ICANZ
THE RIGHT INSULATION MATTERS

INSULATION HANDBOOK

Part 2: Professional Installation Guide - Version 2

Insulation installation for ceilings, walls & floors

An independent publication of the
Insulation Council of Australia and New Zealand

Acknowledgements

A special thanks to:

- Construction Industry Pocketbook – Resource for installers of ceiling insulation, Construction and Property Services Industry Skills Council, Commonwealth of Australia November 2009, 'copyright Commonwealth of Australia reproduced by permission'
- Fletcher Insulation **www.insulation.com.au**
- CSR Bradford Insulation **www.bradfordinsulation.com.au**
- Knauf Insulation **www.knaufinsulation.com.au**

Version	Date	Description
1	Feb 2012	Initial release
2	Nov 2013	Revised Edition

NOTE: This document will be updated periodically. Check ICANZ website to confirm this is the latest edition.
www.icanz.org.au

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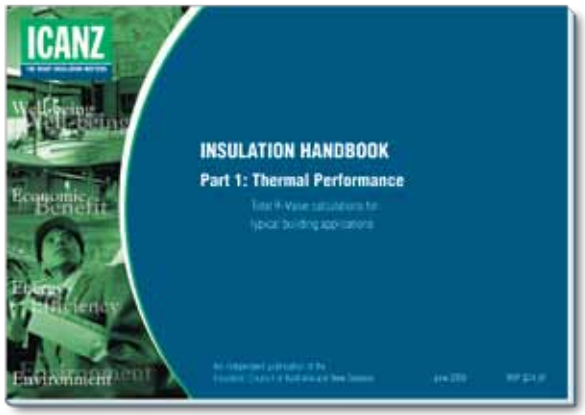
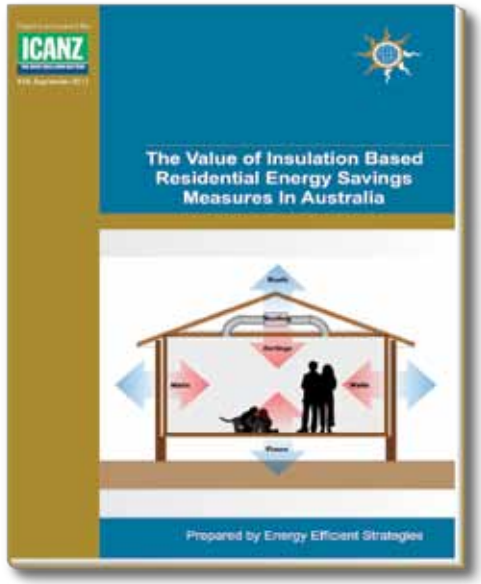
Foreword





Insulation Matters!

Climate change and the challenge of reducing carbon emissions are now foremost on the agenda of Governments, Councils, Industry and consumers. Improving energy efficiency is one of the cheapest, most accessible and effective ways to cut greenhouse gas emissions from buildings.

By 2005, the Building Code of Australia incorporated minimum energy efficiency requirements for all new habitable buildings and major renovations to pre-existing buildings.

Of all the energy efficiency measures available for buildings, insulation is amongst the most immediate and cost effective. Insulation is not just about reducing greenhouse gas emissions. Insulation will:

- reduce peak power loading in extreme weather conditions
- in all seasons, reduce costs and save money by reducing energy bills
- provide healthier living conditions and well being for occupants
- increase passive comfort levels
- reducing sound transmittion through buildings.

Quantified estimates of typical insulation savings (energy savings, reduced greenhouse emissions, reduced peak load) can be found in the ICANZ study “The Value of Insulation Based Residential Energy Savings Measures In Australia” September 2012. This report is available at **www.icanz.org.au.**

Correctly installed insulation provides some of the most cost effective and energy efficient savings investment strategies - particularly for low income households where energy costs are significant and co-benifits such as improved health outcomes are of particular value.

Installing insulation is a once only cost. Choosing the right insulation, correctly installed, will deliver its benefits for the life of the building.

Insulation Handbook Part 1: Thermal Performance

In 2009 the Insulation Council of Australia and New Zealand (ICANZ) developed and published the ‘Insulation Handbook Part 1: Thermal Performance’. This publication provides illustrations and calculations to show how, using the right insulation for typical building applications, Total R-values are calculated.

The ICANZ Insulation Handbook - Part 1 has now become an industry reference guide for builders, architects, designers and specifiers and was last updated in November 2010. Further reviews will occur as building requirements are updated.

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Professional Insulation Handbook Part 2 - Version 2: Installation Guide for ceilings, walls and floors

About this handbook

Selecting the right insulation for the required application is important. Equally important is installing insulation. The full benefits of insulation will be achieved over the life of the building when insulation is correctly installed.

This guide will assist installers to competently install insulation in residential buildings.

This insulation installation handbook is a comprehensive guide providing practical information including:

- principles of energy efficiency, giving an overview of thermal and acoustic products performances and benefits
- the composition of Rockwool and Glasswool products
- Standards, Regulations and Codes relevant to the installation of insulation in ceilings, walls and floors
- Work Health and Safety (Occupational Health and Safety) guidelines covering factors such as storage, handling and ,where required, personal protective equipment (PPE)
- common risks which may be present when installing insulation.

Instructions for the safe installation of insulation covering the following:

- Installation of batt insulation for ceilings.
- Installation of batt insulation for walls.
- Installation of batt insulation for floors.
- Installation of pliable building membranes as wall wraps.

A comprehensive overview of elements of this handbook is available on pages 1 to 3.

The purpose of this handbook is to strongly communicate the message that, to achieve the full potential benefits insulation,
The Right Installation Matters!

How to use this Handbook

This Handbook is designed to provide professional insulation installers with practical guidance on how to install insulation correctly and safely. It does not replace any technical or safety instructions provided by insulation product manufacturers or standards established by building authorities. This Handbook must be read in conjunction with all necessary standards and instructional and guidance material provided by insulation product manufacturers.

More information about insulation is available at **www.icanz.org.au**

Dennis D'Arcy
ICANZ CEO

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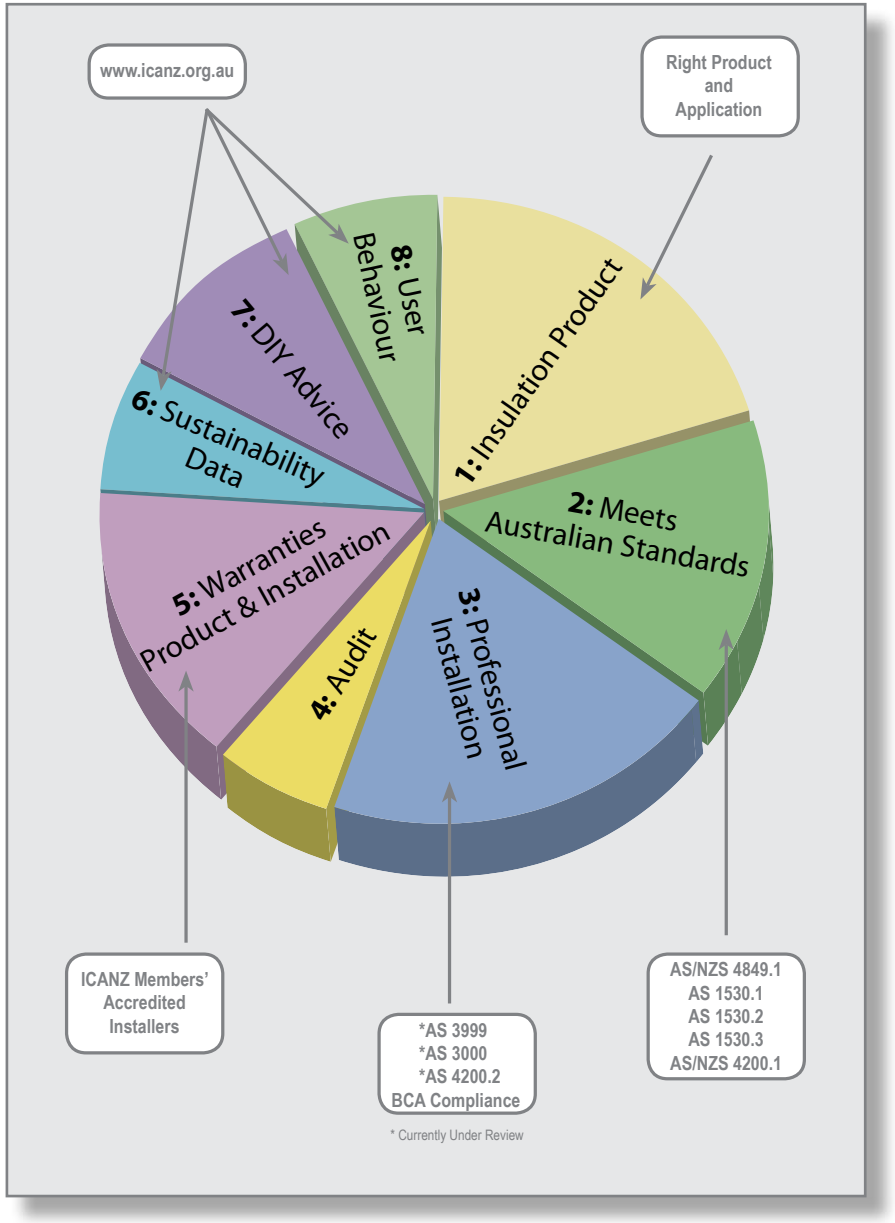
Insulation is more than just a product

The use of buildings in Australia contributes approximately 23% of Australia's greenhouse gas emissions and this percentage continues to increase. Measures to reduce greenhouse gas emissions from buildings will include increasing the required minimum energy efficiency stringencies. As these stringencies increase, more attention will need to be directed to 'closing the loop' with regard to ensuring products and services are installed correctly and used effectively to achieve their promised lifetime returns. A well insulated building is fundamental to achieving effective and long-term energy efficiency levels.

Ensure the best performance outcomes (also refer to pie chart).

1. Selecting the right insulation product for the proposed application is the first important step.
2. There are established Australian Standards for independently testing fire, thermal and acoustic performance claims.
3. Incorrectly installed insulation can substantially reduce its expected life long benefits. As with other products, there are established Australian Standards for installation.
4. Once installed, insulation is out of sight - and in many cases inaccessible once a building is complete. Random audits by installation supervisors during construction will ensure the right insulation is being used and correctly installed. Use an established contactor who offers this service.
5. Correctly installing the right insulation will provide life long benefits. ICANZ members and their approved installation contractors provide warranties and guarantees for product performance and installation to meet all appropriate Australian Standards.
6. Some insulation has high sustainability ratings and a very low impact on the environment. Most insulation types last the lifetime of the building and require no maintenance when correctly installed. Some insulation is made from a high percentage of recycled materials (e.g. glasswool insulation - up to 80% recycled glass content). This information should be available from product manufactures' websites.
7. Some DIY insulation products are available for DIY renovators. ICANZ and ICANZ members provide information on their packaging and websites to assist DYIers to choose the right insulation and install it safely and correctly.
8. The habits and behaviour of building occupants will have a significant impact on energy use and on the effectiveness of insulation in controlling the indoor environment of the building.

Adopting good practice will substantially help save energy costs, improve comfort and reduce greenhouse gas emissions. Helpful information is widely available from State and Federal Government websites and from ICANZ and its member companies.



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Fletcher Insulation

KNAUF INSULATION EARTHWOOL the Feel good insulation

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1.0 ICANZ Recommended Training Requirements for Persons Employed to Install Insulation

Prerequisites					
Module Name	**National Competency**	**Unit Descriptor**	**Requirement**	**Elements**	
Emergency First Aid (Workplace level 1)	HLTAID002	This unit of competency describes the skills and knowledge required to recognise and respond to life threatening emergencies using basic life support measures only.	Recommend	1 2 3 4	Respond in an emergency situation. Apply identified first aid procedures. Communicate details of the incident. Evaluate own performance.
Construction Industry Safety Induction	CPCCOHS1001A	This unit of competency specifies the outcomes required to undertake Occupational Health and Safety (OHS) induction training within the construction industry. It requires the ability to demonstrate personal awareness of OHS legislative requirements, and the basic principles of risk management and prevention of injury.	Mandatory	1 2 3 4	Identify OHS legislative requirements. Identify construction hazards and control measures. Identify OHS communication and reporting processes. Identify OHS incident response procedures.
Work Safely at Heights	CPCCCM2010B	This unit of competency specifies the outcomes required to work safely on construction sites where the work activity involves working above 1.5 metres from ground level and where fall protection measures are required.	Mandatory	1 2 3	Identify work area requirements. Access work area. Conduct work tasks.
Apply OHS requirements, policies & procedures in the construction industry	CPCCOHS2001A	This unit of competency specifies the outcomes required to carry out OHS requirements through safe work practices at any on or off-site construction workplace. It requires the performance of work in a safe manner through awareness of risks and work requirements, and the planning and performance of safe work practices with concern for personal safety and the safety of others.	Mandatory	1 2 3 4 5	Identify and assess risks. Identify hazardous materials and other hazards on work sites. Plan and prepare for safe work practices. Apply safe work practices. Follow emergency procedures.

ICANZ Insulation Installation Guide

Module Name	National Competency	Unit Descriptor	Requirement	Elements	
Principles of Energy Efficiency and Acoustics		Overview of thermal and acoustic variations of products performances and benefits.	Mandatory	1	Identify the purpose and benefits of thermal and acoustic insulation .
Codes, Standards and Regulations		1. Australian standards for insulation. 2. NCC minimum requirements for insulation. 3. State and federal codes that affect insulation.	Mandatory	1 2 3	Codes. Standards. Regulations.
WHS	CPCCOHS2001A + ICANZ supplementary information	Overview of work health and safety requirements when installing insulation.	Mandatory	1 2 3 4	Storage and handling. PPE. Composition. High risk hazards.
Install batt insulation products - ceiling	CPCCPB3014A equivalent + ICANZ supplementary information	This section specifies the outcomes required to install thermal and acoustic insulation products to comply with manufacturer and job specifications.	Mandatory	1 2 3 4	Plan and prepare. Identify Work Requirements. Cut and fix Insulation. Finished Standard Requirements.
Install batt insulation products - walls					
Install batt insulation products - underfloors					
Install Pliable Membrane products	PBMA Pliable Building Membranes Association of Australia & New Zealand	This section specifies the outcomes required to install pliable membrane products into walls to comply with manufacturer and job specifications.	Optional	1 2 3 4	Plan and prepare. Identify Work Requirements. Cut and fix Insulation. Finished Standard Requirements.

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Product Knowledge					
Module Name	**National Competency**	**Unit Descriptor**	**Requirement**	**Elements**	
Manufacturer's Specifications		This unit specifies the manufacturer's product range and applications.	Select 1	1 2 3	Batt insulation. Foil. Other.
ICANZ Competency Requirements					
Module Name	**National Competency**	**Unit Descriptor**	**Requirement**	**Elements**	
Competency Assessments	Installer Supervisor or Trainer.	This unit specifies the assessment requirements as well as on-site practical experience to be completed prior to installing insulation products without direct supervision.	Mandatory	1 2 3	Questions and answers. Practical Demonstration. Supervised onsite installations.

2.0 Glossary of Terms

Term	Definition
Acoustic Insulation	Bulk fibrous insulation, having the ability to absorb various sound frequencies when installed in ceiling, wall and floor cavities.
Added R-value	Thermal resistance added to a construction element by insulation.
Adhesive	A material capable of holding other materials together by surface attachment. Glues, cements, pastes and mucilage are some common adhesives.
Australian Standards	Detailed technical documents developed for Standards Australia by expert working parties drawn from industry and government agencies. There are over 400 Australian Standards relevant to work health and safety (WHS). Some of these have been adopted as codes of practice by individual governments.
Batten	Timber support found underneath roof cladding and sometimes found to support ceiling plaster.
Batt Insulation	Flexible, blanket like pieces of a standard size. Usually made from glasswool, batts are used for thermal or sound insulation. As opposed to loose-fill insulation which is blown in place.
BCA	Building Code of Australia (part of the National Construction Code (NCC)) – a set of national requirements for the use in the design, construction, alteration or demolition of buildings, setting out procedures, acceptable methods or materials and minimum or maximum values. Each state has its own variations to the national document.
Beam	Any major horizontal structural member.
Bearing Partition/ Wall	A partition that supports any vertical load in addition to its own weight.
Breathing Zone	A zone described by a hemisphere of 300mm radius, extending in front and measured from the midpoint of an imaginary line joining the ears.
Building Code	Government rules regulating safe building practices and procedures. The codes generally encompass minimum requirements for structural, electrical, plumbing, and mechanical remodeling and new construction. Inspection may be required to confirm adherence to local codes.
Building Envelope	Is the physical separation between the interior and exterior environments of a building. It serves as the outer shell to maintain the internal environment.
Bulk Insulation	Insulation depending for its performance upon thickness and thermal conductivity to achieve Material R-value.
Ceiling Joist	Structural members providing support and a fixing surface for a ceiling.
Climate Zone	An area defined in the BCA Climate Zone Map of Australia having energy efficiency provisions based on a range of similar climate characteristics.

Term	Definition
Code of Practice	Technical document on a health and safety issue approved by a government minister. It provides practical guidance on ways to achieve compliance with WHS legislation.
Conduction	Heat flow transfer by exciting molecules of a solid material.
Conduit	Metal or plastic tubing designed to enclose electrical wires.
Control (i.e. hazard or risk)	Process used after conducting a risk assessment to identify all practicable measures for removing or reducing the likelihood of injury, to implement these measures and review them to ensure their effectiveness.
Convection	Heat flow transferred by movement of a fluid (e.g. air movement).
Double Sided	Reflective foil on both faces of reflective foil laminate piable membrane.
Double Sided Anti Glare	Reflective foil on both faces of reflective piable membrane with additional ink coating on external face (for WHS antiglare requirements).
Duty of Care	A principle of common law that requires each person or company to take care not to cause harm to other persons.
Emergency	An event that will produce or exacerbate injury to people and / or damage to property unless immediate intervention occurs.
Emergency Procedures	Best practice guidelines for reacting to an emergency so that persons at risk respond in a prompt, orderly and appropriate way.
Emittance	Ratio of radiant energy emitted by a surface compared to that of a blackbody (a blackbody emits radiant energy at the maximum rate possible i.e. 100% emittance).
Exposure Standards	An airborne concentration of a particular substance in the worker's breathing zone, exposure to which, over a period of 8 hours followed by a period free of exposure of 16 hours, and according to current knowledge, should not cause adverse health effects nor cause undue discomfort to nearly all workers.
Extruded Polystyrene	(Extruded or expanded polystyrene boards) – used as an insulation and/or external cladding material that is then rendered.
FBS-1™ Glass Wool	Insulation composed of bio-soluble glass fibres that comply with test requirements of Note Q (refer SafeWork Australia).
FBS-1™ Rock Wool	Insulation composed of bio-soluble rock fibres that comply with test requirements of Note Q (refer SafeWork Australia).
Fibre	A particle with a length to width ratio of at least 3:1.
Fill-Type Insulation	Loose insulating material that is applied by hand or mechanically blown into wall and ceiling spaces.

Term	Definition
Floor Plan	A drawing showing the arrangement of rooms, the locations of windows and doors and complete dimensions – A floor plan is actually a horizontal section through the entire building.
Glasswool Batts	Insulation made from up to 80% of recycled glass, non- conductive of electricity, non - combustible and with high sound absorbing qualities.
Guard or Collar	A fire retardant component (AS 1530.3 - Spread of flame 'O') used to provide adequate separation from combustible building elements, insulation and/or debris to reduce the fire risk caused by recessed luminaires (refer AS 3999).
Hazard	An energy or environmental factor that could produce injury or disease.
Hazardous Substance	A substance that has the potential, through being used at work, to harm health and safety in the workplace. The criteria for identifying a hazardous substance are detailed in the NWHSC Approved Criteria for the Classification of Hazardous Substances (1999) as amended occasionally.
Hazmat	An abbreviation for `hazardous material' used on warning signs.
Heat Transfer	Heat flow from a hot to a cold body (see convection, conduction and radiation).
Heightened Awareness (of Electrical Risks)	An increased level of familiarity and knowledge regarding conditions and circumstances with regard to electrical fittings and cabling that could constitute a safety risk for insulation installers.
Hepa	An air filter that removes 99.97% of all particles greater than .3 microns from the air that passes through it.
Incident	An unplanned, undesirable energy release that may result in injury to people and / or damage to property.
Indoor Air Film	A layer of air adjacent to the internal surface of the building element.
Inspirable Fraction	That fraction of dust which enters the respiratory tract as defined in Australian Standard AS 2640-1989 Workplace Atmospheres: Method for sampling and gravimetric determination of inspirable atmospheric dust.
Insulated Foam Sheathing	A type of sheathing made from compressed foam and covered by a foil or other substance allowing its use as a wall sheathing with increased insulation value.
Insulation	Any material which resists the transfer of electricity, heat or sound. In a home, thermal insulation is any material that slows heat flow. A well-insulated home will provide year-round comfort and costs less to heat and cool. Insulation also helps to reduce noise levels and condensation when in combination with a vapour barrier.
	Insulation can be made from glasswool batts, rockwool batts, natural wool, cellulose fibre, extruded polystyrene or expanded polystyrene boards, polyurethane foam, polyester fibres, and reflective foils.

Term	Definition
Joist	A series of parallel framing members that supports a floor or ceiling load. Joists are supported by beams and load bearing walls.
Joist Hanger	Metal device, shaped like a “U”, used to connect two joists or a joist and beam at right angles to each other.
Joist Support	A horizontal beam that supports the floor joists.
JSA	Job Safety Analysis- a method that can be used to identify, analyse and record (1) the steps involved in performing a specific job, (2) the existing or potential safety and health hazards associated with each step (3) the recommended actions(s) or procedure(s) that will eliminate or reduce these hazards and the risk of a workplace injury or illness.
Kneewall	A wall that extends from the floor of a roof space to the underside of the rafters. Kneewalls are short (usually 1200mm high) and often non-bearing.
Legislation	Law passed by an Act of Parliament.
Loose-fill Insulation	Small pieces of insulation, made from glasswool or rockwool that is blown into a home using a machine that contains a blowing machine. Loose-fill is especially effective at filling small and irregularly-shaped spaces.
Luminaire Barrier (down light)	A product complying with AS/NZS 5110.
Manual Handling	Any activity requiring the use of force exerted by a person to lift, push, carry or otherwise move, hold or restrain any object.
Material R-value	The R-value is a measure of thermal heat flow resistance of a material only and referred to in the building and construction industry. A product’s thermal heat flow resistance is expressed as the thickness of the material divided by the material’s thermal conductivity. The material R-value of a product excludes surface film resistances. Labelled material R-value (R_m) are determined by testing the material to AS/NZS 4859.1 at a mean temperature of 23˚C for Australian conditions. Unit of measure expressed as: m^2K/W.
Micron	One millionth of a metre, or equivalently one thousandth of a millimetre.
Mineral Wool	Insulation composed of fibres manufactured from glass or rock.
MSDS	Material Safety Data Sheet – summary of relevant properties of a hazardous- chemical or proprietary product and which includes safety, health, storage, handling and emergency information.
Natural Ventilation	An air space bounded by one or more permeable surfaces allowing a degree of air movement (e.g. a roof space below on unsarked tiled roof).
Near Miss	An accident that does not produce an injury or disease.

