |
| Surface 1 emittance 0.9, Surface 2 emittance 0.05 | 60 mm | Down | 0.91 | 0.82 | 0.75 |
| Surface 1 emittance 0.9, Surface 2 emittance 0.05 | 100 mm to ≤ 300 mm | Down | 0.96 | 0.85 | 0.76 |

**Table Notes**

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

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

(3) *R-Values* are calculated using AS/NZS 4859.2 based on the following:

(a) summer temperatures of 24°C internally and 36°C externally for heat transfer down; and

(b) winter temperatures of 18°C internally and 12°C externally for heat transfer up; and

(c) emittances are normal emittances of bounding surfaces in accordance with AS 4200.1.

**Explanatory Information**

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

# Specification 37 Calculation of U-Value and solar admittance

## S37C1 Scope

This specification describes the methods of calculating the U-Value and *solar admittance* of a *wall-glazing construction*.

## S37C2 General

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 Storey, Single Aspect)

(1) For the purposes of this method, a *wall-glazing construction* only includes the walls and *glazing* of a single *storey* facing a single aspect.

(2) The *Total System U-Value* of the wall component of a *wall-glazing construction* must be calculated as the inverse of the *Total R-Value*, including allowance for thermal bridging, in accordance with—

(a) AS/NZS 4859.2; or

(b) Specification 38 for *spandrel panels*.

(3) The *Total System U-Value* of a *wall-glazing construction* must be calculated as the area-weighted average of the *Total System U-Value* of each of the components of the *wall-glazing construction*.

~~(4) The *Total System U-Value* must not exceed the applicable value in J4D6(1).~~

## S37C4 U-Value — Method 2 (Single Storey, Multiple Aspects)

(1) For the purposes of this method, a wall-glazing construction only includes the walls and glazing of a single storey facing multiple aspects.

(2) The *Total System U-Value* of the wall component of a *wall-glazing construction* must be calculated as the inverse of the *Total R-Value*, including allowance for thermal bridging, in accordance with—

(a) AS/NZS 4859.2; or

(b) Specification 38 for *spandrel panels*.

(3) The *Total System U-Value* of a *wall-glazing construction* must be calculated as the area-weighted average of the *Total System U-Value* of each of the components of the *wall-glazing construction*.

~~(4) The *Total System U-Value* must not exceed the applicable value in J4D6(1).~~

## S37C5 Solar admittance — Method 1 (Single Storey, Single Aspect)

(1) The *solar admittance* of a *wall-glazing construction* of a single *storey* facing a single aspect must be calculated in accordance with the following formula:

$$SA = \frac{A_{W1} \times S_{W1} \times SHGC_{W1}}{A_{WALL}} + \frac{A_{W2} \times S_{W2} \times SHGC_{W2}}{A_{WALL}} + \ldots$$

(2) In the formula at (1)—

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

(b) $A_{W1}, A_{W2}, \ldots$ = the area of each *glazing* element; and

(c) $S_{W1}, S_{W2,\ldots}$ = the shading multiplier for each *glazing* element in accordance with S37C7; and

(d) $SHGC_{W1,W2,\ldots}$ = the *total system SHGC* of each *glazing* element; and

(e) $A_{WALL}$ = the total *wall-glazing construction* area.

~~(3) The *solar admittance* of the *wall-glazing construction* must not exceed the applicable value in J4D6(5).~~

## S37C6 Solar admittance — Method 2 (Single Storey, Multiple Aspects)

(1) The *solar admittance* of *wall-glazing construction* of a single *storey* facing multiple aspects must achieve a representative *air-conditioning* energy value less than that achieved by the reference *solar admittance*, when using the following formula:

$$E_R = A_N \alpha_N SA_N + A_E \alpha_E SA_E + A_S \alpha_S SA_S + A_W \alpha_W SA_W$$

(2) In the formula at (1)—

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

(b) $A_{N,E,S,W}$ = the area of the *wall-glazing construction* facing each aspect; and

(c) $\alpha_{N,E,S,W}$ = the *solar admittance* weighting coefficient of each aspect equal to—

(i) where the *glazing* area on an aspect is less than 20% of the *wall-glazing construction* area, 0; and

(ii) the values in Table S37C6a and Table S37C6b; and

(d) $SA_{N,E,S,W}$ = the *wall-glazing construction solar admittance* of each aspect—

(i) equal to the applicable value in J4D6(5) in the reference case; and

(ii) calculated in accordance with S37C5(1) in the proposed case.

**Table S37C6a: Solar admittance weighting coefficient — Class 2 common area, Class 5, 6, 7, 8 or 9b building or Class 9a building other than a ward area**

| Aspect | *Climate zone* 1 | *Climate zone* 2 | *Climate zone* 3 | *Climate zone* 4 | *Climate zone* 5 | *Climate zone* 6 | *Climate zone* 7 | *Climate zone* 8 |
|---|---|---|---|---|---|---|---|---|
| Northern | 1.47 | 1.95 | 1.95 | 2.05 | 2.28 | 2.12 | 2.40 | 1.88 |
| Southern | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 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 |

| 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

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 S37C7a—

(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) for shading provided by an external permanent projection that extends vertically for the height of the *glazing* for the same projection distance D, as shown in Figure S37C7b—

(i) the value in Table S37C7c for shading on the northern aspect; or

(ii) the value in Table S37C7d for shading on the western aspect; or

(iii) the value in Table S37C7e for shading on the eastern aspect; or

(iv) 1.0 for shading on the southern aspect; or

~~(b)~~(c) 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: Horizontal ~~S~~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: Horizontal s~~S~~hading 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 |

