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## PART 13.0 ENERGY EFFICIENT HOUSING

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### Purpose

To reduce greenhouse gas emissions by efficiently using fossil fuel generated energy in new dwellings.

### Application

This code applies to new building work for Class 1a and 1b buildings in *Zones 2 and 5* including –

- an extension/addition with a floor area greater than 50m<sup>2</sup>, which creates separate rooms, including the enclosed spaces under a raised dwelling ;
- all extensions/additions to Class 1a and 1b buildings where the original building was previously assessed against this standard;
- roof/ceilings of Class 10 parts of a building with a roof space common to a Class 1 building;
- removal dwellings removed to another site or another location on a site; and
- manufactured or relocatable dwellings built off site and moved to a *permanent location*.

The provisions of this code do not apply to –

- extensions/additions which extend or increase an existing space without a dividing wall in an existing dwelling not previously assessed against this standard;
- external walls, floors and external openings of Class 10 parts of a building which have a common roof/ceiling space with a dwelling;
- external openings to bathrooms, toilets, laundries and storerooms having floor areas less than 7.5m<sup>2</sup>;
- separate Class 10 buildings;
- existing dwellings raised above the ground level and not enclosed to the lower level; and
- skylights.

### Referral Agency

There is no referral agency for this code.

### Associated Guidelines

- Energy Efficient Housing Design Manual

### Referenced Standards

AS 1361 – 1995: Electric heat-exchange water heaters – for domestic applications.

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### Definitions

Note – words that have been italicised in the body of the document are defined.

**Adjustable external shutter** means a fixture permanently fixed to the exterior of a building, which has blades, leaves or similar components capable of adjustment from inside the building or from ground level to prevent direct sun exposure to the glazing of the screened opening.

**Blind** means screening material with a maximum 25% transparency permanently fixed to the exterior of a building, which can be drawn down either manually, mechanically or electronically to prevent direct sun exposure to the glazed opening.

**Envelope** means the parts of a building's fabric that separate heated or cooled spaces from the exterior of the building.

**Elevated or suspended floors** means other than slab on ground construction.

**Fixed screen** means a fixture permanently fixed to the exterior of a building, with fixed blades, slats or battens covering a minimum of 75% of the screen to restrict direct sun exposure to the glazing of the screened opening.

**Ceiling fan** means a fan permanently fixed to the ceiling and hard wired having blades a minimum of 1200mm in diameter and a minimum 60 watt motor with adjustable speed control.

**Fabric** means the basic architectural and structural elements and components of a building including the walls, floors, ceilings and roof, but not furniture or fittings.

**Maximum expected annual energy usage** means the total energy use expressed in MJ/m<sup>2</sup>/pa for artificial heating and cooling.

**Overhang** means the width of the permanently fixed projection of the building measured from the window or door glazing to the outermost point of the projection. The outermost projection may include the horizontal section of any rainwater fixtures with a minimum 100mm width (refer to Diagram 2).

**Permanent location** means the site address for which the development application for building work has been approved.

**Skylight** means any glazed opening fitted within the roof of a building and includes roof lights, roof windows and light wells.

**Total R-value** means a value indicating the thermal resistance (m<sup>2</sup>.K/W) of all contributing components through a section of the building envelope, excluding the bridging effect of ceilings battens, ceiling joist or wall framing, but including indoor and outdoor air films (AIRAH Standard) and the thermal resistances of reflective

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air filled cavities. (refer to the Energy Efficient Housing Design Manual for information on how to achieve the required 'R' values)

**Unit thickness** means the thickness of the masonry unit including any voids within the unit. It does not include cavities or spaces between units.

**WERS** means the Window Energy Rating Scheme administered by the Australasian Window Council.

**Zones** are defined by Local Government boundaries. The Local Government area also means City Council, Shire Council or Town Council.

**Zone 2 (sub tropical)** is defined by the boundaries of the following Local Government areas:

Beaudesert, Boonah, Biggenden, Brisbane, Bundaberg, Burnett, Caboolture, Caloundra, Cooloola, Hervey Bay, Isis, Esk, Gatton, Gold Coast, Ipswich, Kilcoy, Kilkivan, Kolan, Laidley, Logan, Maroochy, Maryborough, Noosa, Pine Rivers, Redcliffe, Redland, Tiaro, Woocoo.