Term	Definition
Nominal Fibre Diameter	The median diameter to which the fibrous product is manufactured. It may be thought of as the diameter at the mid point of a long fibre created by joining all fibres in a sample together in order to increase thickness.
NWHSC	National Work Health and Safety Commission.
NCC	National Construction Code.
Non-Load Bearing Wall	A wall supporting no load other than its own weight.
Non-Ventilated	Air space enclosed by non air permeable building materials.
OHS	Work health and safety – prevention of disease and injury caused by workplace influences. Now referred to as Work Health & Safety (WHS).
Outdoor Air Film	A layer of air adjacent to the external surface of the building element.
Personal Sample	An air sample taken within the breathing zone of the worker.
PPE	Personal Protective Equipment- equipment work by workers to reduce risk from WHS hazards.
Quality Assurance	A planned and systematic process of ensuring that the requirements of the assessment system, unit of competency and any other criteria are applied in a consistent manner. Quality assurance mechanisms or procedures are an integral part of an assessment system.
Radiation	Heat flow transfer by electromagnetic radiation (infra red waves).
Radiation Heat	Flow transfer by electromagnetic radiation (infra red waves).
Reflective Air Space	Air space between flat ceiling and pitched roof bounded by reflective insulation under roofing material.
Reflective Insulation / Foils	A reflective foil laminate (RFL) in which one or both surfaces will conduct comparatively little heat. When used with the surfaces facing air spaces of at least 20mm, such material reduces the heat radiation across the air space by use of one or more surfaces of high reflectance and low emittance.
Regulation	Subordinate legislation passed by parliament to amplify or make explicit the requirements of an Act.
Respirable Fibre	A fibre with a diameter less than 3 micrometres and length greater than 5 microns and with a length to width ratio of greater than 3:1. These fibres can reach the deepest part of the lung.
RFL	Reflective foil laminate.

Term	Definition
Risk	The chance of the hazard actually causing an injury or disease. Measured in terms of consequences and likelihood.
Risk Assessment	Judgment as to the likelihood of an event producing harm to persons under the circumstances of its use.
Rockwool Batts	Insulation made from basalt or other rock material, with up to 45% recycled material, non conductive of electricity, non combustible with high sound absortion qualities.
R_m	Material R-value.
R_t	Total R-value.
Rsys	System R-value.
Weighted Sound Reduction Index (R_w).	A single number acoustic rating that takes into account the sound reduction of the system at a number of different frequencies and is used to easily compare different types of construction. The higher the R_w the better the acoustic performance of the system.
Safe Work Method Statement (SWMS)	Statement which describes how work is to be carried out. It identifies the work activities assessed as having a safety risk and outlines the safety risks. It also describes the control measures that will be applied to the work activities. The SWMS includes a description of the equipment used in the work, the standards or codes to be complied with, the qualifications of the personnel and training required to do the work.
Single Sided (RFL)	Reflective foil on only one face of reflective insulation.
Site Plan	The drawing that shows the boundaries of the building, its location, site utilities.
Specifications	Detailed, precise work instructions that include the kinds of materials to be used and the method of construction.
STC	Sound Transmission Class.
Stringing-in	Fixing some form of string or strap to prevent the batt insulation moving out of cavity stud frame and/or falling prior to plastering.
Structural Member/ Timber	Pieces of wood of relatively large size (with a cross section greater than 100mm X 150mm), the strength of which is the controlling element in their selection and use. Framing for buildings and crossarms for posts are examples of structural timbers.
Summer	Denotes BCA design heat flow direction into the structure.
System R-value	Thermal resistance of a system, or construction of different materials, excluding surface air film resistances.
Top - up Ceiling Batts	Where insulation batts are installed over existing ceiling insulation.

Term	Definition
Thermal Bridging	Thermal bridging occurs when there is an interruption of insulation in a house by other materials. Insulation is only effective if it achieves unbroken coverage around the building. If there are any breaks in the insulating material, heat can escape.
Thermal Bridging	Thermal bridging occurs when there is an interruption of insulation in a house by other materials. Insulation is only effective if it achieves unbroken coverage around the building. If there are any breaks in the insulating material, heat can escape.
	A common example is steel wall framing which interrupts insulation and acts as a thermal bridge. Heat loss along thermal bridges can be minimized by using thermal breaks. Material that does not conduct heat, for example polystyrene, is placed between the steel framework and the outside building material.
Thermal Conductivity	A measure of the ability of a material to conduct heat.
Total R-value	Thermal resistance associated with a material or system, including surface air film resistances.
Ventilated	An air space bounded by surfaces allowing a degree of air movement through opening(s) having an collective area of not less than 1% of the plan surface area that will prevent dead airspaces. In a roof space the definition can be extended to include air movement through opening(s) provided by roof ventilator(s) having a collective opening area of not less than 0.14m^2 in conjunction with gable vents, ridge vents, and/or eave vents.
VOC	Volatile organic compounds (VOCs) are organic chemicals that have a high vapor pressure at ordinary, room-temperature conditions. Many VOCs are dangerous to human health or cause harm to the environment. VOCs are regulated by law, especially indoors, where concentrations are the highest. VOCs are typically not acutely toxic, but instead have compounding long-term health effects.
Walls (1) Internal	Walls that do not form part of the building envelope.
(2) External	Walls that are part of the building envelope.
WHS	Work health and safety – prevention of disease and injury caused by workplace influences. Previously referred to as OHS .
Winter	Denotes BCA design heat flow direction out of the structure.

3.0 Principles of Energy Efficiency and Insulation (Thermal and Acoustic)

3.1 What is Insulation?

Insulation provides a level of flow resistance to heat, cold or noise. This level of resistance can be created using any bulk insulation material which slows the flow of heat, cold or noise. Glasswool or rockwool batts last a lifetime and are a safe, energy saving materials that reduce heat entering your home in summer and heat loss in winter.
Reflective Foil Laminates provide a level of thermal resistance when installed within an airspace adjacent to the reflective surface. These non ventilated reflective air spaces (minimum 20mm) provide a level of heat flow resistance.

3.2 Product Description & Applications

Batts are available in varying densities. They are specifically designed for the thermal insulation of ceilings, walls and floors in domestic and commercial buildings. Batts have the added benefits of being an effective sound absorber and so contribute to both the thermal and acoustic comfort of building occupants.

The comprehensive range of sizes and R-values available ensures there is an efficient and effective batt suitable for any application.
Some batts are specifically designed for wall applications and for installation in both timber and steel framing.

Reflective foil laminates are typically applied externally to the wall framing and roof trusses of a dwelling. Reflective Foil Laminates generally come in rolls and are utilised to sark the dwelling and also provide a second skin membrane for weather, dust and draught proofing.
This manual does not cover guidelines for sarking roofs or floors.

3.3 Is Insulation Sustainable?

Glasswool and Rockwool batts are sustainable. Households, businesses and industry are in a position to save significant amounts of energy through the informed use of insulation.

Benefits associated with using batts include:
- reduction of greenhouse gas emissions which also reduces air pollution
- batts are manufactured from renewable resources (sand and basalt rock) and recycled content (Up to 80%)
- correctly installed, batts will last the life of the building
- requires no maintenance
- reduce sound transmission through building structure.

Reflective foil laminate insulation, correctly installed, will:
- reduce greenhouse gas emissions
- has a long life
- requires no maintenance.

→ Save energy → Save money
Save the environment

made from recycled materials

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3.4 Insulation Advantages for Householders

Batts
Improved comfort in summer by reducing heat GAIN via walls, ceilings and floors
Improved comfort in winter by reducing heat LOSS via walls, ceilings and floors
Improved comfort by reducing noise transfer through ceilings, walls and floors
Reduces the need for artificial heating
Reduces the need for artificial cooling
Reduces the operating times and settings of heaters
Reduces the operating times and settings of air conditioners
Reduces the size of heating and cooling plant equipment
Safe due to superior fire performance – non combustible
Safe to use with down-lights (when installed as per manufacturer's instructions)
Safe due to bonded fibres that do not move around in the roof space or enter the house
Safe to use with allergy sufferers due to low VOC content
Easy to cut and install by DIY
Optimum performance for the life of the home
Guaranteed to perform to AS/NZS 4859.1
A sustainable product made from up to 80% recycled materials
Save on energy bills
Save on greenhouse gas emissions
Australian manufactured
Quality Certified

Foil
Improved comfort in summer by reducing heat GAIN via walls, ceilings and floors
Reduces the need for artificial cooling
Reduces the operating times and settings of air conditioners
Easy to cut and install by DIY
Guaranteed to perform to AS/NZS 4859.1
Save on energy bills
Save on greenhouse gas emissions
Australian manufactured
Quality Certified
Provides draft proofing
Provides dust proofing

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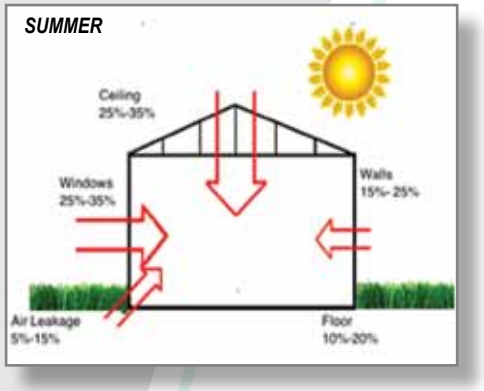

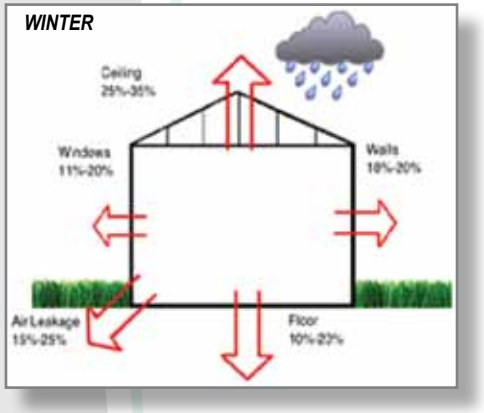

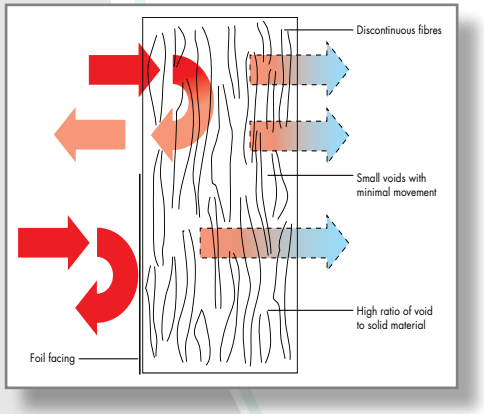

3.5 How Does Insulation Work?

- The number one rule to remember when talking about heat transfer is that heat will always move from a hot place or region to a colder place or region. The greater the temperature difference the faster the rate of heat transfer.
- By installing batt insulation you reduce heat transfer resulting in great savings on energy bills, as well as an increase in comfort.
- Batts can reduce summer heat in homes by up to 8 - 12 ˚C.
- Furthermore batts are non-combustible and can be used with confidence around down-lights when installed as per the insulation manufacturer's recommendations.
- Most insulation batts will slow down the flow of heat into or out of a house.
- Batts consist of millions of tiny air pockets trapped and separated from each other by very thin strands of fibres. Being trapped, the air does not move, this retards heat transfer through the batt by convection.

3.6 What is an 'R-value'?

R is a symbol for the term Thermal Resistance. An R-value is an internationally accepted unit of measure of a material's resistance to heat flow. The higher the R-value, the less thermal (or acoustic) transfer, and the more effective the insulation.

R-values are calculated:

$$R = \frac{\text{t: thickness (m)}}{\text{k: conductivity (W/mK)}}$$

Bulk insulation performance is a function of its nominal thickness. When installing, if the thickness of the insulation does not recover to its claimed value, then the thermal performance will be reduced.

Total R-values are based on the sum of all components of the building system including indoor and outdoor air-films, building materials used in the system and air-spaces.

Bulk insulation thermal resistance is expressed by **Material R-value.**

Reflective insulation thermal resistance is expressed in terms of **Total R-value** based on an application. An R_t-value is given for both Summer and Winter performance (as per BCA). Refer to (ICANZ Handbook Part 1: Thermal Performance), **www.icanz.org.au.**
The BCA/NCC sets out performance targets expressed as Total R-values for summer and winter based on climate zone conditions.

Some insulation materials may not maintain their installed R-value over the life of the product due to settlement of dust on reflective insulations, outgassing of blowing gases in foam insulations and product movement and settlement of some loosefill insulations.

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3.8.4 Measuring sound

Sound pressure is measured in decibels (dB), which is a logarithmic scale. A 10dB increase in sound level is heard roughly twice as loud as original sound. Sound levels between 35dB – 45dB are generally considered comfortable.

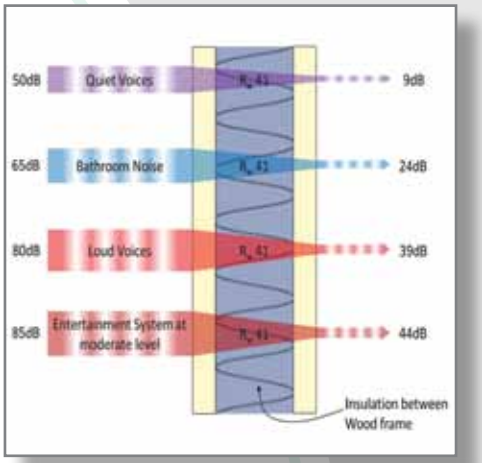
The acoustic performance of a wall, floor or ceiling system is measured by the Weighted Sound Reduction Index (R_w). It is a single number acoustic rating that takes into account the sound reduction of the system at a number of different frequencies and is used to easily compare different types of constructions. The higher the Rw the better the acoustic performance of the system.

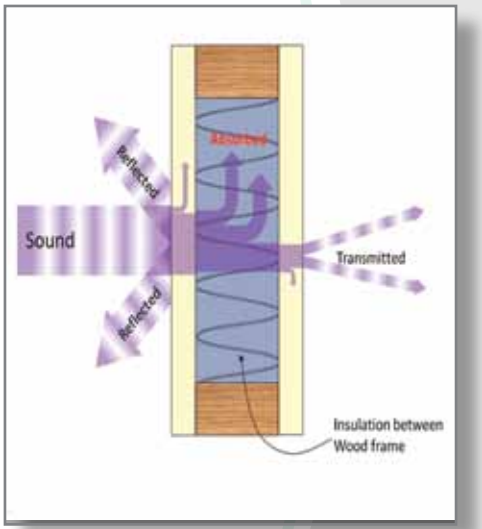
3.8.5 Controlling sound in your home

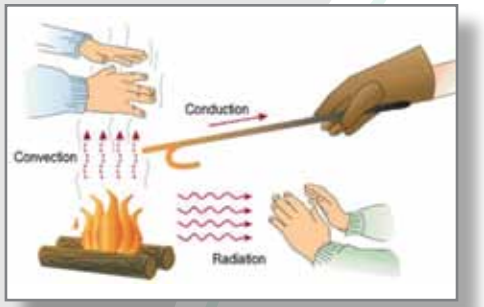
Installing acoustic insulation in external walls, floors and ceilings will not only provide excellent thermal insulation, it will also help reduce noise entering your home from external sources. Combined with door and window seals, it provides an excellent filter for reducing airborne noise.

Traditionally, thermal insulation is applied to the outer building envelope whereas acoustic insulation is installed in the building envelope as well as internal walls, floors and ceilings.

Installing acoustic insulation in interior walls, floors and ceilings can reduce sound transfer creating quiet zones within your home. Installation requirements for acoustic insulation are identical to those specified for thermal insulation.







3.7 How is Heat Transferred?

Heat transfer is an important concept in selecting products. There are 3 ways heat is transferred:

- **Conduction** is heat energy transfers between objects that are in physical contact.
- **Convection** is when warm air rises, then cools and falls. Heat energy can be transferred from surface to surface this way.
- **Radiation** is when heat rays come into contact with surfaces, thus heating them.

3.8 Acoustic Insulation

3.8.1 Soundproofing your home

Doctors and psychologists agree that noise has the ability to raise stress, disrupt sleep and generally reduce quality of life.

These days, there is more external noise – as traffic and housing density increases. Even within our homes, trends such as open plan living, harder surfaces (e.g. timber floors), and more powerful entertainment systems increase the noise levels.

With decreasing block sizes due to urbanisation, there is increasing demand for acoustic insulation to reduce noise within the home from both internal and external noise sources.

3.8.2 How sound is transmitted

Sound travels easily through the air. When sound waves reach a solid surface they are partially absorbed and reflected.

The absorbed energy causes vibrations that can transmit sound to the other side of the solid surface.

In this way, external noise is easily transmitted through walls, floors and ceilings to the inside of your home. Additionally, noise generated from within your home can be transmitted through internal walls, and even floors, to adjacent rooms.

3.8.3 How insulation helps

Bulk insulation materials such as glasswool and rockwool act like a sponge to help soak up sound energy. When the sound waves encounter the insulation they are partially deflected by the density of the product and partially absorbed due to the millions of interconnecting air pockets.

As a general rule, insulation products such as reflective foil or foams with hard surfaces are poor noise insulators.

4.0 Standards, Regulations and Codes

4.1 Australian Standards

Australian Standards are documents setting out specifications and procedures designed to ensure products, services and systems are safe, reliable and consistently perform the way they are intended to. They give business and consumer's confidence that goods and services they are purchasing and using are safe, reliable and will do the job they were intended for.

Australian Standards protect tradespeople and their clients. If an Australian Standard (or a part of it) is referred to in a regulation (e.g. NCC) it must be complied with. Consequences of non compliance include:

- Client dissatisfaction with products or services – this could lead to claims for compensation.
- Reputation as a quality installer and company could be damaged.
- People could be harmed or killed because of faulty products/equipment (e.g. through fire).
- Installer (and employer) could be the subject to a fine or legal action.

Images of The Australian Building Codes documents.

4.2 *Listing of Australian Standards related to Insulation*

Here are some important Australian Standards for installers of insulation products. This is not necessarily a complete listing and Australian Standards are updated from time –to–time. You should always check the latest standards relevant to your work be talking to your supervisor, or visiting the Standards Australia website.

Thermal Insulation	
AS/NZS 4859.1 Materials for the thermal insulation of buildings	Provides requirements for labelling of products and methods of test for materials that are added to, or incorporated in, opaque envelopes of buildings designed for human occupancy, to provide thermal insulation by moderating the flow of heat through these elements.
AS 3999 Thermal Insulation of dwellings - Bulk insulation - Installation requirements	Outlines the installation of bulk thermal insulation in all classes of dwellings. It is not intended to apply to the insulation of building services and equipment.
AS/NZS 3000 Electrical Installations (known as the Australian/New Zealand Wiring Rules)	Covers wiring rules for the electrical industry. It includes minimum clearance distance from recessed luminaries, including downlights, electrical equipment and cables.
AS 4426 Thermal Insulation of pipe-work, ductwork and equipment - Selection, installation and finish.	Deals with the selection, installation and finish of thermal insulation for pipework, ductwork, tanks, vessels and equipment in the temperature range of -75˚C to +800˚C, but excludes manufactured pre-insulated equipment, structural insulation of buildings and cold stores, fireproofing structures, refractory linings of plant, airborne installations and all external underground mains.
AS 4508 Thermal resistance of insulation for ductwork used in building air-conditioning.	Specifies requirements relating to the optimum thermal resistance of insulation for rigid and flexible ductwork and associated fittings used in heating, air-conditioning and evaporative cooling systems of buildings and dwellings.
Acoustic Insulation	
AS/NZS ISO717.1 Acoustics - Rating of sound insulation in buildings and of buildings elements - Airborne sound insulation	Provides a method whereby the frequency dependent values of airborne sound insulation of building elements and in building can be converted into a single number characterizing the acoustical performance.
AS/NZS 2499 Acoustics - Measurements of sound insulation in buildings and of buildings elements - Laboratory measurement of room-to-room airborne sound insulation of a suspended ceiling.	Provides a laboratory method of measurement the airborne sound insulation of a suspended ceiling with a plenum of defined height mounted above an acoustical barrier which separates two rooms of a specified test facility.

Fire Performance	
AS/NZS 5110: RECESSED LUMINAIRE BARRIERS	Standard for the required performance of a luminaire barrier. Each barrier must be tested and deemed suitable for covering that particular model luminaire as well as being suitable for that particular type of insulation.
AS 1530.1 Methods for fire tests on building materials, components and structures – Combustibility test for materials	Sets out a test method for determining the combustibility of building materials and is one of a series of test methods for evaluating the potential fire hazard of building products
AS 1530.2 Methods for fire tests on building materials, components and structures – Test for flammability of materials.	Specifies the apparatus and test method for determining the flammability index of a material.
AS 1530.3 Methods for fire tests on building materials, components and structures- simultaneous determination of ignitability, flame propagation, heat release and smoke release.	Describes a single test method for grading building materials on the basis of ignition tendency, flame spread, heat development and tendency to produce smoke. Apparatus, test procedure, indices for grading and mounting procedures for specimen materials are provided.
Reflective Foils	
AS/NZS 4200.1 Pliable building membranes and underlays - materials	Specifies the requirements for materials suitable for use as a pliable building membrane (also known as underlay) when it is intended to act as a sarking membrane or thermal insulation, or a vapour barrier in a domestic, commercial or industrial building. It does not specify the thermal insulation requirements, nor does it include materials for use in air handling ducts.
AS/NZS 4200.2 Pliable building membranes and underlays - Installation requirements	Specifies the installation procedures for a pliable building membrane (also known as underlay) when it is intended to act as a sarking membrane or thermal insulation, or a vapour barrier in a domestic, commercial or industrial building. It specifies the installation requirements when the membrane is used under sheet roofing, tile roofing or in walls.
Other Insulations	
AS 1366.1 Rigid cellular plastic sheets for thermal insulation – Rigid cellular polyurethane (RC/PUR)	Specifies requirements for rigid cellular polyurethane in the form of sheets, board, blocks and cut shapes for thermal insulation.
AS 1366.2 Rigid cellular plastic sheets for thermal insulation – Rigid cellular polyisocyanurate (RC/PIR)	Specifies requirements for rigid cellular polyisocyanurate (RC/PIR) in the form of sheets, board, blocks and cut shapes for thermal insulation purposes.