**Table S37C7c: Vertical shading multipliers — Northern aspect**

| *Climate zone* | D | W = 1.7H | W = H | W = 0.7H | W = 0.5H |
|---|---|---|---|---|---|
| 1, 2, 3, 5, 6 | 0.1W | 0.91 | 0.90 | 0.90 | 0.90 |
| 1, 2, 3, 5, 6 | 0.3W | 0.85 | 0.83 | 0.82 | 0.81 |
| 1, 2, 3, 5, 6 | 0.5W | 0.82 | 0.78 | 0.76 | 0.74 |
| 1, 2, 3, 5, 6 | 0.7W | 0.81 | 0.76 | 0.73 | 0.70 |
| 4 | 0.1W | 0.91 | 0.91 | 0.90 | 0.90 |
| 4 | 0.3W | 0.87 | 0.84 | 0.83 | 0.82 |
| 4 | 0.5W | 0.84 | 0.80 | 0.78 | 0.76 |
| 4 | 0.7W | 0.83 | 0.78 | 0.75 | 0.73 |
| 7 | 0.1W | 0.92 | 0.91 | 0.91 | 0.90 |
| 7 | 0.3W | 0.87 | 0.85 | 0.83 | 0.82 |
| 7 | 0.5W | 0.86 | 0.82 | 0.79 | 0.78 |
| 7 | 0.7W | 0.85 | 0.80 | 0.78 | 0.75 |
| 8 | 0.1W | 0.92 | 0.92 | 0.91 | 0.91 |
| 8 | 0.3W | 0.90 | 0.88 | 0.86 | 0.85 |
| 8 | 0.5W | 0.91 | 0.87 | 0.85 | 0.83 |
| 8 | 0.7W | 0.91 | 0.88 | 0.86 | 0.84 |

**Table S37C7d: Vertical shading multipliers — Western aspect**

| *Climate zone* | D | W = 1.7H | W = H | W = 0.7H | W = 0.5H |
|---|---|---|---|---|---|
| 1, 2, 3, 5, 6 | 0.1W | 0.93 | 0.91 | 0.90 | 0.90 |
| 1, 2, 3, 5, 6 | 0.3W | 0.87 | 0.85 | 0.84 | 0.84 |
| 1, 2, 3, 5, 6 | 0.5W | 0.85 | 0.82 | 0.80 | 0.79 |
| 1, 2, 3, 5, 6 | 0.7W | 0.83 | 0.79 | 0.77 | 0.75 |
| 4 | 0.1W | 0.93 | 0.90 | 0.90 | 0.89 |
| 4 | 0.3W | 0.88 | 0.86 | 0.85 | 0.84 |
| 4 | 0.5W | 0.87 | 0.84 | 0.82 | 0.81 |
| 4 | 0.7W | 0.86 | 0.83 | 0.81 | 0.79 |
| 7 | 0.1W | 0.96 | 0.95 | 0.95 | 0.95 |
| 7 | 0.3W | 0.94 | 0.94 | 0.94 | 0.93 |
| 7 | 0.5W | 0.94 | 0.93 | 0.93 | 0.93 |
| 7 | 0.7W | 0.94 | 0.93 | 0.93 | 0.92 |
| 8 | 0.1W | 0.93 | 0.90 | 0.89 | 0.89 |
| 8 | 0.3W | 0.90 | 0.88 | 0.87 | 0.87 |
| 8 | 0.5W | 0.90 | 0.88 | 0.87 | 0.86 |
| 8 | 0.7W | 0.90 | 0.89 | 0.87 | 0.86 |

**Table S37C7e: Vertical shading multipliers — Eastern aspect**

| *Climate zone* | D | W = 1.7H | W = H | W = 0.7H | W = 0.5H |
|---|---|---|---|---|---|
| 1, 2, 3, 5, 6 | 0.1W | 0.94 | 0.94 | 0.93 | 0.93 |
| 1, 2, 3, 5, 6 | 0.3W | 0.90 | 0.89 | 0.88 | 0.87 |
| 1, 2, 3, 5, 6 | 0.5W | 0.88 | 0.85 | 0.84 | 0.83 |
| 1, 2, 3, 5, 6 | 0.7W | 0.87 | 0.83 | 0.81 | 0.79 |
| 4 | 0.1W | 0.94 | 0.93 | 0.92 | 0.92 |
| 4 | 0.3W | 0.91 | 0.89 | 0.89 | 0.88 |
| 4 | 0.5W | 0.90 | 0.88 | 0.86 | 0.85 |
| 4 | 0.7W | 0.89 | 0.87 | 0.85 | 0.83 |
| 7 | 0.1W | 0.95 | 0.94 | 0.94 | 0.93 |
| 7 | 0.3W | 0.91 | 0.92 | 0.91 | 0.91 |
| 7 | 0.5W | 0.93 | 0.91 | 0.90 | 0.89 |
| 7 | 0.7W | 0.93 | 0.91 | 0.90 | 0.88 |
| 8 | 0.1W | 0.94 | 0.93 | 0.93 | 0.92 |
| 8 | 0.3W | 0.94 | 0.93 | 0.93 | 0.92 |
| 8 | 0.5W | 0.95 | 0.94 | 0.93 | 0.92 |
| 8 | 0.7W | 0.95 | 0.95 | 0.94 | 0.93 |

