



**Australian Government**

**Department of Education, Employment and Workplace Relations**

# **CPPHSA4019A Inform clients about thermal performance of residential buildings**

**Release: 1**

## **CPPHSA4019A Inform clients about thermal performance of residential buildings**

### **Modification History**

| <b>Version</b> | <b>Comments</b>                                                                       |
|----------------|---------------------------------------------------------------------------------------|
| 1              | This version first released with CPP07 Property Services Training Package Version 11. |

### **Unit Descriptor**

This unit of competency specifies the outcomes required to explain to clients the principles of residential building thermal performance. This includes explaining the process of heat transfer in residential buildings; the factors that impact on thermal comfort; how climatic conditions, building design and materials influence the thermal performance of residential buildings; and the principles of passive design.

### **Application of the Unit**

This unit of competency supports the work of Nationwide House Energy Rating Scheme (NatHERS) assessors engaged in assessing, and making recommendations for improving, the thermal performance of planned and existing residential buildings.

### **Licensing/Regulatory Information**

In some jurisdictions, this unit of competency may form part of the accreditation, licensing, legislative, regulatory or certification requirements for NatHERS assessors.

### **Pre-Requisites**

Not applicable.

### **Employability Skills Information**

This unit contains employability skills.

## Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.

Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.

## Elements and Performance Criteria

|   |                                                                           |     |                                                                                                                                                                |
|---|---------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Explain thermal performance to clients.                                   | 1.1 | Building thermal performance is explained to clients in line with organisational procedures.                                                                   |
|   |                                                                           | 1.2 | Impact of building design and materials on thermal performance of building is identified and communicated to clients in line with organisational procedures.   |
|   |                                                                           | 1.3 | Relationship between building thermal performance, heating and cooling, and energy consumption is explained to clients in line with organisational procedures. |
|   |                                                                           | 1.4 | Main uses of energy in buildings and the proportion attributed to heating and cooling are explained to clients in line with organisational procedures.         |
|   |                                                                           | 1.5 | <b><i>Correct industry terminology for energy use</i></b> is applied when communicating with clients.                                                          |
|   |                                                                           | 1.6 | Correct units of measurement are applied when describing power and energy.                                                                                     |
|   |                                                                           | 1.7 | <b><i>Environmental and social impacts of energy use</i></b> are explained to clients in line with organisational procedures.                                  |
| 2 | Explain the process of heat transfer in residential buildings to clients. | 2.1 | Heat transfer is explained to clients in line with organisational procedures.                                                                                  |
|   |                                                                           | 2.2 | Meanings of <b><i>key terms used to describe heat transfer</i></b> are explained to clients in line with organisational procedures.                            |
|   |                                                                           | 2.3 | Ways in which residential buildings lose and gain heat are explained to clients in line with organisational                                                    |

procedures.

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| 3 | Explain factors that impact on thermal comfort to clients.                                         | 3.1 | Thermal comfort and its use in building thermal performance assessments are explained to clients in line with organisational procedures.                               |
|   |                                                                                                    | 3.2 | <b>Physical factors that influence thermal comfort</b> are explained to clients in line with organisational procedures.                                                |
|   |                                                                                                    | 3.3 | <b>Requirements for thermal comfort</b> are established based on occupant needs and are explained to clients in line with organisational requirements.                 |
|   |                                                                                                    |     |                                                                                                                                                                        |
| 4 | Explain how climatic conditions influence thermal performance of residential buildings to clients. | 4.1 | Major Australian climatic zones are identified and their key characteristics relevant to thermal performance assessments explained.                                    |
|   |                                                                                                    | 4.2 | <b>Types and uses of climate data used in carrying out thermal performance assessments</b> are explained to clients in line with organisational procedures.            |
|   |                                                                                                    | 4.3 | <b>Impact of local climatic conditions on building thermal performance</b> is explained to clients in line with organisational procedures.                             |
|   |                                                                                                    | 4.4 | Ways of improving thermal performance appropriate to the relevant climatic zone are explained to clients in line with organisational procedures.                       |
|   |                                                                                                    |     |                                                                                                                                                                        |
| 5 | Explain principles of passive design to clients.                                                   | 5.1 | <b>Principles of passive design</b> are explained to clients in line with organisational requirements.                                                                 |
|   |                                                                                                    | 5.2 | Application of principles of passive design to planned and existing residential buildings is explained to clients in line with client and organisational requirements. |
|   |                                                                                                    | 5.3 | <b>Factors that diminish the thermal performance of buildings</b> are explained to clients in line with organisational procedures.                                     |

## Required Skills and Knowledge

This section describes the skills and knowledge required for this unit.