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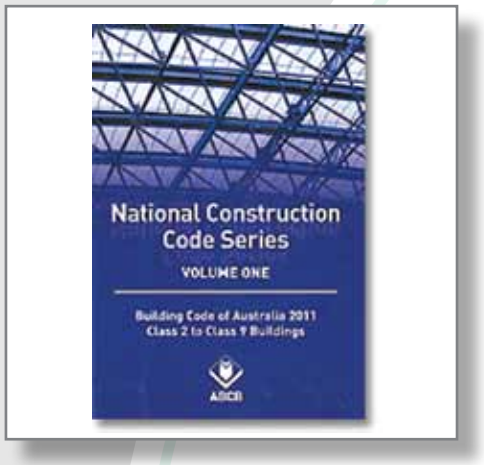
Other Insulations	
AS 1366.1 Rigid cellular plastic sheets for thermal insulation – Rigid cellular polyurethane (RC/PUR)	Specifies requirements for rigid cellular polyurethane in the form of sheets, board, blocks and cut shapes for thermal insulation.
AS 1366.2 Rigid cellular plastic sheets for thermal insulation – Rigid cellular polyisocyanurate (RC/PIR)	Specifies requirements for rigid cellular polyisocyanurate (RC/PIR) in the form of sheets, board, blocks and cut shapes for thermal insulation purposes.
AS 1366.3 Rigid cellular plastic sheets for thermal insulation – Rigid cellular polystyrene – Moulded (RC/PS-M)	Specifies requirements for rigid cellular polystyrene in the form of sheets, board, blocks and cut shapes for thermal insulation purposes.
AS 1366.4 Rigid Cellular plastic sheets for thermal insulation – Rigid cellular polystyrene – Extruded (RC/PS-E)	Specifies material requirements for extruded rigid cellular polystyrene (RC/PS-E) used in sheets, boards, blocks and cut shapes for thermal insulation. Lists minimum properties and test methods for quality control and material specification.
Dust and Respirators	
AS 3640 Workplace atmospheres – method for sampling and gravimetric determination of inhalable dust	Specifies a gravimetric method for the collection and determination of inhalable dust. The aim of this revision is to align the Standard more closely with the definition of inhalable dust given in ISO 7708.
AS/NZS 1715 Selection, use and maintenance of respiratory protective equipment	Sets out the principles of respiratory protection, requirements and recommendations for the section, use and maintenance of personal respiratory protective equipment (RPE) in the workplace. This Standard does not deal with military applications for RPE, but includes special needs of personnel involved in a special response hazardous material (HAZMAT) incident where respiratory concerns need to be addressed.
AS/NZS 1716 Respiratory protective devices	Specifies minimum performance and testing criteria to be observed in the manufacture of respiratory protective devices.

Working at Heights	
AS 6001 Working platforms for housing constructions	Sets out requirements for working platforms and their supporting structures used in the construction of housing, which includes new construction, renovations, additions, alterations and maintenance.
AS/NZS 1576.1 Scaffolding - General requirements	Sets out design and operational requirements for scaffolding, except trestle scaffolding, portable ladders intended to be used as working platforms and elevating working platforms.
AS/NZS 4576 Guidelines for scaffolding	Gives practical guidance for training and certification of scaffolders, the preparation of sites for scaffolding, and the safe selection, supply, erection, alteration, dismantling, maintenance, inspection and use of scaffolding and scaffolding equipment.

Remember that complying with Australian Standards in your installation work, and checking that products comply with relevant Standards, ***is your responsibility.***



4.3 Regulations – National Construction Code (NCC) Requirements

The NCC contains the status of building regulations. The NCC aims to achieve and maintain acceptable standards of structural sufficiency, safety (including safety from fire), health and amenity for the benefit of the community. It contains technical provisions for design and construction of buildings and other structures.

Recent changes to the NCC mean that new homes in Australia have to comply with mimimum energy efficiencyrequirements.

This requires insulation products to comply with Australian Standard AS/NZS 4859.1.

Also, the thermal resistance (R-value) shown on all product labelling must be determined by a recognised laboratory, accredited to test the relevant Standards and procedures.

4.3.1 Complying with Electrical Safety Regulations

To ensure that the installation of insulation complies with electrical safety regulations in each state and territory, contact your local regulator. Details can be found by visiting ERAC (Electrical Regulatory Authorities Council) website at **www.erac.gov.au** and clicking on 'related links'.

4.3.2 Climate zones

The NCC has established Deemed to Satisfy clauses which specify the total R-value and installation requirements for insulation across 8 climate zones in Australia.

For further information visit www.abcb.gov.au

Insulation is to be installed to the R-values required in the NCC.
These R-values will vary depending on the relevant climate zone.

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4.4 Industry Codes of Practice

A Code of practice is a set of guidelines and regulations to be followed by members of an industry, organisation or group.

They are developed through consultation. A code is not law (i.e. not mandatory), but may guide compliance with provisions of an Act or regulation.

In some cases, failure to observe an approved code of practice can be used in legal proceedings as evidence of failure to comply with an Act or regulation.

5.0 Work Health and Safety

Using safe working methods and practices is vital to Work Health and Safety (WHS) in your workplace. To work safely, you need an understanding of the WHS requirements and procedures which cover your work including duty of care, use of Personal Protective Equipment (PPE) etc. You also need to know how to access WHS information.

5.1 Duty of Care

Duty of care requires a person to do everything reasonably possible to protect themselves and others from harm.

Duty of care is the legal responsibility for **everyone** including:

- employers
- self employed persons
- persons in control of the work site
- construction supervisors
- employees/ workers
- designers
- sub-contractors
- inspectors.

Duty of care responsibilities for **employees** are:

- to cooperate with, or help, your employer on health and safety matters
- to take reasonable care to protect the health and safety of yourself and others who may be affected by your actions at work
- to identify hazards in the workplace and implement control measures to minimise risks.

This means, for example, keeping your work area safe and tidy, and telling other workers about potential hazards that you have noticed (such as the location of electrical cables).

Duty of care responsibilities for **employers**, those in control of the work site and self employed persons are:

- to ensure that, as far as is reasonably possible, the employee is, while at work, safe from injury and risk to health
- your employer should provide a safe working environment, facilities, systems and equipment. This could be, for example, giving you a hard hat or respirator for personal protection
- your employer should also provide you with health and safety information and training including a proforma or process to enable you to conduct a through risk assessment of the work area.

5.2 Safe Work Methods and Practices

Using safe work methods and practices will help to protect you, the people around you, and your client's property, free from harm.

5.2.1 When installing insulation, safe work methods and practices can mean:

- not taking any unnecessary risks, particularly when working around electrical cabling
- maintaining vigilance and awareness of potential hazards (e.g. electrical wiring, the dust levels, awareness of asbestos, and stress caused by heat)
- always using personal protective equipment and clothing that has been given to you
- conducting a risk assessment of the work area
- communicating with others about potential hazards and job status
- checking that insulation products and your installation techniques comply with australian standards
- if you must smoke, doing so in designated areas
- keeping your work area clean and tidy and proper disposal (or recycling) of waste
- using tools and equipment that are in safe working order in the way the manufacturer has instructed
- entering and leaving the work site using designated routes
- taking care not to damage client property
- never being under the influence of drugs or alcohol at work, or bringing them to the workplace
- helping to prevent bullying and harassment in the workplace.

5.2.2 What are safe working practices?

Your employer should provide you with information about safe systems of work. This means information about the workplace itself (eg. special client requirements, truck access, entry and exit points, location of any hazards, how to move about safely, emergency exists, location of first aid equipment, etc).

5.2.3 You will also need to know about:

- procedures for handling and disposing of materials and waste (especially if hazardous)
- how to access amenities such as drinking water and toilets
- other systems, methods and procedures which will help you to work safely (such as removing asbestos, minimizing dust, using respirators, and using tools that are non-conductive or have insulated handles to minimize the risk of electrocution).

5.2.4 Which activities require a licence or permit?

There are many common construction activities which require qualifications, licences, tickets, permits and registrations before they can be undertaken. These activities are also controlled by approved Codes of Practice. You should check what special licences or permits are required for activities related to the installation of ceiling insulation, noting in particular:

- removal of asbestos
- scaffolding over 4 metres
- work to move, modify or fix electrical cabling.

5.3 Tips for Keeping the Work Site Safe:

5.3.1 Storage of materials and equipment

These should be stored in a safe and systematic manner which allows them to be retrieved again safely. The way materials and equipment are stored should also be in accordance with Material Safety Data Sheets (MSDSs) and/or Safety Data Sheets (SDSs) and legislation where this applies.

You should make sure that stored materials and equipment cannot fall on a person, or cause injury through the projection of sharp edges, rough surfaces etc.

5.3.2 Removal of debris and litter

Debris- (such as insulation off cuts) should be continually removed from the work area to prevent build up. Build up could affect entry to or exit from the work area or movement around the ceiling space. It can also pose a fire hazard, or other hazards such as tripping.

Litter- includes such things as food scraps and wrappings, waste from packaging, etc. Debris and litter must be disposed of or recycled in approved containers (such as garbage bins or skips). You must ensure that disposal or debris and litter does not create a risk to the environment.

Remember to recycle as much as possible (eg plastic bags can be recycled).

5.3.3 Housekeeping

Good housekeeping is essential to safety. It includes day-to-day cleanliness, tidiness and good order in all parts of your work area, including keeping tools and equipment maintained to ensure they are in safe and efficient working order.

5.4 Installation Hazards

5.4.1 What is a hazard?

A hazard is a thing (including an intrinsic property of a thing) or situation with the potential to cause injury or harm.

5.4.2 What is risk?

Risk is the likelihood of a hazard causing injury or harm.

5.4.3 How are hazards identified?

Identifying a hazard means recording that a hazard exists, or **may** exist. This means finding all hazardous activities, situations, tools and equipment, materials and processes.

Everyone should be involved in hazard identification. It mostly requires you to be observant and aware, for example:

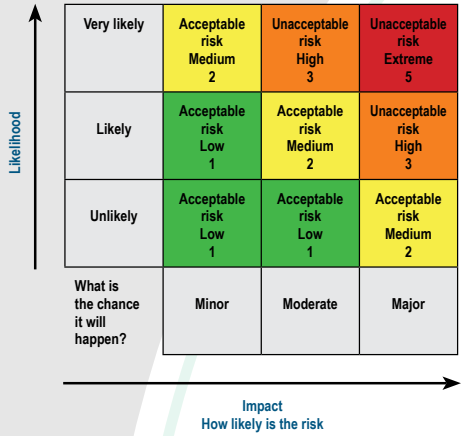
- frequently inspecting your workplace
- conducting a risk assessment of the work area (particularly to identify electrical hazards, i.e. have a heightened awareness of electrical hazards.)
- talking to people to find out about hazards, or letting them know about hazards you have found
- checking reports of previous hazards, injuries and accidents to give you an idea about potential hazards.

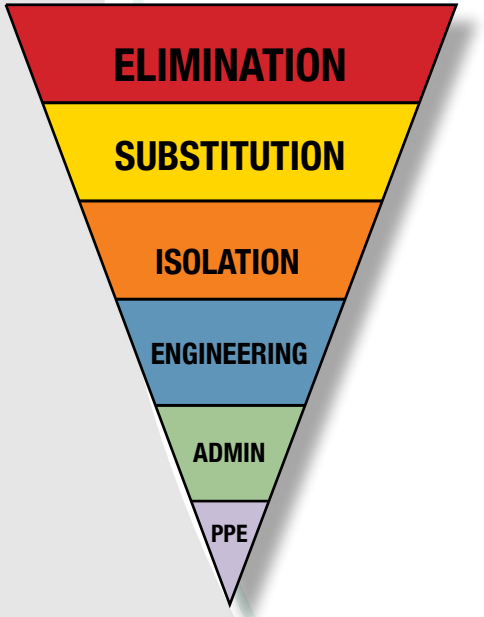
Remember, if you see a hazard or dangerous situation, you must report it so that all workers can be safe.

5.4.4 Risk management

There are five basic principles of risk management:

- **Identify** hazards – Find or See.
- **Assess** the risks involved – Think About and Check.
- **Consult** and report to involve relevant people – Talk and Tell.
- **Control** the hazard – Stop or Prevent.
- **Review** to identify change or improvement – Check and Reflect.





5.4.5 What is a risk assessment?

You will need to be able to assess risks (or potential risks) ***before*** work starts, as well as each time a hazard is found and a risk control used. This is part of the risk management process. It means gathering information so that you can make a clear and educated decision on what needs to be done to lower the risk as far as possible.

Risk assessments are based on the following three factors:

- the **'likelihood'** that it will do harm (probability)
- the **'severity'** of the harm it could do (consequence)
- the **'number'** of times people could be affected by it (frequency).

It is important to think about and to check:

- whether a hazard is likely to cause harm to a person or property….
- how severe the harm could be, or what the consequences would be…
- how often people or property could be affected by the hazard…

A risk assessment instrument should be provided by your employer.

Importantly, a site risk assessment will help you to locate electrical hazards by identifying and assessing the type, position and condition of electrical cabling in the ceiling/ roof space.

Once you have completed this, you will be able to make an accurate decision about which controls (if any) will be needed. This is an important part of risk management.

5.4.6 Controlling hazard

Hazard control means reducing the risk to as low as reasonably practical. It involves implementing measures to reduce the risk of a hazard causing injury using the hierarchy of control.

The hierarchy (order) of control for hazards is:

1. **Elimination:** Removing the hazard completely. This could include removal of a hazardous material or changing work practices to avoid the potential danger or hazard.
2. **Substitution:** Replacing a hazard with something which is less hazardous such as using safer equipment or materials.
3. **Isolation:** minimizing the chance of danger or harm by preventing access such as: erecting physical barriers, or putting a time or distance restriction in place.
4. **Engineering:** Where hazards can't be eliminated substituted or isolated, a safer environment can be created by making equipment and process improvements, for example using a respirator.
5. **Administration:** Where the risk still remains, then administrative measures have to be used and improved to limit the risk. Examples of these are structuring water breaks to avoid heat stress and providing training.
6. **Personal Protective Equipment (PPE):** This is used on top of other measures where extra protection is required. Items might include overalls, gloves and respirators.

5.4.7 How are these controls used?

Elimination – is always the best option!

The rest follow in order (i.e. 1 through to 6). If elimination is not possible, then the hazard needs to be assessed using the risk assessment process described earlier in this booklet. This will help you to describe what else needs to be done to control it.

This process flows down from substitution to using personal protective equipment. The first control (in order) that is able to be achieved should be put in place.

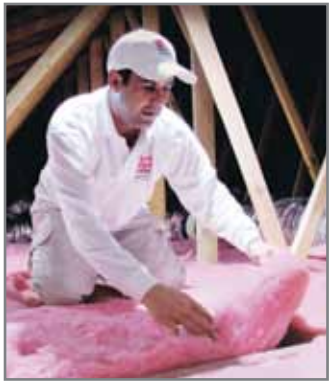
More than one control can be used at any time to reduce exposure to a hazard. For example, exposure can be limited, warning signs installed, training and personal protective clothing provided and used at the same time. It is important that the highest control in the hierarchy is the starting point for safety.

A risk assessment should be done every time a control is used. This is done to make sure that the control can, and will work, and that the hazard is eliminated or reduced as far as possible.

5.4.8 Common installation hazards

The following table lists a number of hazards which may be present when installing insulation.

Hazard	
Working at Heights (including scaffolding) Use of Ladders	All governments have introduced laws regarding working at heights. Where installation of insulation requires walking on the roof surface, work practices must ensure safe work conditions are provided as required by these laws. In particular these laws require the provision of safety barriers to protect workers from falling. Falls from heights are one of the most common forms of serious injury or death.All installers, regardless of height, require appropriate protection. Falls from heights are one of the most common forms of serious injury or death in the construction industry. When working at heights, appropriate protection must be given to you, and used (regardless of the height at which you are working). Where installation requires work at height, or there is a risk of falling e.g. when placing insulation in roofs, working near unprotected open edges or openings in roofs, walls etc, you must always use protection, work safely and comply with Standards. You can't always be sure that a roof is in sound condition, particularly if it is old, or made from cement or fiberglass sheeting. Think about safe use of ladders, use of safety barriers and additional PPE (harnesses etc). Don't forget that weather conditions such as rain and high wind pose additional risks when working at height. **YOU MUST MAKE SURE THAT:** • passage- ways, corridors and stairs are clear of obstruction • people below are protected from falling objects • ladders are used correctly (e.g. set up at 1:4 base to height ratio, used only to 3 rungs from the top, placed on a solid level surface for support, safe carrying of tools, ascending and descending with both hands etc. • scaffolding or mobile work platforms are used if work is of an extended nature • edge protection is used if a person is likely to fall. Check state regulations for details • a safety harness, safety net or other system is used if edge protection can't be used • all scaffolding, temporary structures, planks, decking, tools and equipment etc are secured to stop them from falling • you wear non-slip footwear. **Note: Remember that scaffolding above 4 metres needs to be erected by a licensed scaffolder.** Kick boards, hand railings, barricades and warning signs are required. Check state regulations for details. If extra height is needed, you will need to have a platform re-adjusted. You must not use railings or boards to gain extra height.

Hazard		
Weather Conditions – including heat stress	Weather conditions may make working on roofs unsafe. Where conditions are too wet or windy to allow safe access onto the roof and no alternative method of access to the roof space can be obtained, installers shall reschedule installation on an alternative date. Factors such as heat and humidity can cause heat stress. Heat stress is a big risk for people working in roof spaces, which can become dangerously hot. State workplace safety legislation requires employers to ensure ventilation and rest breaks for employees working in poorly ventilated workspace in hot weather. Some tasks may expose you to hot or cold working environments. Work outdoors may expose you to the sun's radiation, or to wind chill and the potential for heat-related illness. Workers in cold areas may be exposed to thermal hazards on the job. It is important that you know the difference between a situation which threatens health and safety and a feeling of discomfort. Terms like hypothermia and heat stroke refer to serious medical conditions. **Hypothermia:** is where a person gets an abnormally low body temperature as a result of exposure to cold environments. It is a serious condition which can lead to death. **Heat stroke:** is an uncommon and more severe form of heat illness, which is a medical emergency. It occurs when the body can no longer control the body temperature where mental function is seriously impaired. **Heat exhaustion:** is related to lack of fluids or a rapid loss of body fluids. **Heat stress:** is more serious and can lead to death. It is more likely to occur in conditions of high humidity. Roof spaces can become very hot, particularly in warm weather. This has the potential to cause heat stress especially if you need to wear heavy PPE. Do not discard PPE. Get relief from the heat by taking breaks and drinking plenty of water to avoid dehydration. Learn to recognize the signs of heat stress such as headaches, dizziness, fainting, irritability, confusion, thirst, nausea and vomiting.	 
Restricted Access Areas	Many roof and underfloor spaces pose potential hazards as they are cramped dark and dusty, and restricted to move around in except on structural members. You will need adequate lighting, dust masks, gloves, goggles, kneeling boards and non-conductive tools to help you to place insulation products.	

Hazard	
General Dust	Numerous types of dust are found in ceilings and can cause discomfort. Silica dust is created when bricks are cut by power saws during brick installation. Silica dust is a serious and potentially fatal health threat. Ensure you wear all PPE especially a respirator or mask to prevent dust inhalation. Wearing a P2 dust mask will prevent such discomfort allowing you to proceed with the job. 
Asbestos	Asbestos is found in many areas of buildings in bonded form (located around eaves, ceilings, wet areas, some glues and mastics), and friable form (located around hot water pipes, fire retardant and on structural steel). Use of asbestos in ceiling insulation has long ceased, however loosely bound asbestos (friable) may be found in a few older forms of ceiling insulation. Be sure never to remove asbestos and to always report the presence or suspected presence of it to the householder or supervisor.
Nails and sharp edges	Be careful of exposed nails or splinters of wood – especially if you are working in ceilings. Wearing the correct PPE will provide you with protection against such hazards.  
Falling Objects	You must take care to ensure that objects do not fall onto or hit people doing construction work and people in adjoining areas. Adjoining areas could include a private driveway, public footpath, or the yard of a nearby dwelling. Falling objects include anything that can fall or be sent out sideways or upwards, e.g. tools falling off a roof. **IT IS IMPORTANT THAT:** • there are exclusion zones around scaffolding and adjoining areas to stop unauthorized people from accessing the area • perimeter containment screening, scaffolding fans, hoardings or gantries are used to contain falling objects • scaffolding is erected and dismantled during quiet times in built up areas • materials are never dropped from scaffolding- mechanical hoists should be used to move materials • signs are used to warn people of hazards.  
Electricity	Requirements for installing insulation around or near electical cabling, heat generating appliances and recessed lighting are addressed in AS 3999 in the following sections: • Section 2: Pre-Installation considerations and inspections • Section 4.3: Electrical safety requirements • Appendix A: Recessed Luminaries.
Fire	Recessed Luminaires (downlights) - can generate extremely high levels of heat. Check that no combustable materials (such as dry leaves) is in contact with downlights, or combustible loose insulation.

5.5 *Personal Protective Equipment*

When working on a new build or retrofit project, you will be working either on a building site or in a private residence. There are hazards associated with these working environments and you need to make sure that you take care of your own health and safety.

The installation is made easier if the right equipment is used, and this should include the recommended clothing. As part of your SWMS, you should review your PPE requirements prior to commencing work.

5.5.1 Why is PPE important?

PPE is important because it can protect your body from injury by blunt impacts, electrical hazards, heat, chemicals and disease or infection.

Using PPE is only one part of a complete safety program that would normally use a range of strategies to maintain a safe and healthy work environment.

PPE does not reduce the hazard itself, nor does it guarantee permanent or total protection. It simply offers a level of protection. You still need to think and act safely at work to identify and control hazards and risks.

If you are feeling hot, don't shed items of PPE. They can reduce the severity of electric shock. Instead, take frequent breaks and drink plenty of water.

5.5.2 Who supplies PPE?

Your employer must supply you with PPE appropriate to your job. Your employer must also ensure that the purpose of each PPE item that you are given is explained to you, and that you are trained to fit and use it correctly.

5.5.3 Common examples of PPE

Headwear

Hard hats need to be carried at all times and should be worn whenever there is any chance of being hit by debris or falling objects. Also, wide brimmed hats or hats with flaps to protect against UV radiation should be worn when required, e.g. when working on a roof.