**Figure S37C7a: Permanent external horizontal shading – measurement of P, G and H**

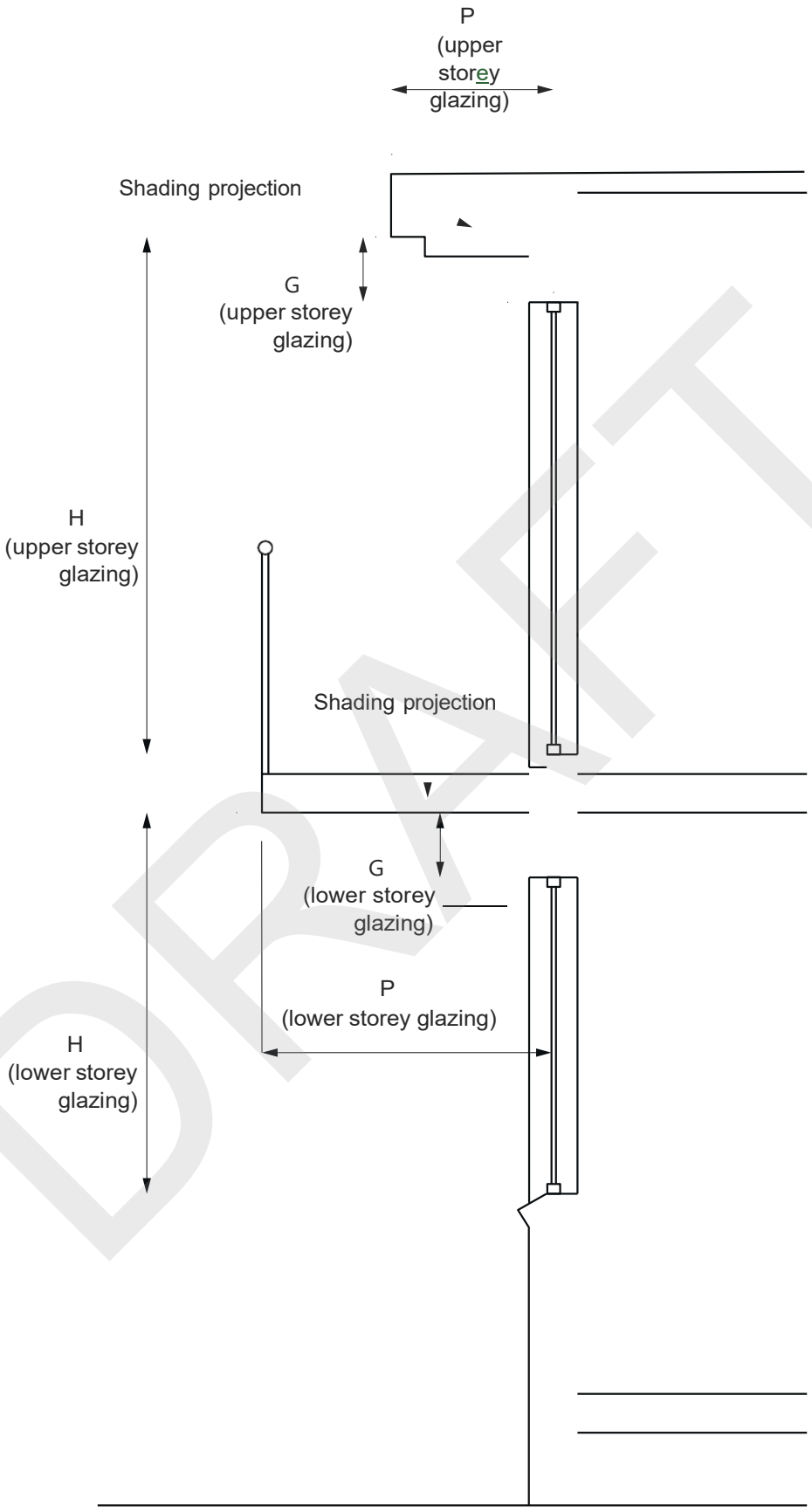
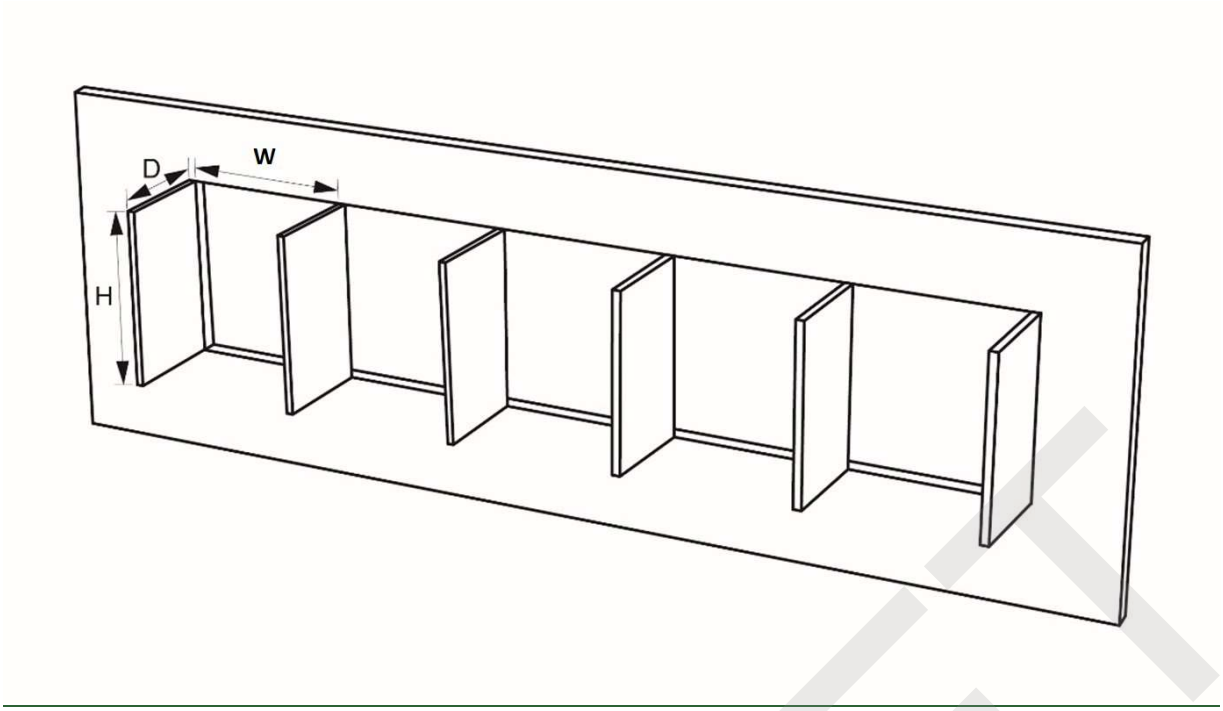