### Required skills

- communication skills to interact with clients from diverse social, economic and cultural backgrounds in an ethical manner
- decision-making and problem-solving skills to make recommendations for ways of improving thermal performance appropriate to particular climatic zones
- literacy skills to read and interpret a variety of texts, both print and electronic, on residential building thermal performance
- numeracy and data analysis skills to calculate and interpret climatic data
- research skills to identify and locate documents and information on the thermal properties of building materials
- time-management skills to conduct research and provide advice to clients in a timely, cost-efficient manner

### Required knowledge

- Australian climatic zones:
  - characteristics of climatic zones
  - climate data used in thermal performance assessment:
    - diurnal temperature range
    - humidity
    - irradiance
    - maximum and minimum temperature
    - solar geometry
    - wind speed and direction
- impact of climate on thermal performance of residential buildings
- environmental and social impacts of energy use:
  - climate change
  - energy cost
  - energy security
  - global warming
  - greenhouse gas emissions
  - operational costs
  - resource depletion
- heat transfer in residential buildings:

- impact on heating and cooling
- mechanisms:
  - radiation
  - convection
  - conduction
- modelling
- U and R-values of building materials
- R-values of wall constructions
- NatHERS scheme:
  - assessors
  - key features
  - NatHERS software tools:
    - accreditation
    - building and external elements included in a NatHERS thermal performance assessment
    - features and types of software tools
    - function
    - protocol
    - scope
  - objectives
- passive building design principles:
  - building envelope
  - construction materials
  - construction methods
  - glazing
  - house plan ratio
  - insulation
  - orientation
  - thermal mass
  - ventilation
  - zoning
- sources of information on climate
- thermal comfort:
  - definition of thermal comfort
  - importance
  - influences on thermal comfort:
    - air movement
    - humidity
    - radiation
    - temperature

- models of thermal comfort
- requirements for thermal comfort
- role of thermal comfort in building thermal performance assessments
- thermal sensitivity of individuals
- thermal performance:
  - factors that diminish and enhance the thermal performance of buildings
  - impact of local climatic conditions on building thermal performance principles
  - relationship between building thermal performance, heating and cooling and energy consumption

## Evidence Guide

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

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| <b>Overview of assessment</b>                                                                       | This unit of competency could be assessed by candidates explaining to clients the principles of building thermal performance, including heat transfer in residential buildings, the factors that impact on thermal comfort, how climatic conditions influence the thermal performance of residential buildings, and the principles of passive design.                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Critical aspects for assessment and evidence required to demonstrate competency in this unit</b> | <p>A person should demonstrate the ability to:</p> <ul style="list-style-type: none"> <li>• explain thermal performance to clients using correct terminology</li> <li>• explain the process of heat transfer in residential buildings to clients, including the ways in which residential buildings lose and gain heat</li> <li>• explain factors that impact on thermal comfort to clients</li> <li>• explain how climatic conditions influence thermal performance of residential buildings to clients, including the ways of improving thermal performance appropriate to particular climatic zones</li> <li>• explain principles of passive design to clients, their application in planned and existing residences, and the factors that diminish thermal performance.</li> </ul> |
| <b>Context of and specific resources for assessment</b>                                             | <p>Assessment of this unit:</p> <ul style="list-style-type: none"> <li>• must be in the context of the work environment</li> <li>• may be conducted in an off-site context, provided it is realistic and sufficiently rigorous to cover all aspects of workplace performance, including task skills, task management skills,</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                |