NOTE: brimmed hats can restrict vision when working in a restrictive space.

Eye Protection

Should be fit for the purpose and job and must be worn where potential damage to the eyes could occur e.g. when installing products overhead, or where safety signage specifies that eye protection must be worn.

Hearing Protection

Ear plugs and muffs are required where noise is a risk to health and safety. Industrial noise is a major factor in partial or permanent hearing loss. The danger can be lessened through the use of appropriate ear protection.

Foot Protection

Footwear needs must meet Australian Standards and be appropriate for the site and weather conditions. Non-slip footwear should be worn when working at height. Rubber soled shoes can reduce the severity of electric shock.

Hand Protection- Gloves

Prevent your hands from being damaged by sharp objects. Leather gloves can reduce the severity of electric shock.
Gloves can also prevent hazardous substances from entering your body through hand contact. You need to adjust these before using them as they provide a 'different feel'.

Respiratory Protection (Lung/Breathing)

A respirator is a device designed to protect you from inhaling harmful dusts, fibres, fumes, vapours and/ or gases. Remember that you should only use a respirator which complies with the relevant Australian Standards.

There are two main categories:

- Air-purifying respirators- (half or full face mask) which force contaminated air through a filtering from hazardous dust, mites, fibres or vapours. The mask must fit your face correctly. Sealing is critical to proper use.
- Air-supplied respirators- which deliver an alternate supply of fresh air through gas type cartridges or scuba equipment. These are generally required when handling chemicals so you will need to check the relevant MSDS.

Body Protection – Clothing

- Overalls or coveralls should be used to keep contaminants from soiling your clothes and from being carried from the workplace. These should completely cover your arms and legs.
- High visibility clothing and vests help you to be seen by others. You need to wear the correct type of vest to suit the lighting conditions (day or night or day/ night). This type of clothing may be required for some categories of building sites.
- Long sleeve shirts and pants help to protect against harsh weather elements, UV radiation and also chemicals. They need to fit correctly to help to avoid injury caused by loose clothing which may get caught in machinery or moving objects. Jewellery and chains present similar dangers.

Height Safety PPE

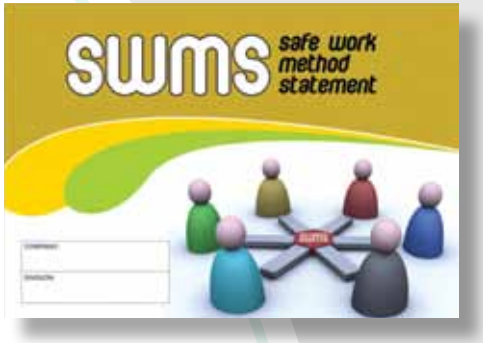
Working at heights generally requires you to use some additional PPE for fall prevention. Depending on the job, this can include temporary anchorage points, static lines, shock absorbing lanyards and full body harnesses.

Equipment such as harnesses and safety lines must comply with relevant Standards. Before each use, you should check your equipment is safe and operational by confirming:

- there are no signs of fraying in stitching and webbing
- lanyards and double yolks are not too worn
- no chemicals or paint have spilt on the equipment
- all fixings are tight and secured
- all rings and housing are in good order
- safety clips/ hooks are not bent, cracked or stress-fractured
- the fall arrest section is intact and not disturbed.

Note: PPE will only assist in preventing damage. It is important to use it, and use it properly, but other safety measures must also be followed.

5.6 WHS Documentation



There should be several types of WHS documents at your workplace. They should provide information about:

- WHS, and a method for reporting, e.g. risk assessment instrument (critical step for identifying, assessing, recording and controlling hazards, particularly electrical)
- construction documentation and plans
- Safe Work Method Statement (SWMS)
- Job Safety Analyses (JSAs)
- accident, incident and injury reports and proformas
- reports of dangerous occurrences or near misses
- Site Safety Plan.

5.7 Electrical Risk Assessment (refer to 'heightened awarness')

Requirements for installing insulation around or near electical cabling, heat generating appliances and recessed lighting are addressed in AS 3999 in the following sections:

- Section 2: Pre-Installation considerations and inspections
- Section 4.3: Electrical safety requirements
- Appendix A: Recessed Luminaires.

5.8 Fixing insulation in position

Insulation or a suitable guard in the ceiling space is required to be fixed in position where located in close proximity to lighting, hot flues or heat generating appliances.

A mechanical strength test for insulation fixing and guards has been developed and the details of this test are given in AS 3999 Appendix B.

Manufacturers and suppliers of insulation are required to supply installers with appropriate independent test results certifying the correct procedure for installing insulation up to 50mm from lighting hot flues and heat generating appliances.

6.0 Managing Electrical Hazards (having a heightened awareness of electrical hazards)

6.1 *Installing insulation in new or existing buildings*

When installing insulation in new or existing buildings after wiring or electrical appliances have been installed, a risk assessment shall be carried out prior to work commencing. This assessment is to be performed by a person with heightened awareness of potential electrical risks (refer Construction Industry Pocket Book Resource for Installers of Ceiling Insulation).

Note: This risk assessment need not be done by a licensed electrician. However, if there is any doubt about how to turn the power off, consult a licensed electrician.

6.1.2 Types of electrical and electrical wiring hazards

Hazard		
Lead Sheathed Cables	These types of cables were installed up until the late 1940s or early 1950s. They had poor quality insulation around each conductor core, and then covered in a lead casing. Problems arose when the insulation of the inner core broke down and made contact with the outer sheath. The lead sheath then had the potential to become live when the earth continuity of the sheath was lost. If these cables are found in a ceiling space, no work should proceed until the area had been assessed as electrically safe by a licensed electrical contractor.	
Tough Rubber Sheathed Cables (TRS Cables)	These cables were installed until the mid to late 1950s. They had a short safe service life and where installed in ceiling spaces, deteriorated even more quickly due to the high ambient temperatures under roofs. However, such cables may still be encountered in older buildings. Such cables may appear on contract leaving exposed live parts. If TRS cables are found in a ceiling space, no work should proceed until the area has been assessed as electrically safe by a licensed electrical contractor.	

Hazard		
Split Steel Conduit	These were used up until the late 1940s. The wiring within such conduit is usually of vulcanized India rubber (VIR) insulated cables. The split steel conduit system relied on remaining effectively earthed through the continuity of the grub screw secured joints in the system. These joints often fail electrically with age. With the passage of time, therefore, earthing cannot be guaranteed and with the deterioration of the insulation of the wiring, sections of conduit can become energized at 240 volts. The same VIR cable was sometimes installed in a wooden (pine) duct, often referred to as “cap and casing”. If split steel conduit (or cables in pine ducted wiring systems) are found in a ceiling space, it is recommended no work should proceed until the area has been assessed as electrically safe by a licensed electrical contractor.	
Thermoplastic Insulated and Sheathed (TPS) Cables	These cables are almost the universal type of electrical cable used in houses today. They have been in use since the late 1950s. Older TPS cables may have a black outer sheath while more modern cables have generally grey or white sheaths. Orange sheathed TPS cables are generally more common in industrial installations. Older TPS cables may have deteriorated to the stage of requiring replacement, although may 50 year old TPS cables remain safe and serviceable. The failure mode of TPS cables is generally from embrittlement and cracking. White Sheathed TPS cables are often more prone to ultra violet radiation. If the following are found, no work should proceed until the area has been assessed as electrically safe by a licensed electrical contractor. • cracked or split sheaths of TPS cables • exposed inner cores of TPS cables (usually red, black, white and green) • exposed copper wire is visable at terminations, electrical accessories or equipment.	
Unenclosed Joints	When TPS cabling was introduced in the late 1970s, some of the wiring joints were not suitably enclosed. These joints were installed in the roof space using exposed connectors. In some instances, Insulation tape was applied. Unenclosed joints (whether enclosed with insulation tape or not), are considered unsafe. It is recommended no work should proceed unless power is isolated and the joint is left undisturbed. A licensed electrical contractor must enclose the joints.	

Hazard	
Corrosive Effects of Thermal Insulation	Thermoplastic insulated and sheathed cables can suffer degradation of their electrical insulation if it comes into contact with polyurethane or polystyrene types of thermal insulation. If polyurethane or polystyrene insulation is to be installed where it will be in contact with the electrical insulation or sheath of an electrical cable, work must not proceed until the cables have been provided with a protective cover, sleeving or barrier, or other precautions put into place by a licensed electrical contractor.
Vermin Damaged Wiring	Vermin damage to electrical cables in ceiling spaces can result in live bare conductors being exposed. Wiring should be checked for such damage. If wiring is identified that shows signs of vermin damage, no work should proceed until the area has been assessed as electrically safe by a licensed electrical contractor. 
Derating of Electrical Cables and Wiring Systems	In addition to thermal insulation around or beside a cable can reduce its current carrying capacity because thermal insulation prevents dissipation of the natural heat rise of cables carrying electrical current. As cable operating temperatures rise, their ability to carry electrical current is significantly reduced. This phenomenon is called 'cable derating'. Cables carrying current in excess of their derated capacity can fail catastrophically. Insulation must not be fitted so as to totally enclose a cable. Insulation must not be arranged where total enclosure may result from a cable sinking into loosefill. The following arrangements are satisfactory: • placing insulation over a cable lying on the surface of a ceiling sheet • placing insulation beside a cable fixed to a structural member such as a joist • a cable lying on the top of batt type ceiling insulation.
Cables Subject to Damage from Insulation Fixing Methods	Lead sheathed cables, TRS cables and thermoplastic sheathed (TPS) cables are not designed to withstand mechanical damage such as would be occasioned from thermal insulation fixing nails, pins or cleats. Under no circumstances must fixing devices in ceiling spaces, or in proximity to electrical wiring, be of metal or other conductive material. Control measures that ensure that a fixing device cannot be at risk of puncturing or otherwise damaging a cable must be used. Controlled measures should also ensure that cables are not trodden on, punctured, abraded, cut, crushed or placed under tension.

Hazard	
Recessed Luminaires/ Downlights	Recessed luminaries (or downlights) are common in houses today. There are detailed requirements in AS 3999 and AS/NZS 3000:2007 (wiring rules) for the precautions that must be in place to ensure that the installation arrangements for these, and their auxiliary equipment, ensure that the risk of fire is prevented. Thermal insulation on or near recessed luminaries can cause excessive temperature rise and has the potential to cause fires. If a ceiling has a recessed luminaire, one of the following precautions derived from AS /NZS 3000:2007 Wiring rules must be used before thermal insulation is installed: • it must be verified that the luminaire has been specifically designed and certified by the manufacturer to permit contact with combustible materials or enclosure or covering by thermal insulation, or • the luminaire must be installed within a suitable fireproof enclosure or • there must be provision of required clearances from combustible and thermal insulation materials as specified by the manufacturer of the luminaire or • there must be provision of the default clearances from combustible and thermal insulation materials as specified in AS 3999 and AS/NZS 3000:2007 (wiring rules). 
Elecrtical Conductive Insulation and Conductive Fasteners	Alumunium foil insulation products and metal fasteners conduct electricity. Aluminium foil insulation is commonly supplied in long rolls and would become energised if contact was made with the aluminium sheet and 240V ac. To avoid risk of electricution care should be taken to ensure these items do not come in contact with electrical wiring during installation 
Other Electrical Appliances	Electrical appliances other than recessed luminaries in ceiling spaces may include air conditioning equipment, exhaust fans, combination bathroom fan/ light/heaters and luminaries installed specifically to illuminate the roof space.You must ensure that installation of thermal insulation does not impede the safe operation of the equipment. The equipment manufacturer's installation instructions/ advice in this regard must not be contravened. Statutory clearances between the equipment and thermal insulation must be maintained in accordance with relevant current Standards including AS 3999 and AS/NZS 3000:2007 (wiring rules). Some equipment such as bathroom combination fan/ light/heater units must not have a cover placed over them as this will create an immediate fire hazard.

Hazard	
Other Electrical Equipment	Recessed luminaries (or downlights) are common in houses today. There are detailed requirements in AS/NZS 3000:2007 Additional risks relate to using any electrical tools or equipment in the installation process, for example power drills and vacuum cleaners. You must report all electric shocks and short circuits. Australian Standards and WHS legislation demand regular inspections of electrical equipment. All electrical equipment must be tested and tagged. Extension leads and portable tools should be checked for defects and correct tags. In work areas, all electrical leads should be suspended off the ground. **If you suspect the wiring in the ceiling does not confirm to AS/NZS 3000:2007, or the building was constructed prior to 1989, you should seek advice from a licensed electrical contractor or electrical inspecting authority to determine whether the cables are suitable for surrounding in thermal insulation.** 
Tools and Machinery	Tools used in the installation of insulation (e.g. knives, cutters etc) pose hazards, particularly when used in confined spaces and around electrical equipment and cabling. Use only tools and equipment that are safe to use. Make sure the equipment you use has been correctly serviced and checked. Also, keep tools in good repair and check to make sure they are fit for use. Knife blades must be covered when not in use and be able to be locked in place when in use. Treat tools with respect. **NEVER** place insulation using tools that can conduct electricity (eg metal sticks or poles). Always use tools that are non-conductive or have insulated handles to minimize the risk of electrocution. 

6.2 Performing the Electrical Isolation

6.2.1 Before performing the Electrical Isolation procedure:

- Inform the client and any other trades on site that it is necessary to isolate the power to remove the risk of electrocution
- Before proceeding, complete a SWMS (Refer to ICANZ SWMS example - page 88).
- If the power can not be isolated, do not proceed. Contact your employer/site manager for further advice.
- Request the client to set the alarm in maintenance mode (if applicable)
- Activate some ceiling lights and appliances so, when the power goes off, it is confirmed that the correct switch has isolated for both lighting and power
- Ensure any gas ducted heaters are switched from 'Auto' to 'Off' mode prior to isolation being carried out.

6.2.2 Review meter box

- Locate and review the meter box.
- Mains power isolators are located in the meter box.
- Identify if there are ceramic fuses (see 6.2.7 Ceramic Fuses) or a model circuit breaker (see 6.2.4 Model Circuit Breaker).
- Ensure you understand what the main isolator is and what individual isolators are.
- Ensure you understand the direction of the 'On' and 'Off' position of the switch.
- The 'Off' position is not always as it seems.

6.2.3 Isolate Mains Power

- Switch off mains power isolator – Labelled MAIN SWITCH
- Make sure switch is in the OFF Position.
- If there are signs of burnt or exposed wiring, do not continue - report the hazard.

6.2.4 Lock out Switches

- Attach an electrical isolation device to the main switch.




6.2.5 Attach danger tag

- Attach Danger Do Not Operate tag to locked out switches
- Run cable tie through hole in lockout and tag
- Record the following on the tag:
  - NAME
  - Your CONTACT NUMBER

6.2.6 Check power is off

To check power is not still running, these checks may be used:

- check if lights are operational
- check if power points are still active
- check cables and power points with voltage detector.


Circuit board

Tagged circuit board


Fuse and circuit breaker


Voltage detector

Example: The switch on the left with the blue mechanism is positioned in the 'On' position. The grey switch looks the same but is actually in the 'Off' position.

Ceramic fuses

6.2.7 Ceramic fuses

- Ceramic fuses are typically found in older style homes.
- Identify if any fuse is deactivated.
- If no isolator switch **DO NOT** proceed.
- **DO NOT** remove ceramic fuses - unless by a Licenced Electrictian.
- Check if there are any fuses currently in the 'Off' position, take note of them.
- Fit lock-out device to main isolator switch and ensure it is locked in the 'Off' position.
- Toggle main switch and place a strip of electrical tape over main switch isolator.
- Apply additional strips of electrical tape over the deactivated fuse and any individual isolator in the 'Off' position as a reminder to leaving it in the 'Off' position once the re-activation procedure has been completed.
- If you find a fuse plug out of its socket, whilst the main isolator is in the 'Off' position, place electrical tape over its respective switch and one over the fuse socket opening.
- **DO NOT** touch the internal metal fittings.
- Place an isolation tag on the main isolator switch or meter box enclosure to advise the power is off and **WORK IN PROGRESS** is occurring.
- Check to ensure the light and appliance, within the home, previously left on are no longer operating to confirm the mains power is now isolated.
- The original person who placed the isolation tag is the only one who can re-activate the power. Advise client of this requirement.

6.2.8 Electrical Current

- Ceramic fuses are typically found in older style homes.

6.2.9 Circuit board

- Circuit boards are typically found in modern homes.
- Check if there are any circuit breakers currently in the 'Off' position, take note of them.
- Toggle main switch and place a strip of electrical tape over main switch isolator.
- Apply additional strips of electrical tape over the deactivated fuse and any individual isolator in the 'Off' position after isolating the mains power as a reminder to leave it in the 'Off' position once the re-activation procedure has been completed.
- Place an isolation tag on the switches or meter box enclosure to advise the power is off and work in progress is occurring.
- Check to ensure the light and appliances within the home previously left on are no longer operating to confirm the mains power is now isolated.
- The originator that placed the isolation tag is the only one who can re-activate the power. Advise client of this requirement.

6.3 *Reactivating the Power*

6.3.1 Old style ceramic fuses

When returning Mains power, the installer is required to:

- request the client and any other trades on site permission to turn off electrical items at the power point
- return mains power; toggle switch to the 'On' position
- any isolator fuse taped in the 'Off' position noted earlier is to remain as is and leave taped over
- advise the client and any other trades on site that power has been restored and of any issues related to the meter box.

6.3.2 Modern circuit board

When returning Mains power the installer is required to:

- request the homeowner's any other trades on site permission to turn off electrical items at the power point
- remove Danger tag and lockout
- switch each of the individual circuit boards to the 'Off' position
- turn on main power isolator
- reactivate individual power isolators, one at a time
- reactivate individual lighting power isolators, one at a time
- reactivate remaining isolators i.e. spa, stove, air conditioning, etc, one at a time
- any circuit breaker fuse electrically taped in the 'Off' position noted earlier is to remain as is and leave taped over
- Check all switches are on and power is working
- advise the client and any other trades on site that power has been restored and of any issues related to the meter box.

WARNING: If you cannot re-install power (eg. circuit board won't turn on) installers are required to report the incident to the client as it may require assistance from a qualified electrician.

6.3.3 Electrical Safety Check

When returning Mains power the installer is required to:

- request the homeowner's permission to turn off electrical items at the power point

7.0 Health and Safety of Glasswool and Rockwool Insulation Material

Glasswool and rockwool insulation batts have been classified as **NON HAZARDOUS SUBSTANCES – NON DANGEROUS GOODS**.

A Safety Data Sheet (SDS) for both glasswool and rockwool material can be downloaded via the ICANZ website:
http://www.icanz.org.au/ohs/occupational-health-safety/

Glasswool and rockwool insulation products are excellent and versatile insulation materials and are safe to use under all conditions.

Both insulation materials have been used worldwide for over 80 years and during that time their manufacture and use has been extensively monitored and researched.

It is clear from comprehensive site and plant monitoring and extensive medical research that no serious health effects have occurred in those manufacturing, using or otherwise exposed to glasswool or rockwool insulation.

FBS-1TM glasswool and rockwool insulation products manufactured in Australia and New Zealand by member companies of ICANZ are classified as NON-HAZARDOUS and NON-DANGEROUS GOODS .
This means that an SDS (GHS-format) or Material Safety Data Sheet (MSDS) is not required under Australian regulations.
The handling of glasswool and rockwool insulation may result in temporary itching.
Often installation sites are dusty and dust can be released from product during installation.
Sensible work practices to minimise this are recommended.

Product specific MSDS's can also be found on ICANZ member's product specific MSDS's:

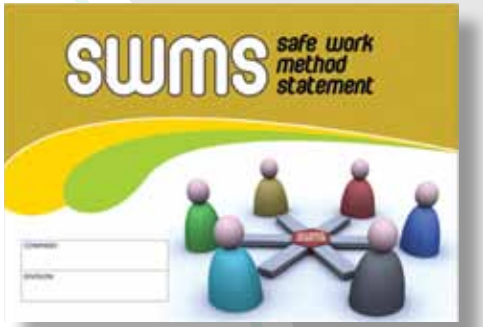
- **Fletcher Insulation at www.insulation.com.au**
- **CSR Bradford Insulation at www.bradfordinsulation.com.au.**
- **Knauf Insulation www.knaufinsulation.com.au**

FBS - 1 GLASS WOOL • BIO - SOLUBLE INSULATION TM

FBS - 1 GLASS WOOL • BIO - SOLUBLE INSULATION TM

ICANZ
THE RIGHT INSULATION MATTERS

8.0 Installation of Ceiling Batts



8.1 Application

Batts for thermal efficiency and acoustic performance.

8.2 Planning before the job

8.2.1 Safety (OHS)

Installers are required to carry out their duties in accordance with their employer safety management plans and policies. The installer may also need to accommodate specific builder safety policies on site. It is a requirement that you review the Safe Work Method Statement (SWMS) prior to commencing installation and ensure all risks are identified and controlled.

Refer to ICANZ SWMS example included in this training document & duty of care responsibility.

8.2.2 Confirm the scope of work

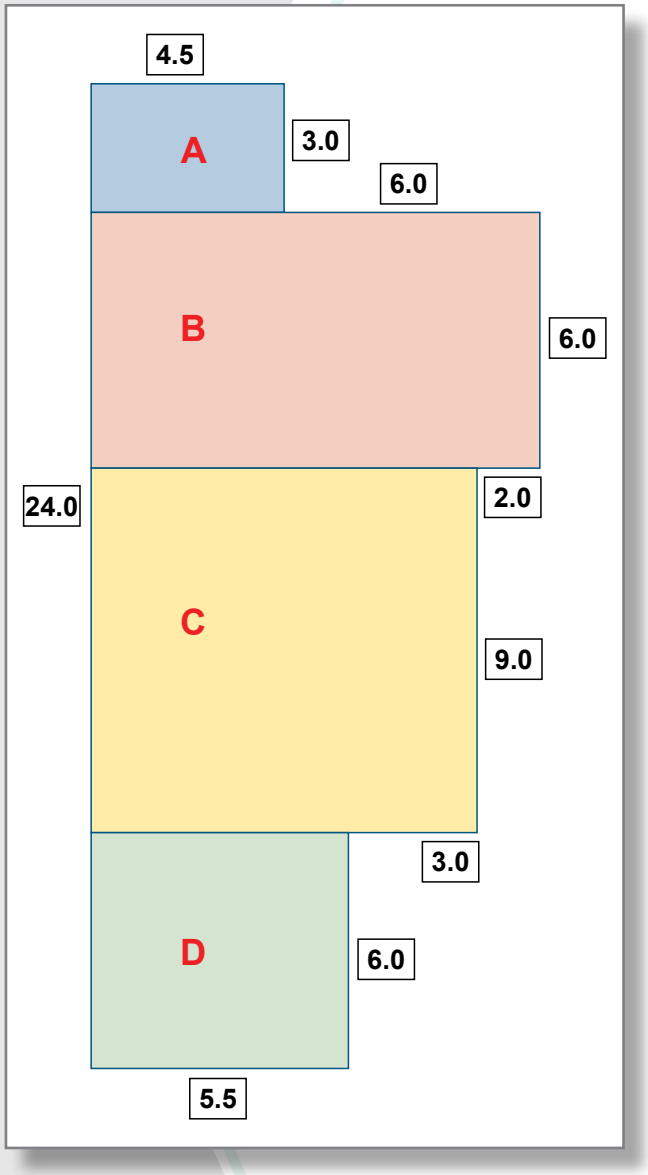
Relevant instructions and operational details are obtained using work information, such as:

- a purchase order
- job sheet instructions
- energy rating reports
- architect drawings and their respective notes
- client specific instructions
- builder specific installations.