**Figure S37C7b: Permanent external vertical shading – measurement of D, W and H**



# Specification 38 Spandrel panel thermal performance

## S38C1 Scope

[2019: Spec J1.5b: 1]

This Specification describes methods of determining the thermal performance of *spandrel panels*.

## S38C2 Spandrel panel R-Value: Calculation method 1

[2019: Spec J1.5b: 2]

*Spandrel panels* are deemed to have the thermal properties nominated in Table S38C2, where—

(a) Configuration 1 consists of—
  (i) a thermally unbroken (bridged) frame; and
  (ii) a centre of *spandrel panel* consisting of—
    (A) a single-glazed opaque or clear face; and
    (B) a 100 mm air gap; and
    (C) a 3 mm aluminium, 0.8 mm galvanised steel or zinc back pan; and

(b) Configuration 2 consists of—
  (i) a thermally unbroken (bridged) frame; and
  (ii) a centre of *spandrel panel* consisting of—
    (A) a double-glazed opaque face; and
    (B) a 50 mm air gap; and
    (C) a 3 mm aluminium, 0.8 mm galvanised steel or zinc back pan; and

(c) Configuration 3 consists of—
  (i) a thermally broken (unbridged) frame; and
  (ii) a centre of *spandrel panel* consisting of—
    (A) a double-glazed clear face; and
    (B) a 50 mm air gap; and
    (C) a 3 mm aluminium, 0.8 mm galvanised steel or zinc back pan; and

(d) Configuration 4 consists of—
  (i) a thermally broken (unbridged) frame; and
  (ii) a centre of *spandrel panel* consisting of—
    (A) a double-glazed low-e clear face; and
    (B) a 50 mm air gap; and
    (C) a 3 mm aluminium, 0.8 mm galvanised steel or zinc back pan.

**Table S38C2: Achieved Total R-Value of spandrel panels**

| Type | No insulation | R0.5 insulation | R1.0 insulation | R1.5 insulation | R2.0 insulation |
|---|---|---|---|---|---|
| Configuration 1 | 0.3 | 0.39 | 0.42 | 0.44 | 0.45 |
| Configuration 2 | 0.35 | 0.41 | 0.43 | 0.44 | 0.45 |
| Configuration 3 | 0.84 | 0.96 | 1.03 | 1.07 | 1.09 |

## S38C3 Spandrel panel R-Value: Calculation method 2

(1) The *Total ~~system U~~R-Value* of a *spandrel panel* is determined in accordance with the following formula:

~~$U_{sp} = \frac{U_{cs}A_{cs} + \Sigma U_{es}A_{es} + \Sigma U_{fs}A_{fs}}{A_{cs} + \Sigma A_{es} + \Sigma A_{fs}}$~~

$$R_{sp} = \frac{A_{cs} + \sum A_{es} + \sum A_{fs}}{U_{cs}A_{cs} + \sum U_{es}A_{es} + \sum U_{fs}A_{fs}}$$

(2) In the formula at (1)—

(a) $A_{cs}$ = the area of the centre region of the *spandrel panel*; and

(b) $A_{es}$ = the area of the edge region of the *spandrel panel*, where the edge has a defined width of 127 mm; and

(c) $A_{fs}$ = the area of the frame region of the *spandrel panel*; and

(d) $U_{cs}$ = the U-value of the centre region of the *spandrel panel*; and

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

(f) $U_{fs}$ = the U-value of the frame region of the *spandrel panel*; and

(g) ~~$U_{sp}$~~ $R_{sp}$ = the *Total ~~System U~~R-Value* of the *spandrel panel*.

# Specification 40 Lighting and power control devices

## S40C1 Scope

This Specification contains the requirements for lighting and power control devices including manual switches, ~~timers,~~ time switches, demand-operated controls ~~motion detectors~~ and daylight control devices.

## ~~S40C2 Lighting timers~~

~~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.~~

## S40C2 Manual switch

An artificial lighting manual switch must be located in a visible and easily accessed position—

(a) in the room or space being switched; or

(b) in an adjacent room or space from where at least 90% of the lighting being controlled is visible.

