



## **Accredited Short Course in Residential Building Thermal Performance Assessment**

The Association of Building Sustainability Assessors, on behalf of the Australian Greenhouse Office, is currently developing a training and assessment program for building thermal performance assessors that can be recognised on the Australian Qualifications Framework.

The objectives of this course are to increase in the capability of assessors and provide a basis for consistent national qualification of building thermal performance assessors. It addresses three main areas of skill and knowledge: thermal performance theory, software competency and understanding of regulatory and documentation requirements.

The development of the proposed course material has included consultation with assessors, trainers, government and industry representatives. Prior to finalisation of the course material, additional consultation meetings will be held in all capital cities. The course will be trialled as part of the Queensland and Western Australia AccuRate Pilot Programs.

The course is being submitted to the NSW Vocational Education and Training Advisory Board for accreditation as a Short Course in Building Thermal Performance Assessment (Residential). The application to VETAB is in three parts:

Section A: information on who will hold the copyright for the course (AGO) and who is developing the course (ABSA).

Section B: reason for the course and general information (such as duration, delivery modes, assessment strategies, recognition, resources, access, pathways, monitoring and evaluation) as well as an analysis of how each of those issues complies with the ANTA guidelines.

Section C: The proposed competency which consists of one unit of competency. An extract of this section is set out below.

A Notice of Intent has already been lodged with VETAB. The accreditation application can be submitted to VETAB, in late April, once the national consultation meetings and course trials have concluded. VETAB accreditation may take two to three months.

Once accredited, the course may be delivered by any person that meets defined requirements for skill, qualification and experience. Assessment can only be undertaken by Registered Training Organisations. Trainers may develop their own format for training and assessment, so long as the performance requirements of the Accredited Course are met.

Accreditation of the course does not require development of training resources, student notes and examination material. However, ABSA will provide these materials as a resource to trainers. These will be based on a 32 hour training program with a take-home exam. These materials will be circulated prior to the national consultation meetings.

## Unit title: Undertake a thermal performance assessment of a residential building.

### Description

This unit specifies the competency required to determine and improve the thermal performance of a residential building.

A thermal performance assessment requires the evaluation of a building design to determine a thermal performance rating and the use of building thermal performance knowledge to make recommendations for altering the building design to improve the thermal performance.

Element Name	Performance Criteria
1. Establish the context within which the <i>thermal performance assessment</i> is to be undertaken	1.1 The need for the thermal performance assessment of a <i>residential building</i> is discussed with client / manager. 1.2 The relevance of the <i>regulatory framework</i> to the thermal performance assessment task is determined 1.3 The <i>relevant industry code of conduct</i> is applied to the assessor's role in the job task. 1.4 <i>Issues relating to the regulatory framework and/or code of conduct</i> are clarified with client / manager.
2. Input information from plans into <i>thermal performance assessment tool</i>	2.1 Details from plans and specifications required for the thermal performance assessment are identified and obtained. 2.2 Information from plans and specifications are entered correctly into the thermal performance assessment tool. 2.3 Methods for inputting unusual materials and designs are utilised correctly.
3. Use thermal performance assessment tool to conduct assessment	3.1 <i>Assumptions</i> used in the thermal performance tool are taken into consideration. 3.2 The thermal performance assessment tool is used to generate <i>outputs</i> . 3.3 The thermal performance assessment tool <i>outputs</i> are explained. 3.4 Errors in data input and assessment are identified and corrected.
4. Make recommendations to improve the rating	4.1 The thermal performance tool outputs are interpreted to identify strengths and weaknesses in a building's thermal performance. 4.2 Recommendations for improving thermal performance are proposed using knowledge of the <i>thermal performance of buildings and materials</i> . 4.3 The thermal performance assessment tool is used to assess the impact of the recommendations on the thermal performance of the building.
5. Thermal performance assessment results are provided to client / manager	5.1 The results (including recommendations) of the thermal performance assessment are collated. 5.2 The results (including recommendations) of the thermal performance assessment are explained to the client / manager, including the relevance of the regulatory framework, cost implications and practicalities.

## Range Statement

*Residential building:* A residential building is any dwelling being the whole or part of a building categorised as a Class 1, 2, 3 or 4 building in the Building Code of Australia.

*Thermal performance assessment:* A thermal performance assessment is the process of using known principles of thermodynamics and the known thermal properties of building design and materials to predict the heating and cooling loads that will be experienced by a building. This may include determining either occupancy comfort levels or the energy that would be required to maintain suitable comfort levels.