Basic information required is as follows:

- material R-value of batts required
- batt width to match joist centres
- number of packs required for the job
- locations of the ceilings to be insulated including any special areas
- ceiling batts to be applied to a short wall within the ceiling void adjacent to a living area i.e. a roof space.

Example of calculation for ceiling and floor insulation



** All measurements are in metres.*

8.2.3 Material type and quantity required

Material selection is based on the scope of work. The installer needs to confirm that the material R-value (R_m) of the batts on hand, are those that meet the material R-value target set by the scope of work. The quantity of batts required is based on the project's ceiling surface area in m^2 (inclusive of the wall top plate dimension) divided by the manufacturers nominal coverage quoted on the batt packaging. The manufacturer's advice normally allows for ceiling timbers. This is a rough calculation and an allowance of surplus stock should also be on hand.

EXAMPLE ONLY: CEILING and FLOOR area calculations and requirements

1. Using the house design plans take off the total ceiling area from top plate to top plate. Do not include eaves. This calculation can be used for both ceiling and floor insulation requirements OR where no plans are available
2. a) Sketch the outline of the house perimeter
   b) measure and plot perimeter dimensions
   c) calculate the total area inside the perimeter (see example)
3. Check the ceiling joist spacings. This will determine the correct batt width required.
4. Check the R value on the packaging to ensure the correct thermal value is being installed
5. Refer to the labelling on the insulation packaging for 'nominal pack coverage'
6. To determine the number of packs needed, divide the total ceiling area by the nominal pack coverage.
7. Where this calculation results in a whole and part pack requirement, round up to the next whole pack.

Example Calculation of ceiling or floor area

Area A: 3.0 X 4.5 = 13.5 m^2

Area B: 10.5 X 6.0 = 63.0 m^2

Area C: 8.5 X 9.0 = 76.5 m^2

Area D: 6.0 X 5.5 = 33.0 m^2

Total 186 m^2

Joist Spacing - 600mm: batt width 580mm

Required R Value – R3.5

Nominal pack coverage – 7.6 m^2

Packs - 186 m2/7.6 m^2= 25.5 packs.

Require 26 packs of R3.5 (580mm)

PLEASE NOTE: Insulation manufacturers may also provide a Ready Reckoner as a guide to assist installers calculate packs required. For steel frame applications with one open side, refer tothe manufacturer's advice for available insulation sizes.

8.2.4 Batt Width Requirements

Measure the joist spacing and check that the supplied batt width (430mm or 580mm) is suited to the joist spacing.
This will minimise the cutting of batts. For the examples below, it is assumed that the timber frame joist is 45mm thick*.

Timber frame joist centres	Batt width
450mm	430mm
600mm	580mm
900mm*	2x430mm side by side
1200mm*	2x580mm side by side

Steel frame joist centres	Batt width
450mm	450mm
600mm	600mm
900mm	2x450mm side by side

- Check any areas in the ceiling that may restrict the ceiling batt from recovering to its nominal thickness. If this is the case, a lower profile batt may need to be used.
- Check to see whether there is an internal wall surface in the ceiling space that creates a separation between a roof space and any conditioned living space. The wall separating these two zones must be insulated using the same R-Value batts as the ceiling. The roof space wall insulation may require stringing-in to hold the insulation vertically in place.
- Check that the R-value on the material delivered corresponds with the work order instructions.
- Discuss with the customer any particular requirements they may have with the work order prior to commencing installation.
- Confirm the suitability of the roof access point.

Hint: When attending an older home, check if the house has undergone an extension. There may be different joist centres in different parts of the house.

8.3 *Access to the Ceiling Space from within the home*

8.3.1 Preload of Insulation

Pitched roofs with flat ceilings provide suitable crawl access for the installer. However, some ceilings have obstructions that limit movement of the packs in the ceiling space. A preload is undertaken during the wall batt installation. The installer can place ceiling insulation packs within the ceiling void and evenly distribute them across the ceiling area.

Hint: For homes that are not secure, cut the external plastic packaging at either end. This will cause the batts to fan out making it difficult to move out of the ceiling space.

8.3.2 Stringing-in Insulation

Stringing-in is used on pitched roofs with raked ceilings and/or where complex obstructions are present such as:

- ducted heating
- truss timber work
- evaporative ducting
- TV-aerials.

These can limit the access of transferring batt packs and installer crawl space across the ceiling area. In these cases, stringing-in the ceiling area using strapping may be required. The stringing-in method requires a staple gun to fix the strap onto the base of the timber frame. Any staple fixed onto the joist surface that is in contact with the plaster must be fully embedded into the frame. Any miss-fired staple must be flattened using a hammer or removed to provide a flat surface to fix the plaster lining. It is recommended to secure the strapping at every 450mm spacing. Complex timber framing may require odd shaped batts to be cut and additional straps to support the batt.

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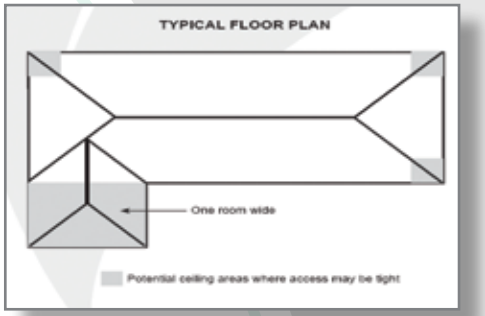
8.3.3 Inaccessible areas

Low pitch corners inaccessible

The diagram on the right illustrates grey areas highlighting tight access zones. These zones are best treated at the time of installing the wall batts.String in ceiling batts during the wall batt installation. External access will require the roof capping and repairs to the capping when finished, and is not typically an option.



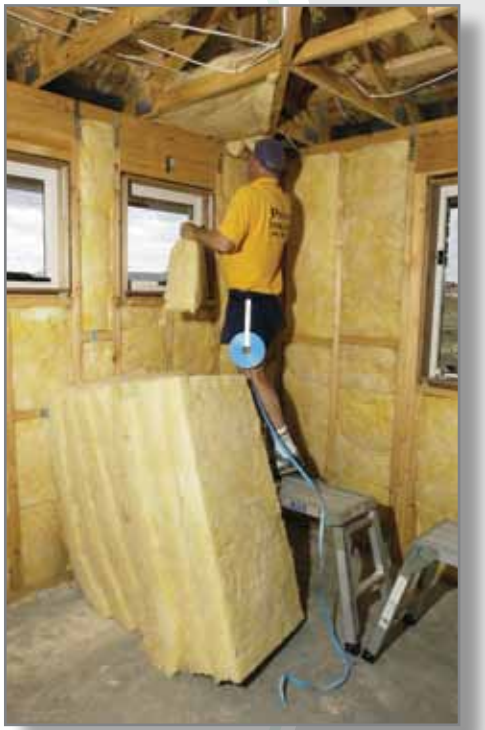
8.3.4 Part of a roof space is inaccessible

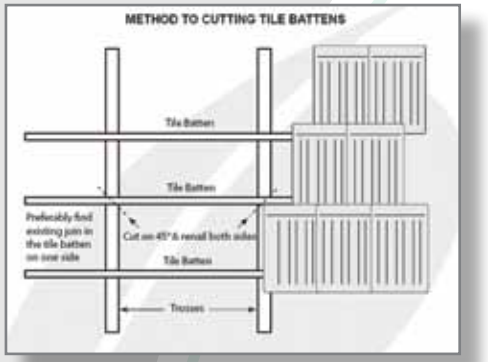
The diagram on the right presents an 18˚ pitched roof that is 5 metres wide having an apex of about 800mm from the ceiling material. It could be further complicated due to services and/or structural members. Assessment of access to the ceiling void should be conducted at the wall installation stage of the project (if applicable). For existing homes, external access will be required.

8.3.5 External roof entry

External access into the roof may be required for various reasons including but not limited to:

- the inability to transfer insulation material through the manhole into the ceiling
- when a manhole is located near the external wall of the home thus restricting access
- obstruction near the manhole
- restrictive manhole dimensions.





8.4 Access to the Ceiling Space via the Roof

8.4.1 Tiled roofs

Each operator should be aware of and comply with the safety requirements in their State. This will involve having a Safe Work Method Statement (SWMS) for the activities to be undertaken.

WARNING: Never attempt an external roof entry when tiles are wet.

- Open up one or more access points.
- The opening in the tiles should be approximately 1200mm above ceiling height where possible.
- For a roof with a 22˚ pitch with no eaves, measure an approximate distance of 3400mm from the gutter fascia towards the ridge. The first and second row of tiles from the ridge should not be disturbed. The third row of tiles can be removed if required with a careful approach not to damage ridge capping.
- Some roofs have every second row of tiles fixed onto the batten or a group of tiles are fixed. Where possible, avoid these tiles by moving up one row or attempt the neighbouring tile.If a fixed down tile is held in position by a nail method, remove the nail using a claw hammer and timber block.
- To create the required access, it may be required to cut one tile batten. If possible find a join in the tile battens and cut the batten on a 45˚ angle. Cut the batten over the adjoining truss/rafter. Refer to Method to, Cutting Tile Batten diagram.* At the end of the job, make sure you nail the tile batten using a flat head nail with a length twice the thickness of the timber batten.
- Some roofs will have sarking beneath roof tiles. Installers are required to cut the sarking on three edges only and peel back the sarking. Repair using suitable foil tape and additional sarking material.
- Only support your weight on a ceiling rafter or roof truss. Never support your weight on a plasterboard batten or plaster surface.

Hint: Whether gaining access through the tiles or loading the roof through the manhole, it is recommended that you install approximately half a dozen packs at a time. This gives an installer a break from the heat and cramped conditions of the roof as the installer is then required to come down and reload the next batch of packs.

8.4.2 Metal clad roofs

Access is gained by removing a length of steel sheet cladding. This may include disconnecting part of the ridge capping to allow the sheet cladding to be removed. An installer will be required to refer to local state plumbing codes as some state authorities require a licensed roof plumber to carry out work pertaining to roof sheeting removal/replacement.

Batten spacing and truss/rafter spacing on metal roofs are typically generous and will not require cutting of the batten. However, if required, follow the procedure outlined above in **8.4.1 Tiled Roofs**

8.5 Tools and Equipment required

Ensure the tools and equipment selected to carry out the tasks are consistent with the requirements of the job. Check for tool defects, rectifying any faults and report findings to your supervisor prior to commencement.

Recommended:

- curved blade knife with plastic handle (non conductive handle)
- for high density batt/blanket a serrated knife with a plastic handle is recommended
- knife holster to quickly access the knife.
- industrial strength ladder
- batt poker(s): a batt poker is an essential item of equipment. this allows you to position batts into inaccessible ceiling locations. ensure that the batt poker handle is made from non-conductive material such as wood or plastic.
- claw hammer
- P2 dust mask
- staple gun
- knee pads
- hand saw
- torch and spare batteries
- tape measure
- safety eye wear
- safety shoes.

8.6 Before you commence work:

- identify yourself to the client if present
- review your safe work method statement (SWMS)
- plan the install route and access, ensure it is unobstructed
- before entering the ceiling, map the position of downlights and other appliances on a sketch plan of the building as they may be difficult to see when in the ceiling
- isolate and tag power.

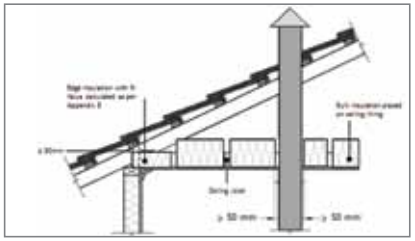
8.7 Installation of Ceiling Batts

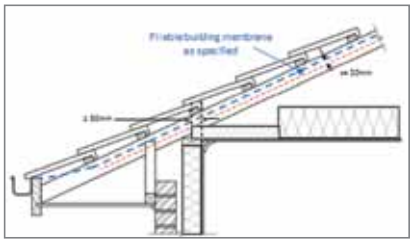
WARNING: If the electrical wiring is connected to the meter box, before entering the roof, ensure the power is isolated and tagged. Refer to WHS – Electrical Safety Wiring

8.7.1 Installing Batts in pitched roof – flat ceiling

WARNING: never walk on a plasterboard ceiling, the use of a kneeling board will allow you to keep balance whilst in the ceiling.

- Check to ensure that you have the correct batts.
- Load and distribute the packs into the ceiling space.
- Cut the bags open along the seam.
- Place the ladder so that you can safely climb and install the batts in the ceiling .
- Start installing insulation at the far corners and work back towards the roof exit.
- Measure the batts against the ceiling to find the best fit around ceiling penetrations.
- Cut the batts against a firm straight surface where no electrical or services exist.
- Gently push the cut batts between the joists. Butt batts closely together to ensure there are no gaps left at joints. Continue cutting and fitting the batts working along the ceiling until all of the ceiling area is covered and extending a minimum 50mm onto the external wall top plate.
- Batts must maintain a minimum of 20mm air gap between the insulation and sarking membranes or underside of the tiles, metal, other roof sheets or battens.
- Cut a label from the batt installed in the ceiling and fix it to a joist near the access manhole in the ceiling. This is to provide information in the future to anyone wishing to know which product has been installed.
- Ensure the man hole is completely covered with a cut to size batt.
- When you have fitted all of the ceiling, tidy away all of the empty bags and any remaining off cuts.
- When you have completed the installation, all materials should be removed and the job should be inspected to ensure it is complete and correct.





Hint: Do not load all the packs of batts into the ceiling. As you get towards the end of the job, estimate how many more packs are needed and only load these into the ceiling.

Hint: At the end of the job it is easier to load another pack into the ceiling than it is to take a full pack out of the ceiling.

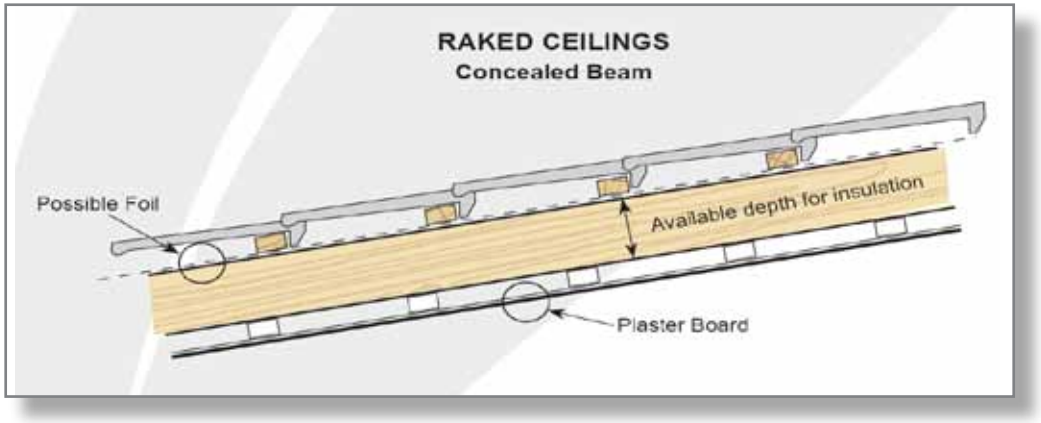
8.7.2 Installing batts in raked ceilings with a tiled roof

WARNING: For installing batts in raked ceilings with a metal roof, an installer will be required to refer to local state plumbing codes as some state authorities require a licensed roof plumber to carry out work pertaining to roof sheeting removal/replacement.

Raked Ceilings with enclosed rafters

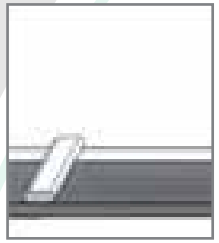
- Confirm the depth of the ceiling void and what R-rating batt is to be installed. The batts' nominal thickness must be less than the clearance measured at the base of the roof batten and above ceiling lining or ceiling batten; which ever is the lesser of the two.
- If the ceiling lining is below the rafters, there will generally only be a shallow depth to install an insulation batt between the tile batten and the ceiling lining. In this instance, the insulation is to be installed by pushing back every third row of tiles and sliding half a batt up and half a batt down between the rafters. It is recommended to select a batt product having a density of 14kg/m^3 or greater so to provide adequate stiffness.
- If sarking is present beneath the tiles, the sarking will need to be slit at these rows parallel to the batten at mid span.
- Start and finish the slit at the mid point of a rafter. Presence of dust can make it difficult to tape sarking unless it is cleaned.
- The installer will need to insert a piece of sarking to seal the opening. The installer must place the repair piece of sarking so that its top runs under the existing sarking and above and over the sarking below.
- Slide a 300mm wide trimmer piece of sarking within the slit to create the cascading effect.
- Tape the upper original sarking onto the trimmer piece surface.
- Ensure the start and end points of the slit are taped to form a water tight seal.
- Inform the customer that the sarking repaired continues to work as a radiant barrier and water proof barrier.
- If the sarking is laid down after installation without taping of the slit opening, it will act as a radiation barrier only.

WARNING: If the roof pitch is 15° or less, the sarking also acts as a waterproof barrier. Unless the water barrier of the roof can be guaranteed using the cascading lap joint principle and the application of sarking tape (72mm wide) onto clean surfaces, DO NOT slit the sarking and install insulation in this instance.



1. unsurrounded electical cable.

Cable running along the inside of a joist



Cable running across plaster board ceiling

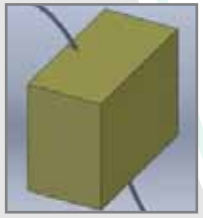
2. Partially surrounded electrical cable.

Cable running along the side of ceiling joist with the top of joist nor covered in insulation

Cable running across the of insulation

Cable running across the top of a plasterboard ceiling which is covered with thermal insulation

3. Totally surrounded by insualtion on all sides.



Electrical cable passing through thermal insulation

Electrical cable running between layers of thermal insulation

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8.7.3 Bulkheads or split ceiling levels

If the ceiling is split in any way, this will generally result in a bulkhead. A bulkhead is a vertical section of wall in the ceiling void that is a division between the internal living space and the ceiling void. It is important that this surface be installed in conjunction with the ceiling. This can be installed with batts with the same R-value as used in the ceiling. These batts will generally need to be held in place using the stringing-in method.

8.7.4 Electrical Cabling and Equipment

When in operation, the flow of electricity through cabling generates heat. Unobstructed, this heat is released. However in some circumstances where insulation and electric cabling are in contact, the heat generated cannot be dissipated quickly enough and can cause cables to overheat and exceed its rated specification. For the purposes of installing insulation, there are three categories to consider:

1. Unsurrounded electical cable.
Where the cable is free of contact with insulation. For example attached to a ceiling timber.

2. Partially surrounded electrical cable.
Where electrical cable has at least one side not in contact with insulation. This (one or more) insulation-free side may however be in contact with timber or plaster.

If electrical cabling is in accordance with AS 3000 (1986) or later editions, insulation up to the rating of R6.0 (e.g. 300mm of glasswool) may be installed. Refer AS/NZS 3000 sections 3 to 5.

3. Totally surrounded by insualtion on all sides.
Any electrical cable can only be completely surrounded by bulk insulation for a maximum length or depth of 300mm.

8.7.5 Recessed luminaires (Downlights)

Downlights and their equipment can only be installed by licenced electricians. This does not include barriers and restraints that can also be installed by insulation contractors.

The application of these requirements need to be considered in the context that insulation may already be (or may not be) present when downlights are installed.

Downlights and their accompanying equipment (e.g. transformers) must be installed in a manner to prevent:

- excessive operating temperature
- risk of fire from ignition of combustible materials.

This requirement will be met if:

- the downlight and installation is certified to meet the intended location by the downlight manufacturer as suited to be
  a. in contact with combustible materials
  b. in contact with or enclosed by thermal insulation
- the installed clearances from combustible materails and thermal insulation are as specified by the downlight manufacturer
- insulation is fixed in place as determined by AS 3999 appendix B
- insulation is installed to the default clearances for combustible materials and thermal insulation - as set out in Appendix A of AS 3999.

8.7.6 Luminaire (down light) Barriers Standard

A new Standard AS/NZS 5110 (Nov 2011) is published. This standard sets out specific performance criteria required by barriers. Barriers must be installed to the instructions as tested by AS/NZS 5110 and deemed specifically suitable for:

- covering the particular model of luminaire
- being in the presence of a particular type and thickness of insulation.

Combustible materials need to be prevented from contacting hot surfaces of the luminaires. This includes structural timber which may be affected by pyrolysis which over a long exposure can result in increased susceptibility to ignition.

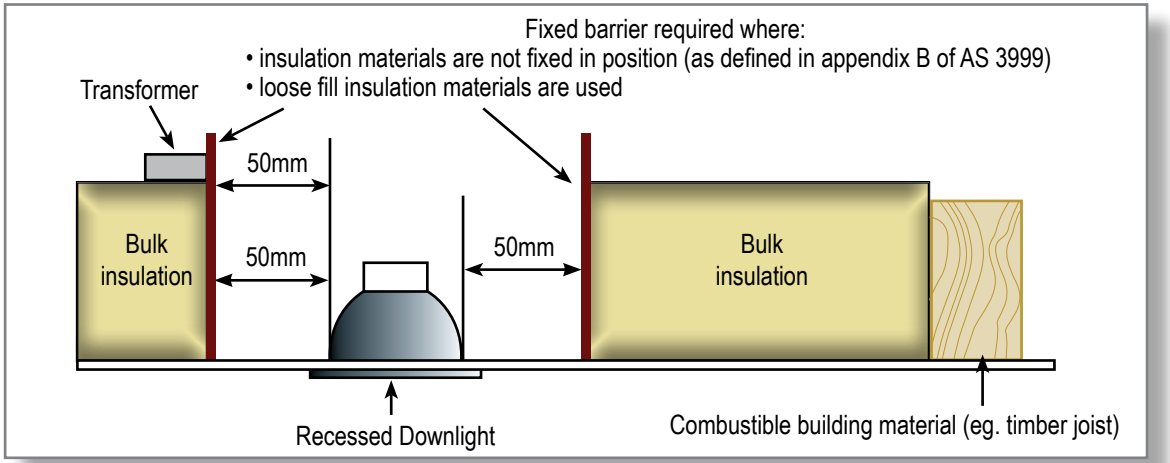
Where extraneous material, such as leaves, vermin debris, or combustible materials stored in a roof space, is present in proximity to the downlight, the precautions should comprise the use of a suitably designed and certified luminaire (Refer AS/NZS 5110).