## S40C3 Time switch

(1) A time switch must ~~be~~—

(a) be capable of switching on and off electric power at variable pre-programmed times and on variable pre-programmed days; and

(b) have the ability to program public holidays at least one year ahead~~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—~~ configured so that the lights are switched off when the space is designated to be occupied

~~(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~~

~~a manual "off" switch.~~capable of being overridden by—

(a) a demand-operated control; or

(b) a manual switch.

(3) A time switch for external lighting must be capable of being configured to limit the period the system is switched on to between 30 minutes before sunset and 30 minutes after sunrise.—

~~(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 maximum period of ~~up to~~ 2 hours outside normal operating hours.~~, after which if there is no further presence detected, the time switch must resume control.~~

## S40C4 Motion detectors

(1) In a Class 2, 3 or 9c *residential care building* other than within a *sole-occupancy unit*, a motion detector mus

(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.

## S40C4 Demand-operated control

(1) A demand-operated control must—

(a) activate artificial lighting upon detecting the presence or movement of an occupant; and

(b) deactivate artificial lighting immediately or after a run-on period not more than 15 minutes after the space is vacated.

(2) A demand-operated control in a *fire-isolated stairway*, *fire-isolated passageway* or *fire-isolated ramp* must be configured so that a minimum of 30% of the full design illumination is provided.

**Notes**

For the purposes of S40C4, demand-operated controls may detect the presence or movement of an occupant via a motion detector, key card, security system or the like.

## S40C5 Daylight sensor and dynamic lighting control device

~~(1)~~ A daylight sensor and dynamic control device for artificial lighting must, in response to the measured level of available daylight in the range 50-1000 lux~~—~~

(a) ~~for switching on and off—~~for high pressure discharge lights, switch lights on and off with a programmable delay and switching differential; and

~~(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—~~for all other lights, dim or step lighting output down in not less than 4 steps to less than 50% power.

~~(i) continuously down to a power consumption that is less than 50% of full power; or~~

~~(ii) in no less than 4 steps down to a power consumption that is less than 50% of full power.~~

~~(2) Where a daylight sensor and dynamic control device has a manual override switch, the manual override switch must not be able to switch the lights permanently on or bypass the lighting controls.~~

(i) openings must shut when the external dry bulb temperature is less than or equal to a temperature 1°C higher than the *air-conditioning service* cooling set point; and

(ii) openings must shut when the external dry bulb temperature is greater than or equal to a temperature 1°C lower than the *air-conditioning service* heating set point; and

(iii) openings must remain open for all hours of the year that do not meet the above closing conditions.

**Table S45C3a: Annual heating degree hours, cooling degree hours and dehumidification gram hours for various locations**

| *Climate zone* | Location | Annual *heating degree hours* | Annual *cooling degree hours* | Annual *dehumidification gram hours* |
|---|---|---|---|---|
| 1 | Darwin | 0 | 15770 | 15364 |
| 1 | Port Hedland | 859 | 16540 | 8011 |
| 1 | Townsville | 595 | 6392 | 5843 |
| 1 | Weipa | 4 | 12144 | 12565 |
| 1 | Wyndham | 126 | 26975 | 9184 |
| 1 | Willis Island | N/A | N/A | N/A |
| 1 | Cairns | 268 | 6411 | 6030 |
| 1 | Broome | 624 | 14749 | 14083 |
| 2 | Rockhampton | 3283 | 6717 | 1701 |
| 2 | Amberley | 10958 | 4483 | 290 |
| 2 | Brisbane | 4744 | 2228 | 1415 |
| 2 | Coffs Harbour | 7137 | 1309 | 231 |
| 2 | Mackay | 976 | 3183 | 5214 |
| 2 | Gladstone | 568 | 4307 | 3543 |
| 2 | Oakey | 15392 | 3979 | 40 |
| 3 | Longreach | 6002 | 14634 | 505 |
| 3 | Carnarvon | 2260 | 4810 | 1023 |
| 3 | Alice Springs | 11767 | 13149 | 125 |
| 3 | Charleville | 11284 | 9580 | 230 |
| 3 | Halls Creek | 611 | 19571 | 2109 |
| 3 | Tennant Creek | 1171 | 18644 | 1747 |
| 3 | Mount Isa | 3060 | 15813 | 1797 |
| 3 | Newman | 6286 | 15240 | 645 |
| 4 | Moree | 13986 | 7291 | 151 |
| 4 | Wagga | 24833 | 4678 | 0 |
| 4 | Mildura | 19003 | 6300 | 11 |
| 4 | Meekatharra | 6883 | 12766 | 67 |
| 4 | Oodnadatta | 8352 | 13845 | 18 |
| 4 | Kalgoorlie | 13048 | 7763 | 31 |
| 4 | Woomera | 11754 | 8434 | 3 |
| 4 | Cobar | 13663 | 7616 | 101 |
| 4 | Dubbo | 20431 | 5332 | 36 |
| 4 | Giles | 6259 | 13082 | 81 |
| 5 | Geraldton | 6846 | 6365 | 10 |
| 5 | Perth | 11024 | 6084 | 0 |