*Regulatory framework:* The regulatory framework includes the Building Code of Australia as well as relevant state or territory planning or building controls.

*Relevant industry code of conduct:* Relevant industry codes of conduct refer to any professional codes of conduct that apply to a thermal performance assessor. This will include any requirements placed on an assessor by a licensing or accreditation body.

*Issues relating to the regulatory framework and/or code of conduct:* This will include, but is not limited to: the basis of the necessity for conducting the thermal performance assessment (voluntary or required), the objectives of the thermal performance assessment (for example, a required star rating), the information required by the thermal performance assessor from the client, the information that the thermal performance assessor is required to provide to the client, the information that the thermal performance assessor is required to document.

*Thermal performance assessment tool:* A thermal performance assessment tool is a software program that performs heat flow calculations for a building based on design inputs and climatic data. Examples of thermal performance assessment tools include: Building Energy Rating Scheme (BERS), National Housing Energy Rating Scheme (NatHERS), FirstRate and Accurate. Thermal performance assessment tools must comply with Building Code of Australia Performance Requirement P2.6.1 and / or other state or territory regulations.

*Assumptions:* Assumptions are inherent in the thermal performance assessment tool and include occupancy profiles, thermostat settings and climate data.

*Outputs:* Outputs include ratings/non-rating mode, heating, cooling and latent cooling in Mj/M2/yr and temperature histograms.

*Thermal performance of buildings and materials.* This refers to knowledge of the ways in which building elements and building materials impact on the overall thermal performance of a building. Many of these concepts are specified in Underpinning Knowledge and Skills, described in the Evidence Guide.

## Evidence Guide

The Evidence Guide identifies the critical aspects, knowledge and skills to be demonstrated to confirm competency for this unit. This is an integral part of the assessment of competency and should be read in conjunction with the Performance Criteria and Range Statement.

### Critical Aspects of Evidence

The following critical aspects of evidence are required to demonstrate competency in this unit:

- interpret and extract data from plans and specifications
- understand the basic principles of how buildings are constructed
- understand the principles of building thermal performance and use this knowledge to ascertain and improve the thermal performance rating of a building
- use a thermal performance tool and explain the assumptions inherent in the thermal performance assessment tool.

### **Relationship to other units of competency**

There are no specified relationships.

### **Underpinning Skills and Knowledge**

This section describes the skills and knowledge needed for competency in this unit. The underpinning skills include the *ability to*:

- Establish requirements for thermal comfort based on occupant needs (include consideration of age, activity levels, clothing)
- Identify sources of information on climate
- Identify and describe major Australian climatic zones
- Establish how climatic conditions will influence thermal performance assessments
- Make recommendations for improving thermal performance that are appropriate to the climate
- Identify sources of information relating to the thermal performance of building materials
- Evaluate the impact of materials and design elements in building thermal performance
- Interpret the properties of materials which can influence thermal performance (include: u value, r value, reflectivity, emissivity)
- Select materials suitable for a given thermal performance improvement task
- Identify and describe building design elements which influence the thermal performance of a building (include: orientation, zoning/layout, insulation, mass, glazing, materials, ventilation, convection, shading, landscaping)
- Specify correct use and installation of materials (insulation, draught proofing, glazing, mass)
- Assess the cost implications of any recommendations for improving performance
- Consider the practical application of any recommendations (ie, how will it / can it be built?)

Attainment of this competency requires *knowledge of*:

- The meaning of the term building thermal performance
- The relationship between building thermal performance and heating and cooling energy consumption
- The main uses of energy in buildings and the proportion attributed to heating and cooling
- The meaning of terminology used to describe energy use including: power, energy, efficiency and primary energy source
- The units of measurement of power and energy and how they are used
- The cost and environmental impacts of energy use including: resource depletion, greenhouse gas emissions and global warming
- The meaning of terminology used to describe heat transfer: conduction, radiation, convection, evaporation
- The ways that a building can lose and gain heat
- The physical factors that influence thermal comfort, include: temperature, humidity, radiation, air movement
- The meaning of the term thermal comfort and the role of thermal comfort in building thermal performance assessments
- How climate data can be used when carrying out a thermal performance assessment (include: temperature - maximum and minimum temperatures, diurnal temperature range - humidity, wind)
- The impact of local climatic conditions on building thermal performance (include: temperatures, sunshine, shading, humidity and wind)
- The thermal performance properties of common building materials
- How building materials can influence the thermal performance of a building (include: glass, mass, insulation)