**Zone 5 (temperate)** is defined by the boundaries of the following Local Government areas:

Cambooya, Clifton, Crows Nest, Jondaryan, Kingaroy, Nanango, Pittsworth, Rosalie, Stanthorpe, Toowoomba, Warwick.

**PERFORMANCE CRITERIA****ACCEPTABLE SOLUTION****ZONE 2 (sub tropical)****Thermal performance of building**

- |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>P1</b> To facilitate the efficient use of fossil fuel generated energy for artificial heating and cooling, a building and its services must have, to the degree necessary, a level of thermal performance appropriate to the geographic location of the building having regard to-</p> <ul style="list-style-type: none"><li>(a) the building <i>fabric</i>; and</li><li>(b) the internal environment; and</li><li>(c) the control of solar radiation; and</li><li>(d) the adequate movement of air; and</li><li>(e) sufficient sealing of the building fabric; and</li><li>(f) the type of hot water system installed.</li></ul> | <p><b>A1</b></p> <ul style="list-style-type: none"><li>(a) The building achieves a minimum points score of 6 using any combination of elements listed in Schedule 1; or</li><li>(b) the building does not exceed the <i>maximum expected annual energy usage</i> for the zone as listed in Schedule 4 by thermal simulation in accordance with Schedule 3; or</li><li>(c) a removal dwelling removed to another site or another location on a site achieves a minimum points score of 5 using any combination of elements listed in Schedule 1.</li></ul> |
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### Schedule 1 – Building Elements – Zone 2

#### Element 1- Roof / ceiling insulation

- 2 pts**      Roofs/ceilings have a total thermal resistance to heat flow inward (down) of not less than R2.5.

#### Element 2-External walls

- 1 pt**      External walls -
- (a) for locations with an elevation less than or equal to 300 metres AHD -
    - (i) have a total thermal resistance to heat flow inward of not less than R1.0; or
    - (ii) are constructed from concrete or masonry with a maximum material density of 2200 kg/m<sup>3</sup> and a minimum *unit thickness* of 180mm and permanently shaded by an *overhang* equal or greater than 0.25 times the height of the wall above the floor level; and
  - (b) for locations with an elevation greater than 300 metres AHD-
    - (i) have a total thermal resistance to heat flow inward of not less than R 1.5; or
    - (ii) are constructed from concrete or masonry with a maximum material density of 2200 kg/m<sup>3</sup> and a minimum *unit thickness* of 180mm.

**Note:** External walls of typical brick veneer construction with reflective foil in the cavity are deemed to have a total thermal resistance to heat flow inward of R 1.5.

#### Element 3- Solar radiation

- 3 pts**      Solar radiation is controlled by -
- (a) external glazing shaded from direct sunshine by -
    - (i) a permanently fixed overhang projection over the glazing in accordance with Table 1 and Diagram 2; or
    - (ii) *adjustable external shutters*; or
    - (iii) *blinds*; or
    - (iv) *fixed screens*; or
  - (b) glazed window or door assemblies having a rating under the *WERS* testing format equal to or better than 3 stars for cooling; or
  - (c) a combination of (a) and (b).

### Element 4 - Air Movement

- 1 pt** Air movement is provided by -
- (a) natural ventilation through external openings having an openable area of at least 10% of the floor area of the habitable room or space; or
  - (b) where the natural ventilation provided is less than 10% of the floor area of the habitable room or space - a *ceiling fan* for each habitable room or space.

### Element 5 - Hot water system

- 2 pts** A hot water system is installed using one of the following types-
- (a) a solar hot water system having a minimum of 2 solar collector panels and a storage capacity of at least 300 litres; or
  - (b) a gas unit; or
  - (c) an electric heat pump system.
- 1 pt** A hot water system is installed being a heat exchange type water heater manufactured in accordance with AS 1361.

### Element 6 - Floor insulation

- Minus  
1 pt** If elevated or suspended floors for locations with an elevation greater than 300 metres AHD, do not have a total thermal resistance to heat flow outward (down) of not less than R1.5.