| *Climate zone* | Location | Annual *heating degree hours* | Annual *cooling degree hours* | Annual *dehumidification gram hours* |
|---|---|---|---|---|
| 5 | Williamtown | 11713 | 2802 | 276 |
| 5 | Adelaide | 13066 | 5132 | 0 |
| 5 | Sydney RO (Observatory Hill) | 7079 | 1466 | 129 |
| 5 | Bickley | 15664 | 4015 | 34 |
| 5 | Swanbourne | 6322 | 3332 | 63 |
| 5 | Ceduna | 14061 | 5212 | 53 |
| 5 | Mandurah | 6081 | 3131 | 2 |
| 5 | Esperance | 11009 | 1884 | 0 |
| 5 | Manjimup | 20910 | 2531 | 0 |
| 5 | Mascot (Sydney Airport) | 6357 | 1596 | 110 |
| 6 | Nowra | 14813 | 2801 | 56 |
| 6 | Melbourne RO | 14494 | 2416 | 0 |
| 6 | East Sale | 27229 | 1259 | 0 |
| 6 | Katanning | 21496 | 3566 | 14 |
| 6 | Forrest | 15294 | 8410 | 14 |
| 6 | Albany | 16131 | 932 | 0 |
| 6 | Mount Lofty | 41095 | 1626 | 0 |
| 6 | Tullamarine (Melbourne Airport) | 23496 | 2764 | 0 |
| 6 | Mount Gambier | 28496 | 2764 | 0 |
| 6 | Moorabbin | 20249 | 2291 | 0 |
| 6 | Warnambool | 27285 | 1406 | 1 |
| 6 | Cape Otway | 19279 | 960 | 3 |
| 6 | Richmond | 15607 | 3917 | 60 |
| 7 | Armidale | 33374 | 1039 | 9 |
| 7 | Launceston (Ti Tree Bend) | 30952 | 833 | 0 |
| 7 | Canberra | 35153 | 2863 | 0 |
| 7 | Cabramurra | 65831 | 79 | 0 |
| 7 | Hobart | 28542 | 451 | 0 |
| 7 | Orange | 40325 | 1192 | 2 |
| 7 | Ballarat | 37873 | 2585 | 2 |
| 7 | Low Head | 26047 | 80 | 0 |
| 7 | Launceston Airport | 39444 | 456 | 0 |
| 7 | Learmonth | 1646 | 14048 | 958 |
| 8 | Thredbo (Village) | 61209 | 147 | 0 |

**Table Notes**

If location is not listed, use the nearest appropriate location with similar climatic conditions, for which data is available.

# Specification 46 Calculation of fan power ratio

## S46C1 Scope

This Specification contains the method of calculating fan power ratio for the purpose of assessing compliance with J6D5.

## S46C2 Calculation of fan performance ratio

(1) The fan power ratio for an individual fan must be calculated in accordance with the following formula:

$$FPR_{individual\ fan} = \frac{P_{dp}}{P_{rf}}$$

where—

(a) $FPR_{individual\ fan}$ = the fan power ratio for the fan; and

(b) $P_{dp}$ = the input power of the selected fan at duty point, calculated in accordance with (3); and

(c) $P_{rf}$ = the input power of the reference fan at duty point, calculated in accordance with (4); and

(2) The average fan power ratio for multiple fans must be calculated in accordance with the following formula:

$$FPR_{average} = \frac{\sum_{applicable\ fans} P_{dp}}{\sum_{applicable\ fans} P_{rf}}$$

where—

(a) $FPR_{average}$ = the average fan power ratio for more than one fan

(b) $P_{dp}$ = the input power of each selected fan at duty point, calculated in accordance with (3); and

(c) $P_{rf}$ = the input power of each reference fan at duty point, calculated in accordance with (4); and

(3) For the formulae in (1) and (2), $P_{dp}$ must be calculated in accordance with the following:

(a) for a variable speed fan—

$$P_{dp\ (variable\ speed)} = \frac{p_{dp} Q_{dp}}{\eta_{sp}}$$

where—

(i) $p_{dp}$ = the pressure (Pa), at the duty point; and

(ii) $Q_{dp}$ = the flow ($m^3/s$), at the duty point; and

(iii) $\eta_{sp}$ = the efficiency at the selection point; and

(b) for a fixed speed fan—

$$P_{dp\ (fixed\ speed)} = \frac{p_{dp*} Q_{dp}}{\eta_{dp*}}$$

where—

(i) $p_{dp*}$ = the pressure (Pa), at the point on the applicable fan curve where the fan flow equals the duty flow; and

(ii) $Q_{dp}$ = the flow ($m^3/s$), at the duty point; and

(iii) $\eta_{dp*}$ = the efficiency at the operating point corresponding to $p_{dp*}$ and $Q_{dp}$.

(4) For the formulae in (2) and (3), $P_{rf}$ must be calculated in in accordance with the following formula:

$$P_{rf} = \frac{p_{dp} Q_{dp}}{\eta_{rf}}$$

where—

(a) $p_{dp}$ = the pressure (Pa) at the duty point; and

(b) $Q_{dp}$ = the flow ($m^3/s$) at the duty point; and

(c) $\eta_{rf}$ = the efficiency calculated using the equation at **J6D5(3)(a)** with input power $P_{dp}$.

# Specification 47 Calculation of climate specific part load value for chillers

## S47C1 Scope

This Specification contains the method to calculate the climate specific part load value for a connected group of chillers that serves a common load, for the purpose of assessing compliance with J6D11.