8.7.7 Insulating around downlights or where recessed ceiling fixtures are present

When using glasswool and rockwool ceiling batts:

- leave a clearance of 50mm from the body of heat emitting fixtures such as downlights and flues
- cut a hole in the batt to suit the location of the fixture
- do not use small pieces of batts to form part of the barrier around a fixture as these pieces could dislodge and cover the fixture potentially overheating/faulting the device (as determined by AS 3999 appendix B)
- locate transformers on the ceiling plaster with a minimum gap of 50mm around the device; alternatively place the transformer onto the glasswool or rockwool batt
- exhaust fans typically vent vertically to the roof space. Insulate around the perimeter of the fixture and ensure a piece of insulation batt does not stop a fan blade from turning as this can overheat and burn out the device
- exhaust fans with a closed body housing and outlet port can have the insulation in contact with the body of the fan casing Ensure the outlet port has an adequate clearance from insulation to the exhaust air (i.e. ≥ 150mm).

Hint: Downlights or fans near the external wall can be difficult to see and it is easy to foul the blade of a fan with a piece of batt. These devices may be best finished from an external roof access approach.



Clearance of 50mm around downlight

Ensure electrical cables are left on top of insulation along the roof edge. If the tension in the cable does not permit the cable to rest on the top of the ceiling joist. If needed use a lesser R-value batt for edge trim.

Batt Pocker

8.7.8 Warning Sign

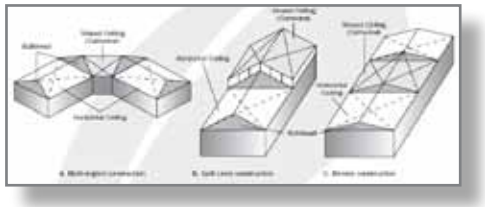
Where recessed luminaires are installed in an accessible roof space, a permanent and legible warning sign shall be installed in the roof space adjacent to the access panel in a position that is visible to a person entering the space. The sign shall comply with AS 1319 and contain the words shown.

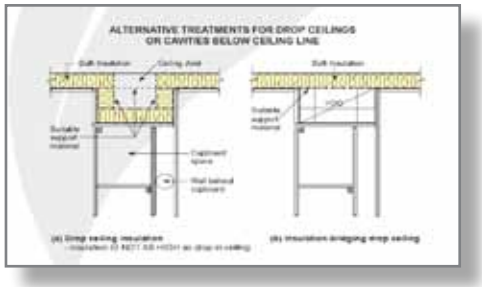
8.7.9 Installing insulation in tight areas

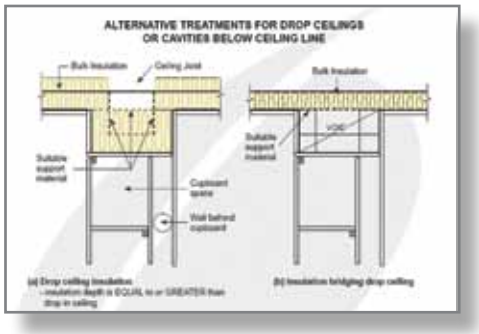
- Start installing insulation at the far corners of the home and work back towards the tile opening or manhole.
- Lay batts from the perimeter towards the centre of the ceiling from either side of the external walls.
- Ensure the insulation does not touch the underside of the roofing material and a nominal gap of 25mm should be maintained to allow ventilation. This may require the use of lower R_m-value batts around the perimeter.
  No less than R_m 2.0 should be used. This strip of lower R_m -value batts may be no longer than 600mm or the minimum required to achieve a clearance in height to the underside of the roofing material, for the original batt to be used.
- If there is a central catwalk, insulate beneath the catwalk using a wall batt minimum of R_m 2.0 or equal of less than the clearance of beneath the walk way (typical 90mm). Tuck a batt under the catwalk.
- Using a non conductive batt poker, (usually wooden handle) stab a batt about a quarter from its length, pushing it out to the external wall plate.
- If there is no insulation material in or on the wall studs, make sure the batt extends at least 50mm onto the top wall plate. If there is insulation material in or on the stud, push the batt to cover the top plate.

Hint: If possible, it is a good idea every now and then to push back a tile over the external wall plate to check if the batts are 50mm onto the wall plate.

Hint: If insulation is being installed into an old roof ceiling it is necessary to quite forcefully push the batt out past the sloping rafter to ensure that it reaches the outer wall plate. Ensure 25mm clearance above tha batt is maintained.

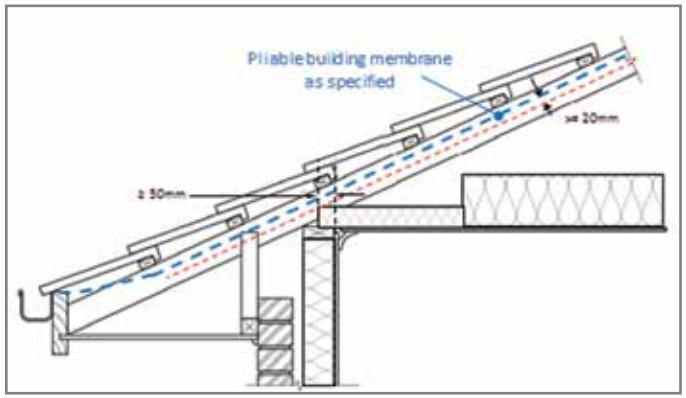


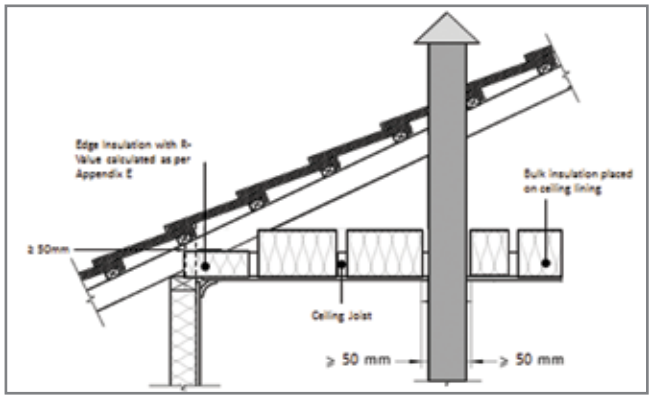




8.7.10 Topping-up ceiling insulation with batts

- Before proceeding with adding new insulation to old insulation, assess if old insulation is in a sutable condition. In many cases completly replacing the existing insulation may prove the better option.
- The method of installing top-up insulkation is the same as that for installing original ceiling insulation as described throughout Section 8.0. There are however additional issues to be addressed when installing top-up batts.
    - acheiving 'R' values: it is not possible to guarantee a total 'R' value when combining new insulation with old insulation. For example by adding R 3.0 batts to an original layer of R 2.5 Batts is more likely to acheive a total 'R' value of between R 4.5 to R 5.0 depending on the condition of the original insulation.
    - existing loose-fill: if the orignial insulation is loose-fill it is recommended to entirely remove the loos-fill insulation and re-insulate with batts.
    - additional weight: check that the additional weight of top-up insulation does not exceed the recommended ceiling load for ceiling linings.
    - electrical wiring: electrical wiring must not be sandwiched between old and new insulation (refer to 8.7.4). Electrical wiring must run either on top of the new insulation, below the original insulation and along the ceiling sheeting or fastened to the side of the joists.
    - downlights: old insulation immediatley around downlights should be replaced completely with one full batt of thicker insulation.
    - eave-edge insulation: ensure insulation has a least 20mm clearance from roofing material. Insulation of a lower 'R' value amy be required at the eaves (see AS 3999).
- Where top-up insulation is used, it is recommended installers should work closely with their materials supplier and obtain specific installation instructions and warranties before proceeding.



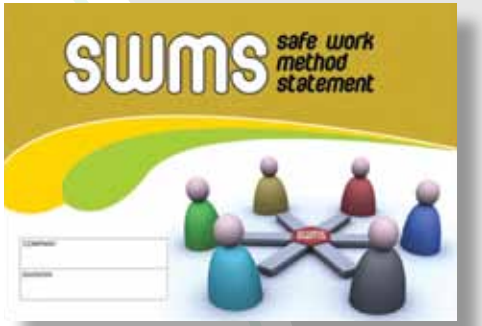


8.8 After Completion

Finishing off.

- Ensuring there are no gaps between the batts, or between the batts and rafters.
- Confirm batts extend at least 50mm past the external top wall plate.
- Ensuring batts are kept 50mm away from ceiling mounted downlights, exhaust fans and hot gas flues.
- Ensuring batts are cut to fit snugly where there are no ceiling penetrations.
- Confirming no insulation has been installed over the oven or refrigerator ceiling vent voids.
- Where there is a drop ceiling or a cavity in the ceiling, ensure batts are placed such that the vertical walls and the dropped flat. ceiling are insulated. Alternatively, place the insulation continuously over the top of the cavity. This method is only suitable if there are no open sides to the cavity and may need to be supported.
- Ensuring insulation on top of the manhole is added and does not restrict future access.
- Ensuring insulation batts installed before the plasterboard is installed will need to be supported and held in place by stringing-in.
- Ensuring the work area is cleaned and off-cut materials are placed back into the original package (when possible) and taped closed. Dispose of in accordance with local authority guidelines.
- Ensuring tools and equipment are cleaned, checked, maintained and stored in accordance with the manufacturer's recommendations and standard work practices.
- Confirming power is reactivated and isolation tags are removed.
- Notifying relevant people that the installation is finalised (i.e. supervisors, the client etc).
- Completing necessary documents and forms.
- Evaluating your work quality and process to identify improvements.
- Following up, reporting and resolving any outstanding issues or problems such as non-conformances, client complaints, damage to property, faulty materials etc.

9.0 Installation of Wall Batts



9.1 Application

Batts for thermal efficiency and acoustic performance.

9.2 Planning before the job

9.2.1 Safety (OHS)

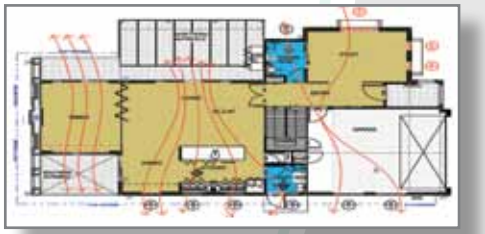
Installers are required to carry out their duties in accordance with their employer safety management plans and policies. The installer may also need to accommodate specific builder safety policies on site. It is a requirement that you review the Safe Work Method Statement (SWMS) prior to commencing installation and ensure all risks are identified and controlled.

Refer to ICANZ SWMS example included in this training document & duty of care responsibility.

9.2.2 Confirm the scope of work

Relevant instructions and operational details are obtained using work information, such as:

- a purchase order
- job sheet instructions
- energy rating reports
- architect drawings and their respective notes
- client specific instructions
- builder specific installations.



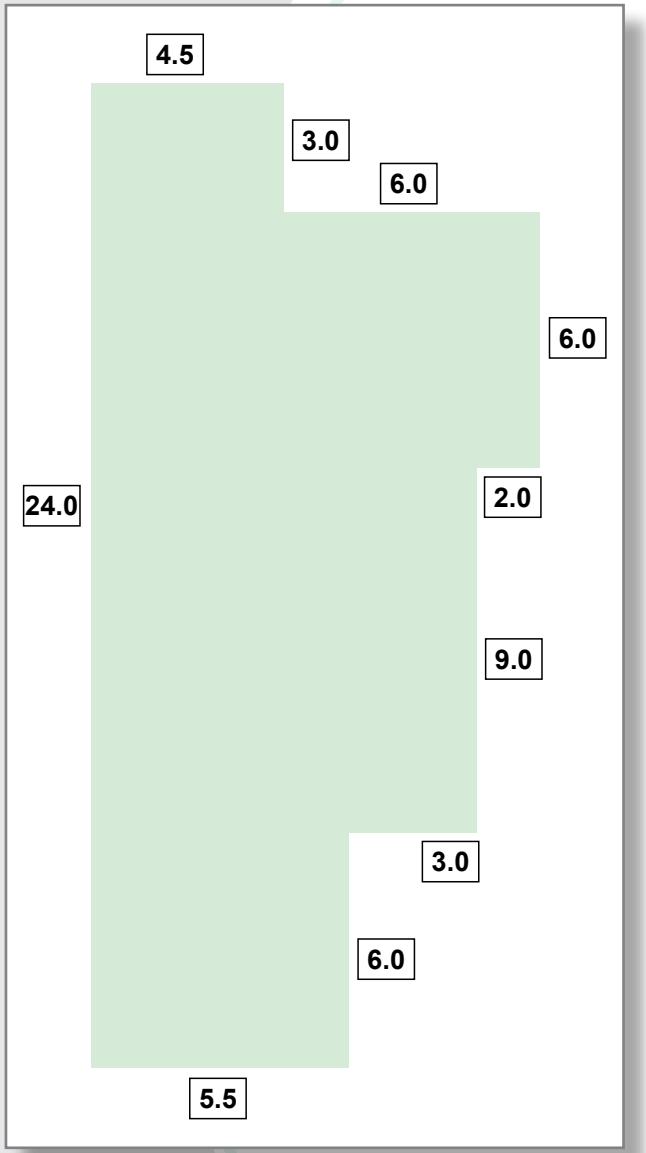
Basic information required includes:

- material R-value of batts required
- batt width to match stud centres
- number of packs required for the job
- locations of the walls to be insulated including any special areas
- for claims of thermal performance from a reflective wall wrap, you must provide a physical restraint between the batt and foil surface to maintain a still air gap of at least 20mm.

9.2.3 Material type and quantity required

The installer needs to confirm that the material R-value (R_m) of the batts on hand, are those that meet the material R-value target set by the scope of work. The quantity of batts required is based on the projects wall surface area in m^2 divided by the manufacturers nominal coverage quoted on the batt packaging. The manufacturer's advice normally allows for wall timbers. This is a rough calculation and an allowance of surplus stock should also be on hand.

Example of calculation for wall insulation



All measurements are in metres.

EXAMPLE ONLY: Wall area calculations and insulation requirements

1. Using the house design plans, take off the exterior wall perimeter for living areas
   OR where no plan is available, measure and sketch these perimeter dimensions (see example). Note all measurements of wall openings (doors and glazing)
2. Calculate the gross wall are of this perimeter
   Perimeter of living area (lineal metres) X wall height (lm) = Gross wall area (m^2)
3. Calculate the total area of all wall openings (doors + glazing)
4. To determine the INSULATABLE wall area (m^2) - deduct the total of all wall openings (m^2) from the Gross wall area (m^2).
5. Check the stud spacings and stud thickness to ensure the width and thickness of batt is supplied
6. Check the R value on the packaging to ensure the correct thermal value and thickness is supplied.
7. Check the labelling for the 'nominal pack coverage'.
8. To determine the number of packs needed, divide the INSULATABLE wall area by the nominal pack coverage
9. Where this calculation results in a whole and part pack requirement, round up to the next whole pack.

Perimeter: 69 lineal metres

Wall Height: 2.55m

Gross wall area: 69m X 2.55m = 176m^2

Openings in the walls (doors and glazing)

- 3 external doors : 5.02m^2
- 15 windows and glass doors 45.9m^2

TOTAL wall openings **50.92m^2**

Insulatable wall area calculation:

- Gross wall area 176.0 m^2
- Minus wall openings 50.92 m^2

INSULATABLE wall area **125.08 m^2**

* Stud spacings: 580mm, depth 90mm

* R value: R2.5, thickness: 90mm

* Nominal pack coverage: 4.5m^2

* Pack calculation: 125.08m2/4.5m^2 = 27.8 packs

*** Required packs: 28 R2.5 (580mm) packs of wall batts**

Calculating wall openings

Doors		m2
3	2.04 X 0.82	5.02
Glazing		
2	1.83 X 2.20	8.05
1	2.70 X 2.20	5.94
1	1.8 X 2.20	3.96
2	1.75 X 0.55	1.92
1	0.83 X 0.77	0.64
1	0.68 X 0.94	0.64
1	3.50 X 2.20	7.70
1	2.73 X 2.2 0	6.00
3	1.83 X 1.200	6.60
1	1.80 X 2. 10	3.78
1	1.25 X 0.57	0.71
Total Glazing		45.90
Total wall openings		50.92

PLEASE NOTE: Insulation manufacturers may also provide a Ready Reckoner as a guide to assist installers calculate packs required. For steel frame applications with one open side, refer tothe manufacturer's advice for available insulation sizes.

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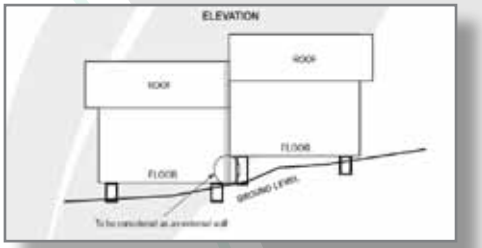
9.2.4 Batt width requirements

- ensure the width of batt (430mm or 580mm) matches the measured common stud frame centre. Two storey projects may require a portion of batts in both width sizes
- check the stud depth and ensure that the specified material R-value of the batt will fit snugly in the cavity.



Standard Stud centre	Batt width
450mm	430mm
600mm	580mm

Hint: This is particularly important in stud walls clad on both sides, e.g. any internal wall such as a plaster bedroom wall or a plaster skin wall separating an attached garage from the condition zone of a home.

- If there is a step down between floor levels, (as shown in the diagram top right) the wall separating this step is to be considered an external wall and must be insulated. Check if this specialty area is nominated in the scope of work instructions.

9.2.5 Homes under construction having ceiling voids with poor access

When scheduling the installation of wall insulation, review the ceiling void for any access issues. Examples could include:

If any of the above are noted, consider sending out the ceiling insulation at the time of wall installation to install or preload the ceiling insulation. This will prevent future access complications. Alternatively, the stringing-in method could be used.

9.3 Tools and Equipment required

Ensure the tools and equipment selected to carry out the tasks are consistent with the requirements of the job. Check for tool defects, rectifying any faults and report findings to your supervisor prior to commencement.

Recommended:

- curved blade knife with plastic handle (non conductive handle)
- for high density batt/blanket a serrated knife with a plastic handle is recommended
- knife holster to quickly access the knife.
- industrial strength ladder
- batt poker(s): a batt poker is an essential item of equipment. this allows you to position batts into inaccessible ceiling locations. ensure that the batt poker handle is made from non-conductive material such as wood or plastic.
- claw hammer
- staple gun
- tape measure
- cordless drill (metal framing)
- safety eye wear
- safety shoes.

9.4 Before you commence work:

- identify yourself to the client if present.
- review your safe work method statement (SWMS)
- plan the install route and access, ensure it is unobstructed
- isolate and tag power.

9.5 Installation of Wall Batts

WARNING: If the electrical wiring is connected to the meter box, before commencing installation, ensure the power is isolated and tagged. Refer to WHS – Electrical Safety Wiring.

9.5.1 Placement and opening of packs

When distributing and opening packs of insulation it is recommended to:

- distribute packs of batts around the building's floor area without obstructing walkways
- cut packaging to allow compressed batts to expand to their nominal thickness prior to installation.

9.5.2 Cutting batts to size

One of the most common causes of poor installation is the failure to use a knife for trimming batts. You must trim batts to ensure they are not:

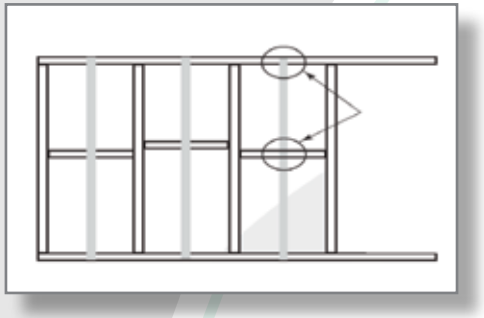
- overly compressed
- bulging in a space
- too small for the area.

There are two methods for cutting batts. Refer to Density of Batts table for dimensions applicable.

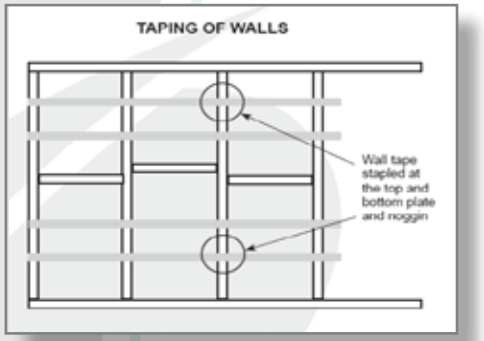
Method 1: Using a cutting board as a base, measure the stud opening and cut the batts width to suit. This method is recommended when installing batts in steel frame construction because you could damage the cutting blade edge if cutting on the steel frame.

Method 2: Using the wall timber stud as a cutting base: Hold batt against the timber stud where the cut needs to be made.

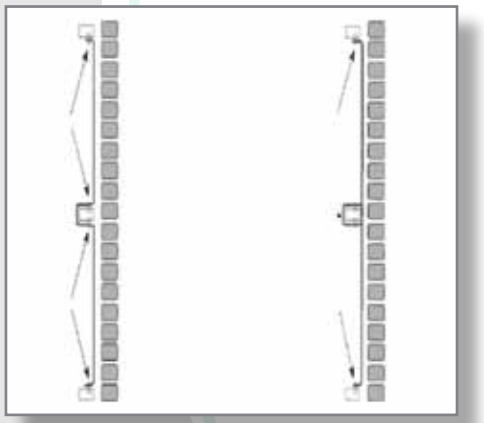
WARNING: When using a stud edge as a cutting base, be aware of nearby services (pipes, wires ect.) ensuring you do not damage them. If services are located on the same stud, it is recommended that an installer need only 'mark' a cut dimension point on the top of the batt and move to a neighbour stud so to avoid potential damage to the services.



Method 1



Method 2



Density of Batts	
Density of batt Kg/m^3	Additional batt length or width versus required stud opening dimension
≤11	15mm
>11 and ≤24	10mm
>24	5mm

9.5.3 External wall stud cavity restraint

Timber framing

All wall insulation (either rockwool or glasswool batts) must be physically restrained in brick veneer stud walls. The restraint could be from the external stud wall wrap or using the stringing-in method.