### Element 7 - Sealing of Building

- Minus  
0.5 pts** If dampers are not fitted to all open fireplaces.

## **ZONE 5 (temperate)**

### **Thermal performance of building**

- |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>P1</b> To facilitate the efficient use of fossil fuel generated energy for artificial heating and cooling, a building and its services must have, to the degree necessary, a level of thermal performance appropriate to the geographic location of the building having regard to-</p> <ul style="list-style-type: none"><li>(a) the building <i>fabric</i>; and</li><li>(b) the internal environment; and</li><li>(c) the control of solar radiation; and</li><li>(d) the adequate movement of air; and</li><li>(e) sufficient sealing of the building fabric; and</li><li>(f) the type of hot water system installed.</li></ul> | <p><b>A1</b></p> <ul style="list-style-type: none"><li>(a) The building achieves a minimum points score of 6 using any combination of elements listed in Schedule 2; or</li><li>(b) the building does not exceed the <i>maximum expected annual energy usage</i> for the zone as listed in Schedule 4 by thermal simulation in accordance with Schedule 3; or</li><li>(c) a removal dwelling removed to another site or another location on a site achieves a minimum points score of 5 using any combination of elements listed in Schedule 2.</li></ul> |
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### Schedule 2 – Building elements – Zone 5

#### Element 1 - Roof / ceiling insulation

- 2 pts** Roofs/ceilings have a total thermal resistance to heat flow inward (down) of not less than R3.0.

#### Element 2 - External walls

- 1 pt**
- (a) External walls-
    - (i) have a total thermal resistance to heat flow inward of not less than R1.5; or
    - (ii) are constructed from concrete or masonry with a maximum material density of 2200 kg/m<sup>3</sup> and a minimum *unit thickness* of 180mm.
  - (b) Glazed window or door assemblies to external openings-
    - (i) have a maximum of 25% of the floor area of the room or space; or
    - (ii) where their area exceeds 25% of the floor area of the room or space, have a rating under the *WERS* testing format equal to or better than -
      - (A) 2.5 stars for heating for windows and doors facing Sector A in Diagram. 1; and
      - (B) 3 stars for heating for windows and doors facing Sectors B, C and D in Diagram 1.

**Note:** External walls of typical brick veneer construction with reflective foil in the cavity are deemed to have a total thermal resistance to heat flow inward of R 1.5.

#### Element 3- Solar radiation

- 3 pts** Solar radiation is controlled by-
- (a) external glazing shaded from direct sunshine by -
    - (i) a permanently fixed overhang projection over the glazing in accordance with Table 1 and Diagram 2; or
    - (ii) *adjustable external shutters*; or
    - (iii) *blinds*; or
    - (iv) *fixed screens*; or
  - (b) glazed window or door assemblies having a rating under the *WERS* testing format equal to or better than 3 stars for cooling; or
  - (c) a combination of (a) and (b).

#### Element 4- Air Movement

- 1 pt** Natural ventilation complies with the BCA requirements.

### Element 5- Hot water system

- 2 pts** A hot water system is installed using one of the following types-
- (a) a solar hot water system having a minimum 2 solar collectors and a storage capacity of 300 litres; or
  - (b) a gas unit; or
  - (c) an electric heat pump system.

- 1 pt** A hot water system is installed being a heat exchange type water heater manufactured in accordance with AS 1361.

### Element 6 -Floor insulation

- Minus  
1 pt** If elevated or suspended floors, have a total thermal resistance to heat flow outward (down) of less than R1.5.

### Element 7 - Sealing of Building

- Minus  
0.5 pts** If dampers are not fitted to all open fireplaces.

## General Requirements

### Schedule 3 – Thermal simulation criteria

Thermal simulation programs must calculate the *maximum expected annual energy usage* having regard to the following criteria-

- (a) thermal mass; and
- (b) roof /ceiling insulation, except the maximum amount of added insulation to the roof/ceiling space used in the calculations must not exceed R2.5 in Zone 2 and R3.0 in Zone 5; and
- (c) wall insulation; and
- (d) floor insulation; and
- (e) floor area; and
- (f) ventilation, including roof ventilation; and
- (g) ceiling fans; and
- (h) glazing area; and
- (i) eaves width and shading by external awnings and the like; and
- (j) window type; and
- (k) orientation.