## S47C2 Calculation of climate specific part load value for chillers

(1) The climate specific part load value for a group of one or more chillers must be calculated in accordance with the following formula:

$$CSPLV = \alpha_{100}EER_{100} + \alpha_{75}EER_{75} + \alpha_{50}EER_{50} + \alpha_{25}EER_{25}$$

where—

(a) $CSPLV$ = climate specific part load value; and

(b) $EER_n$ = the average energy efficiency ratio of the chillers that operate to provide n% of the design cooling load, determined in accordance with (2); and

(c) $\alpha_n$ = load weighting factors specified in—

(i) Table S47C2a for chillers serving a Class 2 common area, a Class 5, 6, 7, 8 or 9b building or a Class 9a building other than a *ward area;* or

(ii) Table S47C2b for chillers serving a Class 3 or 9c building or a Class 9a *ward area*.

(2) $EER_n$ is determined as the average energy efficiency ratio of the chillers operating to meet n% of the design load, allowing for the part-load efficiencies at—

(a) for chillers serving a Class 2 common area, a Class 5, 6, 7, 8 or 9b building or a Class 9a building other than a ward area—

(i) the chilled water leaving temperatures listed in Table S47C2c; and

(ii) the entering condenser water temperature for water-cooled chillers that is determined by adding the design approach temperature to the outside wet-bulb temperatures listed in Table S47C2d; and

(iii) the outside dry bulb temperatures listed in Table S47C2e for air-cooled chillers; and

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

(i) the chilled water leaving temperatures listed in Table S47C2f; and

(ii) the entering condenser water temperature for water-cooled chillers that is determined by adding the design approach temperature to the outside wet-bulb temperatures listed in Table S47C2g; and

(iii) the outside dry bulb temperatures in Table S47C2h for a Class 3 or 9c building or a Class 9a *ward area* for air-cooled chillers.

**Table S47C2a: Load weighting factors – Class 2 common area, Class 5, 6, 7, 8 or 9b building or Class 9a building other than a *ward area***

| Load | CZ 1 | CZ 2 | CZ 3 | CZ 4 | CZ 5 | CZ 6 | CZ 7 | CZ 8 |
|---|---|---|---|---|---|---|---|---|
| 25% | 7% | 25% | 23% | 25% | 24% | 42% | 28% | 20% |
| 50% | 49% | 44% | 49% | 35% | 46% | 31% | 36% | 27% |
| 75% | 43% | 31% | 28% | 37% | 30% | 26% | 34% | 42% |
| 100% | 2% | 1% | 1% | 3% | 0% | 1% | 2% | 11% |

**Table Notes**

(1) Load is the proportion of the total design load served by a connected group of chillers.

(2) CZ = climate zone.

**Table S47C2b: Load weighting factors – Class 3 or 9c building or Class 9a *ward area***

| Load | CZ 1 | CZ 2 | CZ 3 | CZ 4 | CZ 5 | CZ 6 | CZ 7 | CZ 8 |
|---|---|---|---|---|---|---|---|---|
| 25% | 7% | 31% | 23% | 43% | 41% | 59% | 40% | 16% |
| 50% | 31% | 40% | 44% | 39% | 35% | 24% | 31% | 32% |
| 75% | 61% | 28% | 32% | 18% | 23% | 15% | 26% | 49% |
| 100% | 1% | 2% | 1% | 0% | 1% | 1% | 3% | 3% |

**Table Notes**

(1) Load is the proportion of the total design load served by a connected group of chillers.

(2) CZ = climate zone.

**Table S47C2c: Part load evaluation points – chilled water temperature (°C), Class 2 common area, Class 5, 6, 7, 8 or 9b building or Class 9a building other than a *ward area***

| Load | CZ 1 | CZ 2 | CZ 3 | CZ 4 | CZ 5 | CZ 6 | CZ 7 | CZ 8 |
|---|---|---|---|---|---|---|---|---|
| 25% | 9 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| 50% | 7 | 8 | 9 | 9 | 8 | 9 | 9 | 10 |
| 75% | 6 | 6 | 8 | 8 | 7 | 8 | 9 | 10 |
| 100% | 6 | 6 | 7 | 7 | 6 | 6 | 8 | 10 |

**Table Notes**

(1) Load is the proportion of the total design load served by a connected group of chillers.

(2) CZ = climate zone.

**Table S47C2d: Part load evaluation points – outdoor wet bulb temperature (°C), Class 2 common area, Class 5, 6, 7, 8 or 9b building or Class 9a building other than a *ward area***

| Load | CZ 1 | CZ 2 | CZ 3 | CZ 4 | CZ 5 | CZ 6 | CZ 7 | CZ 8 |
|---|---|---|---|---|---|---|---|---|
| 25% | 17 | 16 | 12 | 12 | 14 | 12 | 12 | 10 |
| 50% | 24 | 22 | 17 | 17 | 20 | 18 | 17 | 13 |
| 75% | 27 | 25 | 21 | 20 | 23 | 20 | 19 | 15 |
| 100% | 28 | 27 | 23 | 22 | 25 | 24 | 21 | 14 |

**Table Notes**

(1) Load is the proportion of the total design load served by a connected group of chillers.

(2) CZ = climate zone.