Stringing-in

This is done by fixing strapping support to prevent the wall batt insulation moving forward and/or falling into the brick veneer cavity. The stringing-in material can be either nylon brick layer string or polypropylene strapping. The stringing-in method requires a staple gun to fix the strap onto the timber frame. Any staple fixed onto the stud surface that will come into contact with the internal plaster lining must be embedded into the frame. Any miss-fired staple must be flattened or removed. If there is external support material such as wall wrap or speed bracing, holding the insulation in place, it is not required to stringing-in these areas.

Where thermal performance from a reflective wall wrap is specified, a physical restraint is required against the batts to maintain a still air space of not less than 20mm between the batt and the reflective wall wrap. Installers need to ensure the nominal thickness of the batt, together with the air gap dimension, does not exceed the stud depth dimension. Failure to maintain this air gap consistently will negate the reflective air gap claimed for thermal performance.

There are two methods for stringing-in support for external walls:

Method 1: Minimum one (1) vertical strap per stud opening

Method 2: Minimum two (2) horizontal straps per noggin opening.

- At the beginning of the wall strap run (either horizontally or vertically) staple the wall tape towards the back of the stud and extend to the next stud or noggin.
- Wrap the tape around the timber, pulling tightly.
- Alternatively, staple the tape at the back of the cavity, bring the tape around the timber to the other side and staple again at the back of the cavity in the next opening.
- Proceed in this way until the entire wall is strapped.

Steel framing

In steel frame homes metal studs that require stringing-in are more difficult as the fixing method is typically a cordless drill with wafer head tec screws. The horizontal stringing-in method can be used as per the timber frame section.

Hint: Ensure that you do not over-pull on the strap as this may twist some steel stud framing members.

9.5.4 Internal wall stud restraint

Internal walls (e.g. the wall between the garage and the media room and other living spaces) can have a stringing-in method applied to both sides to prevent winds moving the batt.

9.5.5 Batt installation

The timing of installation of wall batts is critical in a project. Once the internal lining is applied, there is no access to the wall cavity. Any error may be costly to amend once the cavity is sealed. Ensure all services to be installed in the wall are completed prior to commencing wall batt installation.

Install the wall batts into the frame. The insulation must be kept within the frame and must not be pushed into any wall cavity. Batts must not touch the brickwork or mortar surface. Ensure the batts do not bow inwards towards the plaster lining. Where batts need to be cut to fit into a non-standard opening, cut the batt as per procedure **9.5.2 Cutting Batts to Size.**

Wall heights in today's home designs will often vary. This will require an additional piece of insulation to extend the batt length. Smaller pieces may be required in both the upper and/or lower stud bays. Always install a piece of batt on the upper position of each bay using one width piece. To reach upper wall heights, you can use a low height step ladder or a batt poker.

Hint: Left overs and off cuts may be placed in internal walls.

It is not acceptable to use damaged or overly small off cut pieces to fill a stud bay of an external wall. Ensure you achieve full and snug coverage of the external wall including obstructed areas (e.g. behind a bath located against external wall). There should be no remaining gaps visible.

9.5.6 Windows and door lintels

Insulation is required in areas above lintels. However the lintel surface area itself does not require insulation unless specific instructions are provided. Lintel thickness occupies part of the stud depth and if insulation of this area is specified a batt with the correct nominal thickness will be needed to fill this limited depth of remaining stud depth.

9.5.7 Penetrations

Any object penetration through a wall requires the insulation to be neatly cut around the object. Align the batt near the object and cut batt the edge to approx the centre of the object to suit the area required.

Glasswool and rockwool batts can make contact with the object. The exception is any object having a hot surfaces >90˚C requiring an air space for cooling or similar. In this situation, always allow a minimum 50mm radius around the hot surface.

If there are any concerns consult with the relevant manufacturer.

9.5.8 Non electrical services and obstructions

Obstructions such as:

- natural gas lines
- water lines
- air-conditioning gas lines
- PVC vent lines
- cross bracing
- bracing adjustment bolts.

These non-electrical services could be located inside the stud walls and will determine how the batts are installed. This includes:

- stopping the batt at the obstruction and restarting after the obstruction
- removing a portion of the batt so to limit contact with object
- cutting and chasing the obstruction into the batt.

9.5.9 Electrical outlets and recessed wall mounted objects

Any object in the wall that may compress bulk insulation will require the insulation in contact with the object to be removed. General Purpose Outlets (GPO's) require a portion of the insulation, behind the GPO, to be removed. This provides the electrical tradesman a cavity within the insulation for the flex cabling to rest and ensures there is no pressure on the GPO or the external wall wrap (if present). When required, cut the insulation to be removed neatly around the object. In most cases the removal of the full thickness depth of the insulation is not necessary. Continuous electrical cabling (240 volts) travelling along the wall cannot be fully surrounded by the insulation for a length greater than 300mm. In runs greater than 300mm, the electrical wiring must be touching a timber stud or the plaster lining.

Hint: Not all objects protruding into the wall cavity need the insulation's full thickness to be removed. Recess mounted speakers may benefit having a small thickness of insulation behind the speaker body.

Hint: Generally the use of Glasswool and Rockwool batts will allow the insulation to make contact with object as they are electrically non conductive.

9.5.10 Narrow gaps within stud cavities and around windows and door frames

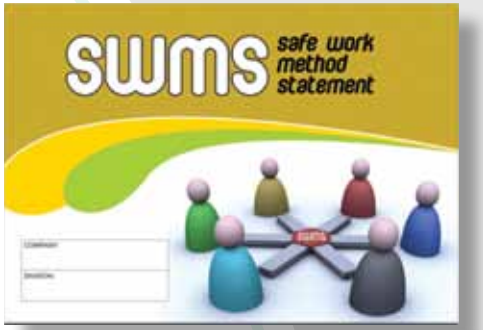
Narrow openings are insulated with a small section of insulation pushed into the full depth of the cavity with some compression.
The loss of thickness due to compression is out weighed by having some form of material R-value in lieu of a cavity absent of insulation.
Alternatively, narrow openings (typically less than 15mm) can be sealed using polyurethane insulation foam to cork the gap.

9.6 After completion

Finishing off.

- Ensuring that there are no gaps in the insulation batts or between the batts and studs or noggins.
- If the batts are being installed in a brick veneer wall, confirm they have been mechanically held in the stud frame by the stringing-in method.
- Where insulation batts are around water pipes or other rigid obstructions in the wall, ensure that the insulation batt doesn't protrude past the stud.
- Ensuring that the batts do not protrude past of the stud surface area and fit snugly.
- Stringing-in any inaccessible ceiling areas that will not be accessible from the ceiling void, during the wall batt installation process
- Returning functioning work areas to a clean and tidy state. This may require wet mopping of loose fibre or alternatively vacuum the area using a vacuum cleaner with a High Efficiency Particulate Air (HEPA) filter.
- Ensuring the work area is cleaned and off-cut materials are placed back into the original package (when possible) and taped closed. Dispose of in accordance with local authority guidelines.
- Ensuring tools and equipment are cleaned, checked, maintained and stored in accordance with the manufacturer's recommendations and standard work practices.
- Confirming power is reactivated and isolation tags are removed.
- Notifying relevant people that the installation is finalised (i.e. supervisors, the client etc).
- Completing necessary documents and forms.
- Evaluating your work quality and process to identify improvements.
- Following up, reporting and resolving any outstanding issues or problems such as non-conformances, client complaints, damage to property, faulty materials etc.

10.0 Installation of Underfloor Batt/blankets



10.1 Application

Batts for thermal efficiency and acoustic performance.

10.2 Planning before the job

10.2.1 Safety (OHS)

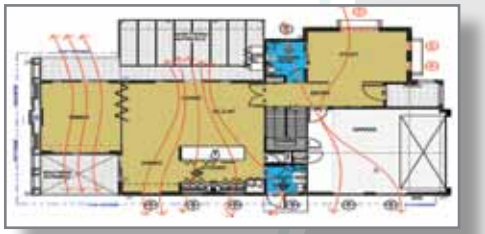
Installers are required to carry out their duties in accordance with their employer safety management plans and policies. The installer may also need to accommodate specific builder safety policies on site. It is a requirement that you review the Safe Work Method Statement (SWMS) prior to commencing installation and ensure all risks are identified and controlled.

Refer to ICANZ SWMS example included in this training document & duty of care responsibility.

10.2.2 Confirm the scope of work

Relevant instructions and operational details are obtained using work information, such as:

- a purchase order
- job sheet instructions
- energy rater reports
- architect drawings and their respective notes, client specific instructions
- builder specific installations
- refer to manufacturer's installation requirements for their preferred methods for fixing.



Basic information required includes:

- material R-value of batt/blankets needed
- batt/blanket width to match joist centres
- number of packs required for the job
- location of underfloors to be insulated including any special areas.

10.2.3 Material type and quantity required

The installer needs to confirm that the material R-value (R_m) of the batts on hand, are those that meet the material R-value target set by the scope of work. The quantity of batts required is based on the projects underfloor surface area in m^2 divided by the manufacturers nominal coverage quoted on the batt packaging. The manufacturer's advice normally allows for underfloor joists. This is a rough calculation and an allowance of surplus stock should also be on hand.

Refer to **8.2.3 Material Types and quantity required.**

PLEASE NOTE: Insulation manufacturers may also provide a Ready Reckoner as a guide to assist installers calculate packs required. For steel frame applications with one open side, refer tothe manufacturer's advice for available insulation sizes.

10.3 Tools and Equipment required

Ensure the tools and equipment selected to carry out the tasks are consistent with the requirements of the job. Check for tool defects, rectifying any faults and report findings to your supervisor prior to commencement.

Recommended:

- curved blade knife with plastic handle (non conductive handle)
- for high density batt/blanket a serrated knife with a plastic handle is recommended
- knife holster to quickly access the knife
- industrial strength ladder
- claw hammer
- P2 dust mask
- staple gun
- knee pads
- torch and spare batteries
- tape measure
- safety eye wear
- safety shoes
- hammer
- cordless drill (metal framing).

10.4 Before you commence work:

- identify yourself to the client if present
- review your safe work method statement (SWMS)
- plan the install route and access, ensure it is unobstructed
- isolate and tag power.

10.5 Installation of Underfloor Insulation

WARNING: If the electrical wiring is connected to the meter box, before commencing installation, ensure the power is isolated and tagged.

WARNING: Prior to commencing work, check clearances for access points and crawl spaces in the sub floor.

10.5.1 Installing the insulation from underneath.

- Sart at the furthest position from the access point.
- Friction fit the insulation batt/blanket between the floor joists.
- Ensure insulation is positioned up against the floor.
- Fix support strapping by stapling to the floor joist maintaining the position of batt/blanket.
- Provide support (e.g. cross-strapping) in accordance with manufacturers instructions..
- Remove any off cuts and rubbish as you progress throughout the underfloor.
- If the insulation is being installed from on top before the sheet flooring is installed, the strapping can be installed from above.

Hint: When installing insulation under an existing floor, install a few packs at a time. This gives you a break from the cramped conditions underfloor.

10.5.2 Non electrical services and obstructions

Obstructions such as:

- natural gas lines
- water lines
- air-conditioning gas lines
- PVC vent lines
- cross bracing
- bracing adjustment bolts.

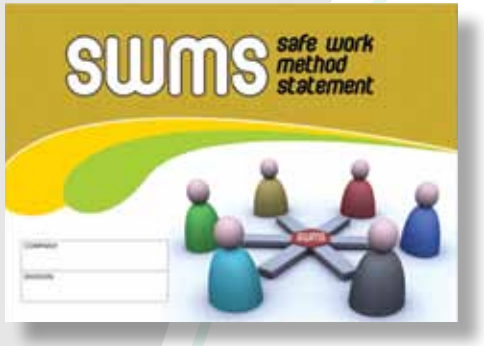
These non-electrical services could be located inside the stud walls and will determine how the batts are installed.
This includes:

- stopping the batt at the obstruction and restarting after the obstruction
- removing a portion of the batt
- cutting and chasing the obstruction into the batt.

10.6 After Completion

Finishing off.

- Ensuring there are no gaps between the batts, or between the batts and joists.
- Ensuring batts are kept 50mm away from heat emitting devices.
- Ensuring batts are cut to fit snugly around any underfloor penetrations.
- Ensuring the work area is cleaned and off-cut materials are placed back into the original package (when possible) and taped closed. Dispose of in accordance with local authority guidelines.
- Ensuring tools and equipment are cleaned, checked, maintained and stored in accordance with the manufacturer's recommendations and standard work practices.
- Confirming power is reactivated and isolation tags are removed.
- Notifying relevant people that the installation is finalised (i.e. supervisors, the client etc).
- Completing necessary documents and forms.
- Evaluating your work quality and process to identify improvements.
- Following up, reporting and resolving any outstanding issues or problems such as non-conformances, client complaints, damage to property, faulty materials etc.
- Inspecting, cleaning and maintaining tools and equipment used during the installation to ensure they are in safe working.



11.0 Installation of Wall Wrap

11.1 Application

Wall Wrap for thermal efficiency.

11.2 Planning before the job

11.2.1 Safety (OHS)

Installers are required to carry out their duties in accordance with their employer safety management plans and policies. The installer may also need to accommodate specific builder safety policies on site. It is a requirement that you review the Safe Work Method Statement (SWMS) prior to commencing installation and ensure all risks are identified and controlled.

Refer to ICANZ SWMS example included in this training document & duty of care responsibility

11.2.2 Confirm the scope of work

Relevant instructions and operational details are obtained using work information, such as:

- a purchase order
- job sheet instructions
- energy rater reports
- architect drawings and their respective notes
- client specific instructions
- builder specific installations.

The timing of the wall wrap installation is critical in a project. Once the external lining is applied, there is no access to the wall cavity to apply wall wrap. Any error may be costly to amend once the cavity is sealed.

Basic information required prior to installing wall wrap includes:

- roll width
- number of rolls required for the job
- location of walls to be wrapped including any special areas e.g. a gable end.

11.2.3 Material type and quantity required

Material selection is based on the scope of work details. The installer needs to confirm that the material grade and type supplied matches the scope of the work. The quantity of material required is based on the projects wall surface area in m^2 (inclusive of overlaps and openings) divided by the manufacturers nominal coverage quoted on the roll packaging. This is a rough calculation and an allowance of surplus stock should also be on hand.

In addition to the wall wrap material, you may require:

- TEC screws
- UV stable, non shrink tapes i.e. foil tape
- wall wrap fasteners and/or staples.

11.3 Safety advice when installing electrically conductive insulation material

Ensure the tools and equipment selected to carry out the tasks are consistent with the requirements of the job. Check for tool defects, rectifying any faults and report findings to your supervisor prior to commencement.

Recommended:

- curved blade knife with plastic handle (non conductive handle

11.4 Tools and Equipment required

Ensure the tools and equipment selected to carry out the tasks are consistent with the requirements of the job. Check for tool defects, rectifying any faults and report findings to your supervisor prior to commencement.

Recommended:

- curved blade knife with plastic handle (non conductive handle)
- industrial strength ladder
- knife holster to quickly access the knife
- claw hammer
- staple gun
- tape measure
- safety shoes
- cordless drill
- UV eye wear.

11.4 Before you commence work:

- identify yourself to the client if present
- review your safe work method statement (SWMS)
- plan the install route and access, ensure it is unobstructed
- isolate and tag power.

11.5 Installation of Wall Wrap

WARNING: If the electrical wiring is connected to the meter box, before commencing installation, ensure the power is isolated and locked and tagged with installer contact mobile number.

Refer to WHS – Electrical Safety Requirements

- Face the antiglare side of the wall wrap outwards ensuring the print or logo is visible and matches the order.
- Starting at a corner location, line up the bottom of the wall wrap with the base of the timber bottom plate, cut at a height so that the wall wrap slightly overlaps the window by approximately 50mm.
- Roll the wall wrap out to the far end of the subsequent window and affix. Ensure the wall wrap is cut slightly oversized.

Hint: If the damp course is not installed, the wall wrap should not be fastened within 100mm of the bottom. This allows the damp course to be later slipped behind the wall wrap.

Hint: If the damp course is installed, fasten the bottom of the wall wrap over the damp course.

- If using fasteners, leave the overlap of 150mm from the top unfastened as this will be fastened once the next layer of wall wrap is applied. Once this run has been fastened, trim neatly around the window.
- Initially fasten the wall wrap at one point, roll the wall wrap along ensuring it is level before fastening.
- Smooth the wall wrap down to the bottom edge at the corners to minimise creases in the wall wrap.
- Affix three to four fasteners per stud for each run.
- If using staples, fix the wall wrap at approximately 150mm to 200mm per stud including the top plate.
- Install the next run of wall wrap leaving a 150mm overlap on the layer of wall wrap below.
- If an overlap of 150mm cannot be achieved, provide a minimal overlap. This must be taped and sealed using a UV stable, non shrink tape.
- Where the wall wrap does not reach the top plate, cut a strip of wall wrap inclusive of a 150mm overlap to ensure the top plate is covered.
- If the wall wrap is being installed onto a steel frame, use double sided tape and button head screws to fix the wall wrap to the steel studs.
- Install the double sided tape or button head screws over/down each stud.

- Do not peel the protective paper from the double sided tape until you apply the wall wrap.
- AffixTEC screw fasteners with oversized washers when longer term exposure to weather is expected. This will provide added fixing strength. For paper based wraps, where longer term exposure to weather is expected a combination of masonite strips and tec screws are required every 300mm centres.
- Where a service penetrates the wall wrap, use a UV stable, non shrink tape to create a weather tight seal.

Hint: To provide additional strength, metal wafer tec screws can be affixed every 600mm. If weather conditions are such that damage may occur to the wall wrap install prior to external linings being applied, additional fixings may be required.

11.6 After Completion

Finishing off.

- Ensuring full coverage of the frame in wall wrap.
- Ensuring overlap of wall wrap at all windows.
- If fastened with staples, wall wrap should be fixed at 150mm to 200mm centres per stud.
- If fastened with fasteners, wall wrap should be fixed at 300mm to 400mm centres per stud.
- If the bottom damp course is not in place, do not fix the wall wrap within 100mm of the bottom plate.
- Ensuring that penetrations through the wall wrap by services have been taped to provide a weather tight seal.
- Ensuring the work area is cleaned and off-cut materials are placed back into the original package (when possible) and taped closed. Dispose of in accordance with local authority guidelines.
- Ensuring tools and equipment are cleaned, checked, maintained and stored in accordance with the manufacturer's commendations and standard work practices.
- Confirming power is reactivated and isolation tags are removed.
- Notifying relevant people that the installation is finalised (i.e. supervisors, the client etc).
- Completing necessary documents and forms.
- Evaluating your work quality and process to identify improvements.
- Following up, reporting and resolving any outstanding issues or problems such as non-conformances, client complaints, damage to property, faulty materials etc.

12.0 Manufacturer's Specifications

Products and their applications vary from manufacturer to manufacturer. It is important for installers to familiarise themselves with their manufacturer's product range and to understand which products are best suited for various applications.

A full understanding of products and their applications can be achieved through the study of product literature developed by the manufacturer. Such literature can be accessed via the following links:

Manufacturer's Name	Website
Fletcher Insulation	www.insulation.com.au
CSR Bradford	www.bradfordinsulation.com.au
Knauf Insulation	www.knaufinsulation.com.au

Bradford™
for smarter environments

Fletcher®
Insulation

KNAUF INSULATION
EARTHWOOL®
the feel good insulation

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13.0 Professional Installer

This section outlines the requirements to achieve ICANZ Member Insulation Installer Accreditation. All ICANZ Accredited Installers are trained and have demonstrated competency in all aspects of the ICANZ INSULATION HANDBOOK Part 2.

ICANZ Member Installer Accreditation Pathway

13.1 Pre-requisites

Prior to gaining ICANZ accreditation, Installers must successfully complete the following pre-requisite national competencies with a Registered Training Organisation (RTO).

National Competency	Module Name
HLTAID002	Emergency First Aid (Workplace level 1)
CPCCOHS1001A	Construction industry safety induction
CPCCCM2010B	Work Safely at heights
CPCCOHS2001A	Apply OHS requirements, policies and procedures in the construction industry

13.2 Training and assessment

ICANZ Members' Installers are to receive training on the full content of the ICANZ INSULATION HANDBOOK Part 2: Installation Guide - Insulation installation for ceilings, walls and floors. At the completion of the training and to achieve ICANZ Member Installer Accreditation, Installers must demonstrate their achieved competency by passing a comprehensive assessment.

The assessment will be based on a combination of;

1. **Written assessment:** ICANZ members will devise a list of questions which the candidate must answer to demonstrate their understanding of the content contained within the guide. ICANZ members will set a minimum percentage score which will determine whether the candidate has passed or failed each component.
2. **Practical Assessment:** ICANZ members can assess the candidate's competency using practical demonstrations where installers are asked to demonstrate/role play their understanding of various competencies. It will be left to the discretion of the experienced installer to determine if the installer has proven their understanding and ability.

In order for a candidate to gain accreditation, they must achieve a pass mark for each competency listed in the ICANZ Installer Accreditation Checklist.