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|  | <p>contingency management skills and job role environment skills</p> <ul style="list-style-type: none"><li>• must meet relevant compliance requirements.</li></ul> <p>Resource implications for assessment include:</p> <ul style="list-style-type: none"><li>• relevant codes, standards and government regulations</li><li>• technical reference library with current publications on passive building design, thermal performance of building materials, building thermal performance, NatHERS, and manufacturer product information on building products and materials.</li></ul> |
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| <b>Method of assessment</b>                | <p>Assessment for this unit must verify the practical application of the required skills and knowledge, using one or more of the following methods:</p> <ul style="list-style-type: none"> <li>written and/or oral assessment</li> <li>observed, documented and/or first-hand testimonial evidence of the candidate explaining to clients the principles of building thermal performance, including: <ul style="list-style-type: none"> <li>heat transfer in residential buildings</li> <li>factors that impact on thermal comfort</li> <li>how climatic conditions influence the thermal performance of residential buildings</li> <li>the principles of passive design.</li> </ul> </li> </ul> |
| <b>Guidance information for assessment</b> | <p>This unit could be assessed on its own or in combination with other units relevant to the job function.</p> <p>Reasonable adjustments for people with disabilities must be made to assessment processes where required. This could include access to modified equipment and other physical resources, and the provision of appropriate assessment support.</p> <p>Assessment processes and techniques should, as far as is practical, take into account the language, literacy and numeracy capacity of the candidate in relation to the competency being assessed.</p>                                                                                                                       |

## Range Statement

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

|                                                                           |                                                                                                                                                                                                                                  |
|---------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b><i>Correct industry terminology for energy use</i></b> may include:    | <ul style="list-style-type: none"> <li>efficiency</li> <li>energy</li> <li>power</li> <li>primary energy source.</li> </ul>                                                                                                      |
| <b><i>Environmental and social impacts of energy use</i></b> may include: | <ul style="list-style-type: none"> <li>climate change</li> <li>energy cost</li> <li>energy security</li> <li>global warming</li> <li>greenhouse gas emissions</li> <li>operational costs</li> <li>resource depletion.</li> </ul> |

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| <b>Key terms used to describe heat transfer</b> may include:                                            | <ul style="list-style-type: none"> <li>• conduction</li> <li>• convection</li> <li>• evaporation</li> <li>• radiation.</li> </ul>                                                                                                                                                                                                                                                                                                                                                               |
| <b>Physical factors that influence thermal comfort</b> may include:                                     | <ul style="list-style-type: none"> <li>• air movement</li> <li>• humidity</li> <li>• radiation</li> <li>• temperature.</li> </ul>                                                                                                                                                                                                                                                                                                                                                               |
| <b>Requirements for thermal comfort</b> may include:                                                    | <ul style="list-style-type: none"> <li>• activity levels</li> <li>• age</li> <li>• clothing.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Types and uses of climate data used in carrying out thermal performance assessments</b> may include: | <ul style="list-style-type: none"> <li>• diurnal temperature range</li> <li>• humidity</li> <li>• maximum and minimum temperatures</li> <li>• temperature</li> <li>• wind.</li> </ul>                                                                                                                                                                                                                                                                                                           |
| <b>Impact of local climatic conditions on building thermal performance</b> may include:                 | <ul style="list-style-type: none"> <li>• humidity</li> <li>• shading</li> <li>• sunshine</li> <li>• temperatures</li> <li>• wind.</li> </ul>                                                                                                                                                                                                                                                                                                                                                    |
| <b>Principles of passive design</b> may include:                                                        | <ul style="list-style-type: none"> <li>• building envelope</li> <li>• construction materials</li> <li>• construction methods</li> <li>• glazing</li> <li>• house plan ratio</li> <li>• insulation</li> <li>• orientation</li> <li>• thermal mass</li> <li>• ventilation</li> <li>• zoning.</li> </ul>                                                                                                                                                                                           |
| <b>Factors that diminish the thermal performance of buildings</b> may include:                          | <ul style="list-style-type: none"> <li>• air leakage</li> <li>• deviation from ideal orientation</li> <li>• excessive glass area</li> <li>• high building surface area to volume</li> <li>• installing glazing where solar gain during the day and thermal losses during the night cannot be controlled easily</li> <li>• insulation materials that are not matched to the main mode of heat transfer</li> <li>• lack of adequate shading during seasonal periods of high solar gain</li> </ul> |

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|  | <ul style="list-style-type: none"><li>• lack of radiant heat barriers</li><li>• loss of effectiveness of materials over time</li><li>• occupant behaviour</li><li>• open staircases leading to unequal distribution of warm air between upper and lower floors as warm air rises</li><li>• operation of buildings</li><li>• poor maintenance practices</li><li>• thermal losses through non-insulated or unprotected glazing.</li></ul> |
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## **Unit Sector(s)**

Home sustainability assessment

## **Custom Content Section**

Not applicable.