The inclusion of –

- (a) curtains, internal blinds or pelmets;
- (b) roof colour;
- (c) wall colour;
- (d) carpets and floor coverings to concrete slabs; and
- (e) added insulation to roof/ceiling in excess of R2.5 in Zone 2 and R3.0 in Zone 5;

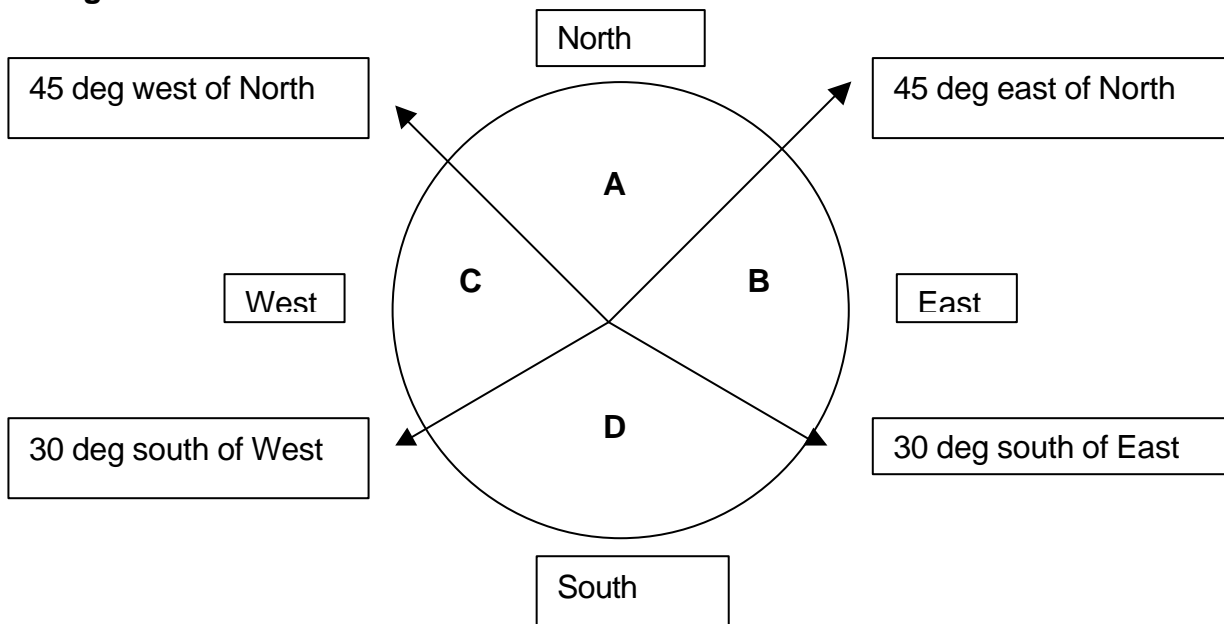
must not contribute to or detract from the final calculation in any way.

Where a solar, gas or heat pump hot water system is installed as per Schedule 1 or 2, an amount of 30 MJ/m<sup>2</sup>/pa can be deducted from the calculated annual energy usage determined by a computer simulation program. Where a heat exchange hot water system is installed as per Schedule 1, an amount of 15 MJ/m<sup>2</sup>/pa can be deducted.