	Competency verified by written assessment	Competency verified by practical demonstration	Comments
Section 3.0 Principles of Energy Efficiency			
The Installer must demonstrate an understanding of :			
The purpose of insulation			
Typical applications for bulk and reflective foil insulation			
Principles of sustainability relating to insulation			
Insulation advantages of batt and foil insulation for householders			
Section 4.0 - Standards and Codes			
The Installer must demonstrate an understanding of :			
The purpose and application of Australian Standards			
Australian Standards relating to thermal insulation			
Australian Standards relating to acoustic insulation			
Australian Standards relating to reflective foil insulation			
The relevance of the National Construction Code pertaining to the installation of insulation			
Section 5.0 - Standards and Codes			
The Installer must demonstrate an understanding of :			
Duty of care			
Safe Work Method Statements			
Maintaining a safe work site			
Hazard identification relating to the installation of insulation			
Risk assessments and controls relating to the installation of insulation			
The importance of PPE when installing insulation			
Types of PPE required when installing insulation into various applications			
Common Installation hazards and controls			

	Competency verified by written assessment	Competency verified by practical demonstration	Comments
The Installer must demonstrate the ability to :			
Complete a Safe Work Method Statement (SWMS)			
Conduct a risk assessment and to implement appropriate controls if required			
Section 6.0 - Managing Electrical Hazards			
The Installer must demonstrate the ability to :			
Identify and manage potential electrical hazards			
Perform an electrical isolation			
Section 7.0 - Health and Safety of GW and RW Insulation			
The Installer must demonstrate an understanding of :			
The WHS classification of Glasswool and Rockwool Insulation products			
Section 8.0 - Installation of Ceiling Batts			
The Installer must demonstrate an understanding of :			
Safety considerations when installing ceiling batts			
Methods to access the ceiling			
Tools and equipment required to install ceiling batts			
Requirements for electrical cabling, lighting and other auxiliary equipment located in the ceiling			
Post installation requirements			
The Installer must demonstrate the ability to :			
Create a sketch plan of downlights and other appliances prior to commencing the installation			
Confirm the scope of work prior to commencing the installation :			
Identify the material R-value of batts required			
Determine batt width required			

	Competency verified by written assessment	Competency verified by practical demonstration	Comments
Determine the number of packs required for the job			
Access the ceiling space			
Correctly execute all steps outlined in the procedure for installing ceiling insulation			
Insulate according to the requirements for electrical cabling, lighting and other auxiliary equipment located in the ceiling			
Correctly stringing batts			
Requirements for top up batts			
The Installer must demonstrate an understanding of :			
Assessing conditions of pre-existing insulation			
Removing existing insulation			
Assessing potential impact of additional ceiling weight			
Assessing additional risks in relation to electrical wiring and downlights			
Familiarity with relevant manufacturers recommendations regarding adding top-up material			
Section 9.0 - Installation of Wall Batts			
The Installer must demonstrate an understanding of :			
Safety considerations when installing wall batts			
Tools and equipment required to install wall batts			
Requirements for non electrical services and obstructions			
Post installation requirements			
The Installer must demonstrate the ability to :			
Confirm the scope of work prior to commencing the installation :			
Identify the material R-value of batts required			
Determine the batt width required for the job			
Determine the number of packs required for the job			

	Competency verified by written assessment	Competency verified by practical demonstration	Comments
Correctly execute all steps outlined in the procedure for installing wall batts			
Insulate according to the requirements for non electrical services and obstructions			
Correctly stringing-in batts			
Section 10.0- Installation of Underfloor Batts/Blankets			
The Installer must demonstrate an understanding of :			
Safety considerations when installing underfloor insulation			
Tools and equipment required to install underfloor insulation			
Requirements for non electrical services and obstructions			
Post installation requirements			
The Installer must demonstrate the ability to :			
Access the underfloor areas to be insulated			
Confirm the scope of work prior to commencing the installation :			
Identify the material R-value of batts required			
Determine batt width required			
Determine the number of packs required for the job			
Correctly execute all steps outlined in the procedure for installing underfloor insulation			
Insulate according to the requirements for non electrical services and obstructions			
Correctly stringing-in batts			
Section 11.0- Installation of Wall Wrap			
The Installer must demonstrate an understanding of :			
Safety considerations when installing wall wrap			
Tools and equipment required to install wall wrap			

	Competency verified by written assessment	Competency verified by practical demonstration	Comments
Post installation requirements			
Various fixing methods			
Instances where the wall wrap must be taped			
The Installer must demonstrate the ability to :			
Confirm the scope of work prior to commencing the installation :			
Roll width			
The number of rolls required to complete the job			
Location of the walls to be wrapped including any special areas			
Correctly execute all steps outlined in the procedure for installing wall wrap			
Section 12.0 Manufacturer's Specifications			
The Installer must demonstrate an understanding of :			
Where to source additional information pertaining to insulation products			

INSTALLERS NAME	ASSESSORS NAME	DATE OF PASS ACHIEVED

13.3 Supervised installs

To achieve ICANZ Member Installer Accreditation, installer must also complete a minimum of 12 supervised installs. The aim of the supervised installs is to confirm the installer's application of the trained competencies. The supervisor of each install must verify the type of install and confirm the install was complete to the standards set down in the ICANZ INSULATION HANDBOOK Part 2: Installation Guide - Insulation installation for ceilings, walls and floors.

The installer must complete an adequate number of each type of install as listed below;

	Minimum number of installs	
Installation of ceiling batts / top up batts	3	Batt Accreditation
Installation of wall batts	3	
Installation of underfloor batts/blankets	3	
Installation of wall wrap	3	Wrap Accreditation

13.4 Recognised prior learnings.

Installers with 2 years or more install experience can have their install work history recognised as part of the SUPERVISED INSTALL requirement as out lined in Section 13.3. Their employer must provide a declaration of their duration of employment as an installer.

An experienced installer is still required to pass the Installer assessment as set out in section 13.2 prior to receiving ICANZ Member Insulation Installer Accreditation.

14.0 Appendices

Note: This Safe Work Method Statement (SWMS) is an EXAMPLE ONLY. This will need to be developed further in consultation with the installer.

<table>
<tr><td colspan="6">NOTE: Work must be performed in accordance with this SWMS.
This SWMS must be kept and be available for inspection until the high risk construction work to which this SWMS relates is completed. If the SWMS is revised, all versions should be kept.
If a notifiable incident occurs in relation to the high risk construction work in this SWMS , the SWMS must be kept for at least 2 years from the date of the notifiable incident.</td></tr>
<tr><td colspan="2">[PCBU Name, ABN, Office Address and Phone]</td><td colspan="2">Principal Contractor (PC)</td><td colspan="2">[Name, ABN, Office Address]</td></tr>
<tr><td>Works Manager:
Contact phone:</td><td colspan="2"></td><td>Date SWMS provided to PC:</td><td colspan="2"></td></tr>
<tr><td>Work activity:</td><td colspan="2">[Job description]</td><td>Workplace location:</td><td colspan="2"></td></tr>
<tr><td rowspan="7">High risk construction work:</td><td>❑ Risk of a person falling more than 2 metres</td><td colspan="2">❑ Work on a telecommunication tower</td><td colspan="2">❑ Demolition of load-bearing structure</td></tr>
<tr><td>❑ Likely to involve disturbing asbestos</td><td colspan="2">❑ Temporary load-bearing support for structural alterations or repairs</td><td colspan="2">❑ Work in or near a confined space</td></tr>
<tr><td>❑ Work in or near a shaft or trench deeper than 1.5 m or a tunnel</td><td colspan="2">❑ Use of explosives</td><td colspan="2">❑ Work on or near pressurised gas mains or piping</td></tr>
<tr><td>❑ Work on or near chemical, fuel or refrigerant lines</td><td colspan="2">❑ Work on or near energised electrical installations or services</td><td colspan="2">❑ Work in an area that may have a contaminated or flammable atmosphere</td></tr>
<tr><td>❑ Tilt-up or precast concrete elements</td><td colspan="2">❑ Work on, in or adjacent to a road, railway, shipping lane or other traffic corridor in use by traffic other</td><td colspan="2">❑ Work in an area with movement of powered mobile plant</td></tr>
<tr><td>❑ Work in areas with artificial extremes of temperature</td><td colspan="2">❑ Work in or near water or other liquid that involves a risk of drowning</td><td colspan="2">❑ Diving work</td></tr>
<tr><td colspan="3">Have workers been consulted about the SWMS?
Note: Consultation with Health and Safety Representatives (HSRs) should be undertaken where there is a HSR at a workplace</td><td colspan="3">❑ YES ❑ NO</td></tr>
<tr><td colspan="3">Person responsible for ensuring compliance with SWMS:</td><td>Date SWMS received:</td><td colspan="2"></td></tr>
<tr><td colspan="3">What measures are in place to ensure compliance with the SWMS?</td><td></td><td colspan="2"></td></tr>
<tr><td colspan="3">Person responsible for reviewing SWMS control measures:</td><td>Date SWMS received by reviewer:</td><td colspan="2"></td></tr>
<tr><td colspan="3">How will the SWMS control measures be reviewed?</td><td></td><td colspan="2"></td></tr>
<tr><td colspan="3">Review date:</td><td>Reviewer's signature:</td><td colspan="2"></td></tr>
</table>

Note: This Safe Work Method Statement (SWMS) is an EXAMPLE ONLY. This will need to be developed further in consultation with the installer.

CHECKLIST OF ITEMS THAT MAY BE REQUIRED FOR THIS WORK ACTIVITY	
WORKCOVER APPROVALS / CERTIFICATES Note:Design and Item Registration for certain plant	Certificates of Competency as required by WorkCover
	General OHS Induction Certificate
	ICANZ Insulation Installer training
	Manual Handling Training
LIST OF RELEVANT LEGISLATION APPLICABLE CODES OF PRACTICE OR ADDITIONAL REFERENCES AS REQUIRED	Workplace Health and Safety Act 1995 and Dangerous Goods and Safety Management Act 2001(QLD)
	OHS Regulation 2001 (NSW)
	OHS Regulation 2001 (NSW)
	OHS Act 2004 and Dangerous Goods Act 1985 (VIC)
	Codes or Standards applicable to the works: 1. Australian Standard AS/NZS 4859.1 Materials for the thermal insulation of buildings/AS 3999-1992 Thermal Insulation of dwellings – bulk insulation. AS 6001 Working at Heights. 2. Building Code of Australia Requirements
COMMUNICATION & CONSULTATION	ICANZ members regularly consults with its employees and contractors on OH&S by way of
	OH&S Committees, Toolbox Meetings and regular written communications.
	This Safe Work Method Statement was developed using these methods of communication & consultation.
	Any suggested improvements or issues with this SWMS should be reported to your supervisor and passed on to our Head Office, this will allow for a process of continuous improvement in safety.
MAINTENANCE CHECKS	As per manufacturers Instructions & recommendations.
	All plant and equipment used is to be checked and serviced on a frequent basis.
	Plant & equipment must be checked on a daily basis prior to their use.
COUNCIL / EPA PERMITS	All work is to be carried out in compliance with local council by - laws in conjunction with
	Development Approval (DA) & Environmental Protection Agency (EPA) Act & Regulations.
RTA PERMITS	

Note: This Safe Work Method Statement (SWMS) is an EXAMPLE ONLY. This will need to be developed further in consultation with the installer.

Equipment & Tools To Be Used	Hazardous Substances	Itemise PPE Used?	*Tick*	Potential Hazards Review Risks	Risk Class
Scaffold (mobile)	Chemicals and solvents	Hard Hat	❑	Fall from ladder	
Boom Lift/EWP	Asbestos fibre	Safety Boots	❑	Fall from heights	
Extension ladder		HI-Viz Safety Vest	❑	Fall from scaffold	
Step ladder		Fluoro Shirt	❑	Contact with electricity	
Trestles		Hearing Protection	❑	Falling objects	
Harness		Safety Glasses	❑	Foreign Body (eye)	
Retractable knife		UV Cream	❑	Slip, trips and falls	
Blade Knife		Safety Line / Lanyard	❑	Manual handling	
Light		Safety Harness	❑	Exposure to noise	
Ramset Gun		Dust Masks if required	❑	Struck by moving plant	
		Drinking Water	❑	Inhalation of dust or fumes	
		Overalls/ Long sleeved shirt and pants	❑	Cuts	
			❑	Heat Exhaustion	
			❑		
			❑		
			❑		

Installer/Contractor to complete

Note: This Safe Work Method Statement (SWMS) is an EXAMPLE ONLY. This will need to be developed further in consultation with the installer.

Likelihood	Consequence (Severity)				
	No injury	First aid	Medical treatment	Serious injury	Fatalities
Almost certain	11 High	16 High	20 Extreme	23 Extreme	25 Extreme
Likely	7 Moderate	12 High	17 High	21 Extreme	
Possible	4 Low	8 Moderate	13 High	18 Extreme	22 Extreme
Unlikely	2 Low	5 Low	9 Moderate	14 High	19 Extreme
Rare	1 Low	3 Low	6 Moderate	10 High	15 High

Scope of Works
The work activities are scored for risks associated with work hazards, and then controls implemented to reduce the risk to the lowest possible result.
1. Step by step sequence of the tasks in carrying out the work from start to finish
2. Listing of potential hazards and the risk to health and safety
3. Rating of the risk (from the "Hazpak" score 1 - 25)
4. The safety controls that will be implemented to eliminate or reduce the risk to the lowest possible level
5. Rating of the risk after controls have been implemented
NOTE: If a hazard is rated 19-25 action must be taken immediately to ensure the control is adequate to reduce the hazard to at least 5 as a minimum.
6. Insert the name or title of the person responsible for ensuring these controls are in place for this work task being undertaken.

Note: This Safe Work Method Statement (SWMS) is an EXAMPLE ONLY. This will need to be developed further in consultation with the installer.

Activity Steps	Hazards	Initial Risk Score	Control Measures	Residual Risk score	Monitor & Review	Responsibility
Step 1: Unloading and set up.	Musculoskeletal Strains (Manual Handling)		When unloading the vehicle we will ensure that we are as close as possible to the area where the equipment will be set up. If required we will seek out assistance in unloading heavy items, however our normal work does not include heavy items. We will use sensible manual handling techniques making sure our backs remain straight and we bend at the knees.		Monitoring will be carried out visually and reviewed if circumstances change	Installer Team
	Slips trips falls		Walk the area from the vehicle to the work site and ensure that there are no hazards in the way.			Installer Team
	Other trades		Where other trades are present we will communicate with them to let them know what Hazardous Substances we are using and find out what they are using.			Installer Team
	Other site hazards		Where other hazards are detected they will managed and controlled which will be documented on a site specific risk assessment			Installer Team
	Electrical Hazards, Fire		Before commencing any work in the roof we will turn off all power supply to the site. We will walk through the premises to identify the location of all down lights and other ceiling accessories.As a default we will leave a clearance of 50mm from incandescent lights and 200mm from halogen lights including 50mm for any transformer, unless the lights are fitted with a suitable fire rated enclosure.			Installer Team
	Musculoskeletal Strains (Manual Handling)		When installing the insulation we will ensure that we carry the equipment in easy to manage loads without the need to strain ourselves. The equipment is designed for single person set up and is made of light material.		Monitoring will be carried out visually and reviewed if circumstances change	Installer Team

Installer/Contractor to complete

Note: This Safe Work Method Statement (SWMS) is an EXAMPLE ONLY. This will need to be developed further in consultation with the installer.

Activity Steps	Hazards	Initial Risk Score	Control Measures	Residual Risk score	Monitor & Review	Responsibility
Step 2: Commence Work.	Musculoskeletal Strains		When working we will ensure that we always bend our knees and keep our backs straight. We will take regular breaks from repetitive work and avoid leaning at an angle.		Monitoring will be carried out visually and reviewed if circumstances change	Installer Team
	Slips, Trips, Falls		By keeping the worksite as clean as possible to avoid trip hazards. Be aware at all times of permanent other installed roof/cable fixtures.			Installer Team
	Atmospheric Conditions		We will monitor the temperature in the roof space. If we believe the roof space is 'too hot', installers will immediately exit this space.			Installer Team
	Heat Conditions/ Stress		Drink lots of water regularly			Installer Team
			Take regular breaks			

Installer/Contractor to complete

Note: This Safe Work Method Statement (SWMS) is an EXAMPLE ONLY. This will need to be developed further in consultation with the installer.

Activity Steps	Hazards	Initial Risk Score	Control Measures	Residual Risk score	Monitor & Review	Responsibility
Step 3: Commence Working, Work at Height.	Falling		When working at heights we will do a risk assessment. We will use a ladder/scaffolding to gain access and the ladder will be 1 metre past the step off point. We will secure the ladder top and bottom where possible and have it at a ration of 4: 1. We will have 3 points of contact on the ladder at all times.		Monitoring will be carried out visually and reviewed if circumstances change	Installer Team
			When working at any height we will use a combination of the ladder, roof baricade and gutter guard. There will be a clear fall zone of 2 metres from the edge of the roof. If the above cannot be achieved we will not commence this work.			
	Electrocution, Electric Shock		We will not work nearer than 3 metres to live electrical wires. All tools will be battery powered.			Installer Team
			If this is not possible we will suspend the work until either the power can be safely cut or the work terminated.			
Step 4: Commence Work, Battery Powered Tools	Cuts, Abrasions, Eye and ear injuries.		Guards on tools and equipment will be maintained and working effectively before being used on site. Guarding on tools will not be removed to perform any work activity.		Monitoring will be carried out visually and reviewed if circumstances change	Installer Team
			All tools and equipment will be inspected prior to work activity for any faults or defects. If a fault or defect is found the item will be removed from services, and reported to the supervisor as soon as practicable.			

Installer/Contractor to complete

Note: This Safe Work Method Statement (SWMS) is an EXAMPLE ONLY. This will need to be developed further in consultation with the installer.

Activity Steps	Hazards	Initial Risk Score	Control Measures	Residual Risk score	Monitor & Review
Step 5 : Commence work, Hazardous Substances	Poisoning, Burning, Choking, Diseases.		Before using hazardous substances we will read the MSDS and comply with the requirements within. In most cases our work is in a well ventilated area. Risk assessments will be conducted both prior to and after using a hazardous substance. Sec 203(1) & (2)		Monitoring will be carried out visually and reviewed if circumstances change
Step 6: Clean up and re-packing.	Musculoskeletal Strains		When cleaning up and re packing we will practise good manual handling techniques such as bending the knees and not the back, team lifts where possible and avoid carrying very heavy items.		Monitoring will be carried out visually and reviewed if circumstances change
Step 7: Leaving Site	Environmental damage		When leaving site we will make sure that we take away any of the left over insulation. When cleaning we will ensure that all environmentally sensitive products are disposed of correctly. Any left over hazardous substances will be taken off site and disposed of.		Monitoring will be carried out visually and reviewed if circumstances change
Step 8: Other Hazards			Where other hazards are detected they will managed and controlled which will be documented on a site specific risk assessment.		Monitoring will be carried out visually and reviewed if circumstances change

Installer/Contractor to complete

Note: This Safe Work Method Statement (SWMS) is an EXAMPLE ONLY. This will need to be developed further in consultation with the installer.

What are the tasks involved?	What are the hazards and risks?	What are the control measures?
List the work tasks in logical order.	Identify the hazards and risks that may cause harm to workers or the public	Describe what will be done to control the risk. What will you do to make the activity as safe as possible?

Name of Worker(s)	Worker signature(s)
Date SWMS received by workers:	

Note: This Safe Work Method Statement (SWMS) is an EXAMPLE ONLY. This will need to be developed further in consultation with the installer.

Declaration by Workers: This Safe Work Method Statement has been developed in consultation with our employees, has been read, understood & signed by ALL employees and contractors involved with this specific work activiy.
Note: *Copies of all training certificates should be made available to your Manager*

INSTALLERS NAME	INDUCTION OHS CARD #	SWMS TRAINING CONDUCTED	SIGNATURE	DATE
		Installing Insulation		
		Installing Insulation		
		Installing Insulation		
		Installing Insulation		
		Installing Insulation		
		Installing Insulation		
		Installing Insulation		
		Installing Insulation		
		Installing Insulation		
		Installing Insulation		

(Supervisor to complete)

NAME		SIGNATURE			DATE
INDUCTION OHS CARD #		POSITION		LOCATION	

ICANZ PURPOSE:

ICANZ is the peak body of Australian and New Zealand insulation providers.

ICANZ member companies include leading Australian manufacturers and international manufacturers that manufacture insulation in accordance with internationally accredited standards and are involved with leading energy efficiency trade associations. Some member companies have been manufacturing insulation for over 80 years and together account for more than more than 70 per cent of the insulation sold and installed in Australia.

ICANZ works with all levels of government in Australia to advocate the significant benefits that flow from improving the energy efficiency of buildings:

- lower energy costs;
- more jobs in the construction sector;
- improved health and comfort for building occupants;
- reduced carbon emissions; and
- greater competitiveness for the Australian economy.

ICANZ recognises that insulation is the most fundamental step in improving the energy efficiency of Australian buildings and is committed to working with other organisations to identify the most effective regulatory path-ways for delivering better buildings which will help protect Australian households and businesses from rising energy costs.

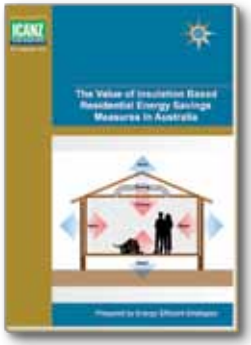
ICANZ seeks to increase public awareness of the role that insulation can play in an energy efficient future by publishing research and contributing to the development of better standards for the industry.

Visit ICANZ website:

www.icanz.org.au

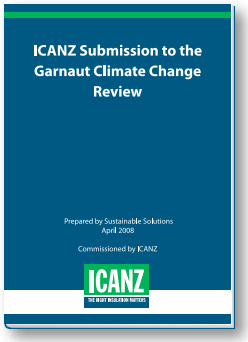
FURTHER REFERENCE STUDIES

Insulation Handbook - Part 2: Version 2
Professional Installation Guide
Prepared by ICANZ: November 2013

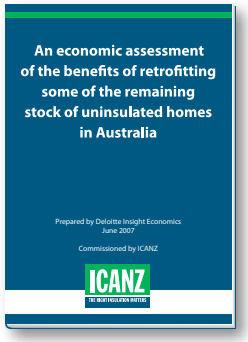


The Value of Residential
Ceiling Insulation In Australia
Prepared by Energy Efficient
Strategies: September 2011

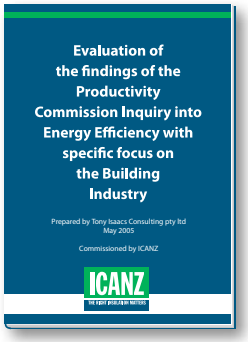
Insulation Handbook - Part 1:
Thermal Performance
Prepared by ICANZ: November 2010



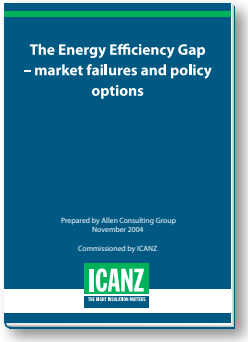
ICANZ Submission to the
Garnaut Climate Change
Review
Prepared by Sustainable
Solutions: April 2008



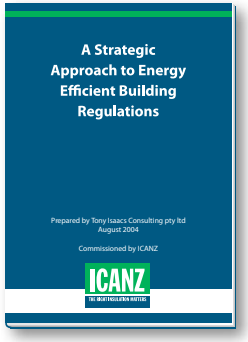
An economic assessment
of the benefits of
retrofitting some of
the remaining stock of
uninsulated homes in
Australia
Prepared by Deloitte
Insight Economics:
June 2007



Evaluation of the findings of
the Productivity Commission
Inquiry into Energy Efficiency
with specific focus on the
Building Industry
Prepared by Tony Isaacs
Consulting Pty. Ltd: May 2005



The Energy Efficiency Gap –
market failures and policy
options
Prepared by Allen Consulting
Group: November 2004



A Strategic Approach to Energy
Efficient Building Regulations
Prepared by Tony Isaacs
Consulting Pty. Ltd.: August 2004

Reports available on ICANZ website:

www.icanz.org.au

ICANZ
THE RIGHT INSULATION MATTERS

NOTES:

ICANZ
THE RIGHT INSULATION MATTERS

Insulation Council of Australia and New Zealand

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