- How climate can influence the choice of materials when improving the thermal performance of a building
- The physical constraints which will influence the choice of materials (include: size, space, costs, practicality)
- The impact of building design elements on thermal performance
- How building design elements can be altered to improve thermal performance
- The circumstances under which thermal performance assessments are legally required for a building or building design
- How ratings are used, the current ratings requirements and how these must be documented
- What information is required to be provided to a client and/or consent authority
- An assessor's legal responsibilities
- The accreditation process in the candidate's state (include: name of accreditation body, training, examination and auditing requirements, costs, renewal of accreditation, listings of assessors)
- The roles and responsibilities of an accredited assessor
- Codes of Conduct set by the accreditation body
- Administrative requirements which must be followed when undertaking or reporting on a thermal performance assessment
- Occupational health and safety issues associated with the place/s or work.

### **Method of Assessment**

Assessment will be designed to ensure that candidates demonstrate competency in the performance criteria, critical aspects of evidence and the underpinning skills and knowledge. In particular, assessment in this competency will include:

- Written/oral questioning – this may relate to the underpinning skills and knowledge and also to the use of the thermal performance assessment tool.
- Undertaking a thermal performance assessments of at least 3 buildings, requiring that the rating be both determined *and* improved.

Assessors should collect sufficient evidence to ensure that candidates are able to competently use the thermal performance assessment tool and are able to answer questions relating to the assumptions inherent in the tool.

### **Key Competencies**

This section describes how candidates will need to apply key competencies.

The candidate will need to:

#### *Collect, analyse and organise information*

For example: Research, analyse, organise and understand the process for undertaking a thermal performance assessment and subsequent reporting procedures. This might include finding information on submitted plans or specifications, collecting information and researching ideas on building materials and designs to assist in the improvement of a rating and ensuring technical information is used correctly and managed effectively. Level 3

#### *Communicate ideas and information*

For example: Communicate and negotiate ideas and information to enable application of recommendations. This might include taking information from a building design and correctly inputting it into the software and then communicating the meaning of the results of the assessment to the client. Practitioners will also need to communicate with clients to obtain correct information as well as negotiate suitable options for changing the design to achieve the desired rating. Issues that will need to be communicated include performance, cost, comfort and operating costs. Level 2

### *Plan and organise activities*

For example: Plan and organise activities including the planning of information gathering, analytical processes and strategies related to the determination of the thermal performance rating and recommendations. This may include ensuring that clients are aware of the information that is required for the thermal performance assessment to be undertaken in a timely manner. Time management and task planning are critical to undertaking a thermal performance assessment as assessments are generally multi-staged, iterative processes in which information is sought, recommendations are made and communicated, further information is sought, additional analysis is carried out and further recommendations are negotiated and so on until the desired rating is achieved with the agreement of all parties. Level 2

### *Work with others and in a team*

For example: Work with others and in a team by recognising dependencies and using co-operative approaches to optimise satisfaction and productivity. While thermal performance assessments are often carried out by an individual, communication and cooperation with occupants/clients, builders, designer and regulators is required. It is critical that the roles of different parties are recognised and that outcomes of the thermal performance assessment are documented and communicated to all necessary parties, for example the construction team. Level 2

### *Solve problems*

For example: Establish analytical processes, including diagnostic processes, which anticipate and allow for risks, cater for both direct and indirect evidence, avoid or minimise reworking. This competency is largely about solving problems. Thermal performance assessments require that practitioners not only determine a rating for a building but, quite often, improve that rating within the constraints of design, costs and practicalities to the satisfaction of clients, builders and regulators. Level 3

### *Use mathematical ideas and techniques*

For example: Use mathematical ideas and techniques to correctly complete measurements, calculate analytical requirements, quantify and present analytical results and determine impact on the thermodynamics of a building. This will include understanding and manipulating the mathematical assumptions upon which the thermal performance assessment tool is based. Practitioners need to use indicators of thermal performance determined through well established equations, such as: heating cooling load  $\text{mj/sqm/yr}$  expressed as heating and cooling degree hours, interpreting the output of the software through established mathematical procedures to determine hours of comfort or discomfort or required appliance usage). Level 3

### *Use technology*

Use workplace technology related to information gathering and analysis, diagnosis, information research, report writing, administration and management procedures. This will also include use of a thermal performance assessment software tool, effective use of which requires an understanding of the assumptions within the software. Level 2

## **Resource implications**

Resource requirements for this unit of competence may include:

- Relevant texts and references
- Appropriate assessment environment
- Thermal assessment software
- Computing facilities.