**Table S47C2e: Part load evaluation points – outdoor dry bulb (°C), Class 2 common area, Class 5, 6, 7, 8 or 9b building or Class 9a building other than a *ward area***

| Load | CZ 1 | CZ 2 | CZ 3 | CZ 4 | CZ 5 | CZ 6 | CZ 7 | CZ 8 |
|---|---|---|---|---|---|---|---|---|
| 25% | 27 | 21 | 21 | 18 | 19 | 17 | 17 | 14 |
| 50% | 31 | 27 | 32 | 27 | 25 | 26 | 25 | 20 |
| 75% | 32 | 29 | 34 | 31 | 28 | 31 | 29 | 23 |
| 100% | 29 | 29 | 28 | 32 | 27 | 36 | 32 | 25 |

**Table Notes**

(1) Load is the proportion of the total design load served by a connected group of chillers.

(2) CZ = climate zone.

**Table S47C2f: Part load evaluation points – chilled water temperature (°C), Class 3 or 9c building or Class 9a *ward area***

| Load | CZ 1 | CZ 2 | CZ 3 | CZ 4 | CZ 5 | CZ 6 | CZ 7 | CZ 8 |
|---|---|---|---|---|---|---|---|---|
| 25% | 8 | 9 | 10 | 10 | 9 | 10 | 10 | 10 |
| 50% | 7 | 7 | 9 | 9 | 8 | 9 | 9 | 10 |
| 75% | 6 | 6 | 8 | 8 | 7 | 8 | 9 | 10 |
| 100% | 6 | 6 | 6 | 7 | 6 | 7 | 8 | 10 |

**Table Notes**

(1) Load is the proportion of the total design load served by a connected group of chillers.

(2) CZ = climate zone.

**Table S47C2g: Part load evaluation points – outdoor wet bulb temperature (°C), Class 3 or 9c building or Class 9a ward area**

| Load | CZ 1 | CZ 2 | CZ 3 | CZ 4 | CZ 5 | CZ 6 | CZ 7 | CZ 8 |
|---|---|---|---|---|---|---|---|---|
| 25% | 19 | 18 | 12 | 14 | 17 | 14 | 14 | 10 |
| 50% | 24 | 22 | 17 | 18 | 21 | 19 | 17 | 13 |
| 75% | 27 | 25 | 20 | 20 | 23 | 21 | 19 | 14 |
| 100% | 29 | 27 | 24 | 23 | 26 | 23 | 20 | 17 |

**Table Notes**

(1) Load is the proportion of the total design load served by a connected group of chillers.

(2) CZ = climate zone.

**Table S47C2h: Part load evaluation points – outdoor dry bulb temperature (°C), Class 3 or 9c building or Class 9a ward area**

| Load | CZ 1 | CZ 2 | CZ 3 | CZ 4 | CZ 5 | CZ 6 | CZ 7 | CZ 8 |
|---|---|---|---|---|---|---|---|---|
| 25% | 24 | 22 | 21 | 20 | 21 | 19 | 18 | 14 |
| 50% | 29 | 27 | 31 | 29 | 26 | 27 | 26 | 17 |
| 75% | 31 | 29 | 36 | 34 | 29 | 33 | 31 | 22 |
| 100% | 34 | 32 | 39 | 41 | 32 | 41 | 36 | 27 |

**Table Notes**

(1) Load is the proportion of the total design load served by a connected group of chillers.

(2) CZ = climate zone.

# Specification 48 Calculation of weighted efficiency index for unitary air-conditioning equipment

## S48C1 Scope

This Specification contains the method of calculating the weighted efficiency index of the unitary air conditioners serving a building, for the purpose of assessing compliance with J6D12.

## S48C2 Calculation of weighted efficiency index for unitary air conditioning equipment

The weighted efficiency index of unitary air-conditioning equipment must be calculated in accordance with the following formula:

$$WEI = \frac{\sum_{All\ unitary\ systems\ i} EER_i D_i}{\sum_{All\ unitary\ systems\ i} EER_i^{min} D_i}$$

where—

(1) $WEI$ = the weighted efficiency index of the unitary air conditioners serving a building; and

(2) for each air conditioner, (i) —

(a) $EER_i$ = the energy efficiency ratio, including the compressor and fan power. when tested in accordance with AS/NZS 3823.1.2 at test condition T1; and

(b) $D_i$ = the cooling capacity, including the compressor and fan power, when tested in accordance with AS/NZS 3823.1.2 at test condition T1; and

(c) $EER_i^{min}$ = the applicable nominal minimum energy efficiency ratio in Table S48C2.

**Table S48C2: Nominal minimum energy efficiency ratio figures for air-cooled unitary air-conditioning systems**

| Design cooling capacity | Unitary systems other than variable refrigerant flow systems | Variable refrigerant flow systems |
|---|---|---|
| ≤ 39kW | 3.3 | 4.1 |
| > 39kW | 3.1 | 3.7 |

# Specification 49 Comparison of zone peak loads in proposed building and reference building

## S49C1 Scope

This Specification contains the requirements for comparing peak sensible heating and cooling loads for each assessable zone in the proposed building with the corresponding zones in the reference building.

### S49C2 Comparison of zone peak loads in proposed building and reference building

(1) The sensible zone load is the sensible heating or cooling effect required to maintain the temperature in each zone within the range specified in S34C3(8).

(2) The sensible loads for each zone in the proposed building and the reference building must be calculated in accordance with the modelling parameters of Specification 34.

(3) The zone peak heating load is the highest sensible heating load across 98% of the hours of operation.

(4) The zone peak cooling load is the highest sensible cooling load across 98% of the hours of operation.

(5) A zone of the proposed building is assessable under J1V3(1)(b)(iii) to (v) if it has—

(a) a peak sensible *heating load* of at least 10 W/m²; or

(b) a peak sensible *cooling load* of at least 40 W/m².