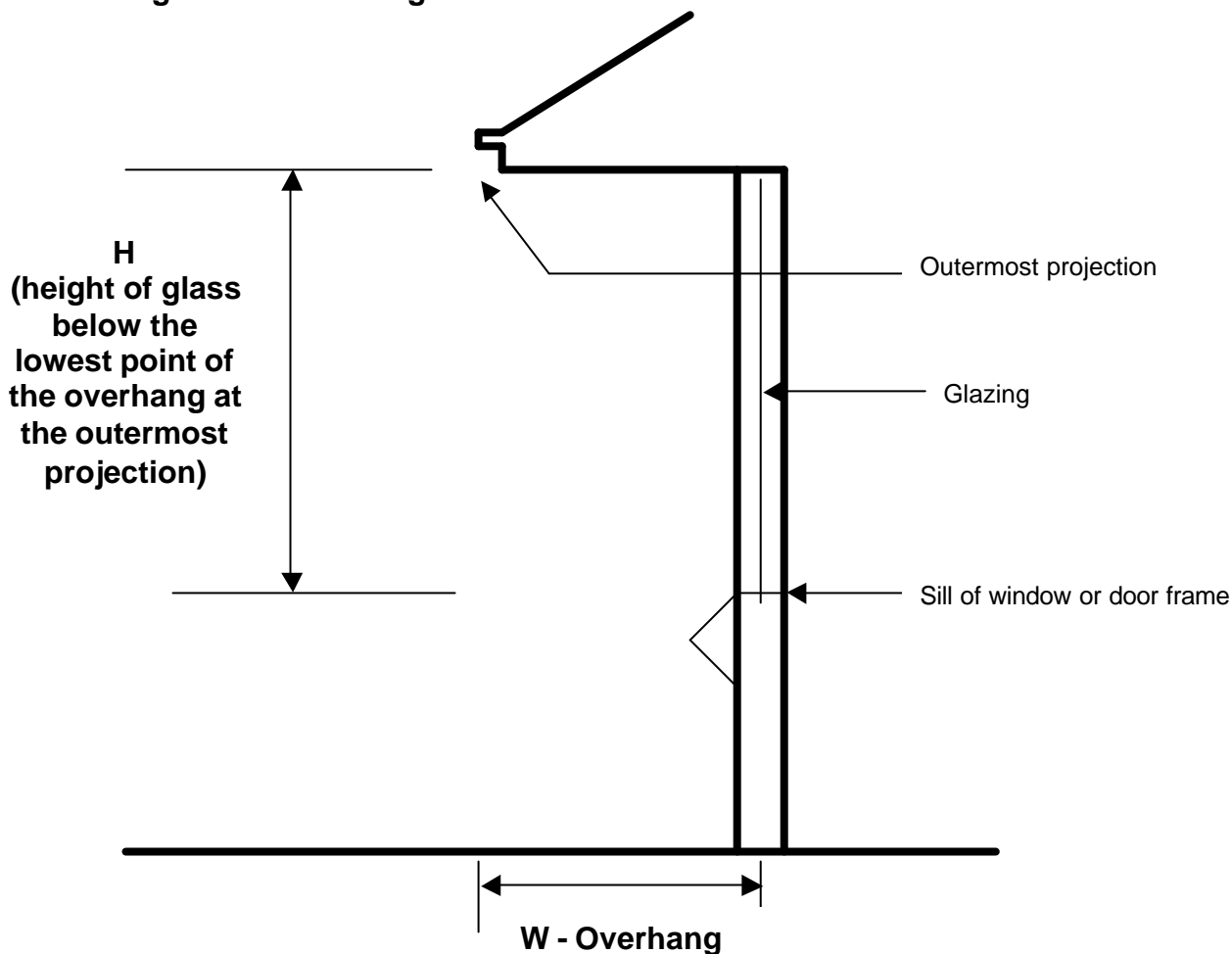
### Schedule 4 – Maximum expected energy usage for artificial heating and cooling

Zone	Maximum expected energy usage (MJ/m <sup>2</sup> /pa)
Zone 2	105
Zone 2 above 300m AHD	120
Zone 5	225

**Diagram 1 - Orientation Sectors**



**Diagram 2 - Overhangs**



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Table 1 - *Overhangs* for Window /Door Openings

Height of glazing (H) Refer Diag 2	W -Width of <i>Overhang</i>		
	Sector A (North) Refer Diag 1	Sectors B & C (East-West – refer Diag 1	Sectors D (South) refer Diag 1
Up to 1200mm	<b>W (min) = 0.5 x H</b>	<b>W (min) = 0.5 x H</b>	Nil
1201 to 2400 mm	Minimum 600 mm	Minimum 600 mm	Nil
2401 to 4800mm	<b>W (min) = 0.25 x H</b>	<b>W (min) = 0.25 x H</b>	Nil